Paulding Wind Farm IV LLC
Case No. 18-91-EL-BGN

Application Part 10 of 11

Part 10 includes:

- **Exhibit W** **Turbine Safety Manuals**
- **Exhibit X** **Emergency Action Plan**
- **Exhibit Y** **Ice Throw Analysis**
- **Exhibit Z** **Off-Air Television Analysis**
- **Exhibit AA** **AM/FM Radio Report**
- **Exhibit BB** **NTIA Correspondence**
- **Exhibit CC** **Airport Coordination**
- **Exhibit DD** **Licensed Microwave Report**
- **Exhibit EE** **HDD Frac-out Contingency Plan**

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Date Filed: July 2, 2018

Exhibit W

Turbine Safety Manuals

- **Acciona Safety Instructions**
- **Siemens Gamesa Environmental Health and Safety Plan for Project Execution**
- **Vesta VAME QSE Plan**

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Exhibit W

Acciona Safety Instructions

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Rev	***Fecha*** ***Date***	***Descripción de la revisión*** ***Description of the revision***
"A"	02.05.13	Elaboración / First edition
"J"	18.02.16	Acceso sin elevador / Access without lift
"K"	11.08.16	Actualización Velocidad de viento limitante para dejar dovelas verticalizadas en premontaje conforme a IMC0132_O y para montaje de Pala con una grúa con Balancín pala L=22m, conforme a IMC088_k / Update wind speed limit to leave verticalized keystones during preassembly, agree with IMC0132_O and for the assembly of blades with one crane with Blade Spreader L=22m, agree with IMC0088_k Prohibición de fumar durante la estancia en la máquina / Forbidden to smoke during stay in the windturbine.
"L"	17.01.17	EPIs Trabajos eléctricos – Pegatina bloqueo de rotor / PPE Electrical Works – locking conditions sticker
"M"	23.03.17	Comprobaciones del elevador previas al uso / Checking before using the lift

Realizado / Done	*Revisado / Reviewed*	*Aprobado / Approved*

En caso de duda prevalecerá la versión en castellano/ In case of doubt, the Spanish version shall prevail.

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1.- INTRODUCCIÓN

La finalidad de este documento es informar sobre las normas de seguridad generales durante cualquier trabajo que se realice en parque, con aerogeneradores AW3000. En cualquier caso, siempre se deberá cumplir la normativa de seguridad indicada por el propietario de cada parque.

Estas normas abarcan las reglas y procedimientos de seguridad generales, para el personal de ACCIONA WINDPOWER así como de las compañías subcontratadas por ACCIONA WINDPOWER, S.A., en cualquier tipo de labor que requiera la manipulación de la turbina.

Existen instrucciones de mantenimiento donde se describe de forma detallada como realizar cada uno de las actuaciones de operación y mantenimiento del aerogenerador. Dichas instrucciones son de obligado cumplimiento y contienen indicaciones de seguridad complementarias a lo descrito en este documento.

Del mismo modo, en los parques en construcción existe un Plan de Seguridad y Salud específico del parque, así como instrucciones de montaje de la máquina. Tanto el plan de seguridad y salud como dichas instrucciones son de obligado cumplimiento.

Las medidas de seguridad recogidas en este documento y las indicaciones incluidas en las instrucciones son adicionales a las medidas de seguridad derivadas de la evaluación de riesgos particular de cada uno de los trabajos a realizar en el aerogenerador.

El operador / usuario no puede realizar ningún cambio, añadidos ni reformas en el aerogenerador que pueda afectar a la seguridad, sin la previa autorización por escrito de ACCIONA WINDPOWER.

No se debe eliminar o prescindir de ninguna protección en máquinas o instalaciones. Si hubiera necesidad de eliminar alguna protección, se solicitará permiso al responsable de ACCIONA WINDPOWER para que se ordene la toma de precauciones necesarias, incluyendo el poner los avisos que adviertan el riesgo existente. Toda protección que se haya suprimido por necesidad, será repuesta en cuanto cese dicha necesidad.

<u>Para las subcontratas:</u>

Las subcontratas de Acciona Windpower deberán comunicar y solicitar el acceso para la realización de cualquier trabajo al coordinador local de AWP, excepto en el caso de un contrato de mantenimiento continuo entre las dos empresas, ya planificado. También se

1.- INTRODUCTION

The purpose of this document is to describe the general safety procedures to be followed during any work performed on site, with AW3000 turbines. The safety norms established by the proprietor of each site should be followed at all times.

These safety norms cover the general safety regulations and procedures to be followed by ACCIONA WINDPOWER personnel, and those of companies subcontracted by ACCIONA WINDPOWER for any type of work performed on the wind turbine.

There are maintenance instructions providing detailed instructions for the performance of each maintenance operation. These instructions are considered mandatory and contain safety instructions which are complementary to those indicated in the present document.

During construction there is a Health and Safety Plan, site specific as well as assembly instructions. Bothe, Health and Safety Plan and assembly instructions are considered mandatory to follow.

The safety measures described in this document and those indicated in the instructions are additional to the safety measures indicated in the risk evaluation of each task to be carried out on the wind turbine.

The operator / user cannot make any changes, additions or reforms to the turbine which may have an impact on safety without the prior written authorization.

No protective elements should be removed from machines or installations. If it is necessary to remove any protective elements, request permission from the ACCIONA WINDPOWER site manager in order for them to take the necessary precautions, including warning others of the existing risk. All protective elements which have been removed by necessity must immediately be reinstalled afterwards.

<u>For subcontractors:</u>

Subcontractors of ACCIONA WINDPOWER must inform and request access to the site from the local AWP coordinator for the execution of any work, except for planned actions as part of ongoing maintenance contracts between the two companies. Subcontractors will apply to

solicitará siempre a Acciona Windpower la autorización por parte del propietario de la instalación para la realización de trabajos excepcionales.

Acciona Windpower for authorization from site proprietors for the execution of special or exceptional work activities.

Queda terminantemente prohibido acceder y manipular cualquier elemento del aerogenerador sin el permiso expreso de ACCIONA WINDPOWER, S.A.

It is strictly prohibited to access or handle any part of the wind turbine without the expressed permission of ACCIONA WINDPOWER.

Antes del inicio de los trabajos deberán cumplir lo indicado en el procedimiento, "Coordinación de actividades empresariales", especialmente en lo referente al intercambio de documentación.

Before initiating any work, the procedures described in "Co-ordination of business activities" must be complied with, especially those referring to the exchange of documentation.

Será responsabilidad de Acciona Windpower distribuir entre las subcontratas aquellas instrucciones y planes de seguridad que les afecten, así como mantener actualizadas las ediciones de dichos documentos en todo momento.

Acciona Windpower will be responsible for providing subcontractors with the pertinent instructions and EH&S Plans, as well as to keep these documents up to date at all times.

Será responsabilidad de las subcontratas difundir el contenido de los mismos entre sus trabajadores, formarles en las materias desarrolladas en los mismos, y disponer de una copia actualizada de las instrucciones que les afecten en el lugar de trabajo.

Subcontractors will be responsible for distributing the contents of these instructions to their employees, providing the necessary training for the same and proving an updated copy of the instructions affecting their workplace or tasks.

La Empresa subcontratada nombrará una persona que será responsable directo de todas las medidas de Seguridad y Salud a adoptar, debiendo cumplir y hacer cumplir rigurosamente todo lo indicado en las Normas establecidas al personal que de él depende. Así mismo asumirá también la responsabilidad de sus subcontratados.

The Subcontractor will designate a person to be directly responsible for all Health and Safety measures to be adopted and ensure that all Safety Norms are scrupulously complied with by all personnel. They will also be responsible for their subcontracted companies and personnel.

Las Empresas subcontratadas por ACCIONA WINDPOWER deberán cumplir en todo momento la Legislación vigente en materia de Prevención de Riesgos Laborales del país en que se encuentre el parque y promover adecuadamente las prácticas de seguridad en el trabajo.

All companies subcontracted by ACCIONA WINDPOWER must comply with the Workplace Health and Safety regulations of the country where the site is located and must promote safe practices in the workplace.

Del mismo modo, se deberá cumplir las normas y medidas de seguridad particulares establecidas por el propietario de cada una de las instalaciones.

Companies must also comply with the safety norms and procedures established by the proprietor of the site.

2.- CONDIDIONES ATMOSFÉRICAS Y VELOCIDADES DE VIENTO LÍMITES

2.- ATMOSPHERIC CONDITIONS AND WIND SPEED LIMITS

Estas limitaciones de seguridad son de carácter general y se aplicarán siempre y cuando no se establezcan otras más restrictivas en el plan de seguridad o la instrucción, en la evaluación de riesgos o en la normativa de seguridad del propietario de las instalaciones.

These safety limits are general and apply whenever they do not establish a more restrictive standard in the correspondent safety plan, instruction, risk assessment or safety regulation of the owner facilities.

CONDICIONES ATMOSFÉRICAS:

- En caso de tormenta con aparato eléctrico, se abandonará inmediatamente el aerogenerador y la persona se refugiará en la subestación o en el vehículo. Se actuará de igual modo si la persona se encuentra en cualquier otro lugar del parque eólico.

- En condiciones de falta de visibilidad (de noche o con niebla intensa), con nieve o hielo sobre las superficies o bajo intensa lluvia, no se podrán realizar trabajos puntuales desde las trampillas de salida al exterior de la nacelle estando la persona convenientemente atada a un punto de anclaje resistente del interior de la nacelle.

- Se suspenderán o aplazarán todos los trabajos en presencia de densa niebla que impidan tener una visión simultánea y permanente de todos los equipos de trabajo y personas implicadas en la operación (maniobras con polipasto en las que no se tenga una visibilidad completa del recorrido de la carga, trabajos con grúa que no garanticen el contacto visual permanente gruísta-nacelle y viceversa, etc.). Excepcionalmente, en el supuesto de encontrarse trabajando en la nacelle y de echarse la niebla encima, podrá descenderse la herramienta con el polipasto extremando las precauciones y asegurándose que la zona está despejada y nadie se sitúa bajo la carga suspendida.

- También, bajo condiciones atmosféricas adversas (niebla intensa, lluvia fuerte y nieve que colapse las pistas de acceso a los aerogeneradores y que dificulte la circulación de los vehículos) se prohíbe toda operación clasificada como de “gran correctivo”.

- En caso de terremoto se evacuará a un punto seguro conforme al plan de autoprotección del parque eólico

- En caso de posibilidad de presencia de hielo o nieve en la turbina, vigilar desde lejos para asegurarse que no existe riesgo de desprendimiento conforme nos acercamos a la máquina. En estos casos los trabajos con plataformas elevadoras estarán prohibidos.

En estos casos, si las condiciones de acceso seguro a los aerogeneradores lo permiten, se realizarán los siguientes movimientos de pitch con cada una de las palas:

Llevar la pala a 0º y a continuación pulsar una seta para llevar la pala rápidamente a 90º para tratar de quitar el hielo o la nieve en las palas.

TEMPERATURAS BAJAS EXTREMAS:

1. Limitaciones del tiempo de exposición y tiempos de recuperación en función de la temperatura, velocidad

ATMOSPHERIC CONDITIONS:

- In case of an electrical storm, evacuate the turbine immediately, seeking refuge in the substation or vehicle. This applies to all personnel in any location on the site.

- During adverse weather conditions (snow or ice on surfaces or during intense rain) or limited visibility (at night or heavy fog) occasional tasks may not be performed from the exit hatches of the nacelle when the worker is safely attached to a secure anchor point within the nacelle.

- Tasks will be suspended or postponed in the case of severe fog which impedes the constant and simultaneous view of the equipment and the personnel employed in the operation. These may include maneuvers using hoists where the load is not visible at all times; work with cranes without constant view of the operator and the nacelle, etc. In exceptional cases, for example when working in the nacelle and fog suddenly appears, loads may be lowered using the hoist with extreme precaution, ensuring that the area is clear and no personnel remain under the suspended load.

- In adverse weather conditions (intense fog, rain, snow which blocks access to the turbines and makes driving difficult) the execution of “large corrective actions” are also forbidden.

- In case of earthquake, evacuate to safety point agree with emergency plan of windfarm

- In case there is a possibility of ice or snow in the wind turbine, monitor it from far away to make sure there is no risk of ice coming off the nacelle or other part of the wind turbine. In any of these cases work with lifting platforms will be forbidden.

In these cases, if the conditions of safe access to the wind turbine allow it, the following pitch movements with each of the blade will be made:

Bring the blade to 0° and then press an emergency button to bring the blade quickly to 90º, to try to remove ice or snow on the blades.

EXTREME LOW TEMPERATURES:

1. Limitations of the exhibition and recovery time depending on the temperature, wind speed and metabolic activity of the task to perform:

de viento y actividad metabólica de la tarea a realizar:

Trabajos Ligeros en el Exterior (consumo metabólico ligero 100W/m2: supervisión de trabajos a pie, andando despacio, manipulando materiales pequeños, etc…)

- Si Tª<-30ºC (-22 F), se interrumpirán los trabajos.
- Si Tª<-20ºC (-4 F) y velocidad de aire >8m/s (18 mph), se interrumpirán los trabajos.
- Si Tª<-20ºC (-4 F) y velocidad de aire >5.4m/s (12 mph), no se estará expuesto más de 48 min de forma continuada.
- Si Tª<-20ºC (-4 F) y velocidad de aire <5.4m/s (12 mph), no se estará expuesto más de 1h de forma continuada.
- Si Tª<-10ºC (14 F) y velocidad de aire >8m/s (18 mph), no se estará expuesto más de 1h de forma continuada.
- Si Tª<-10ºC (14 F) y velocidad de aire >5.4m/s (12 mph), no se estará expuesto más de 1h 42min de forma continuada.
- Si Tª<-10ºC (14 F) y velocidad de aire <5.4m/s (12 mph), no se estará expuesto más de 3h de forma continuada.

Trabajos Ligeros en el Interior (consumo metabólico ligero 100W/m2: realizar comprobaciones de pie, manipular herramienta ligera, etc…)

- Si Tª<-30ºC (-22 F), se interrumpirán los trabajos.
- Si Tª<-20ºC (-4 F), no se estará expuesto más de 1h de forma continuada.
- Si Tª<-10ºC (14 F), no se estará expuesto más de 3h de forma continuada.

2. Medidas preventivas a adoptar

- Los tiempos de recuperación durarán entre 1h y 3h, en un local a una temperatura de entre 22 (71 F) y 25ºC (77 F), donde sea posible quitarse la ropa y tomar bebidas calientes. El tiempo de recuperación puede ser menor si durante el descanso se realizan trabajos ligeros.
- Evite en todo momento que su ropa se moje o humedezca, ya que se generará una pérdida de calor que facilitará la aparición de síntomas de hipotermia. Por ello, quítese ropa si su actividad física aumenta, y por tanto tiene más posibilidades de sudar. Así mismo, retírese la ropa húmeda o mojada tras los descansos.
- Realice descansos periódicos en una zona cálida. Adecúe la cantidad de ropa que lleva. Le

Light work outside the nacelle (metabolic light consumption 100W/m2: supervision of work afoot, walking slow, manipulating small materials, etc …)

- If Tª<-30ºC (-22 F), works will be stopped.
- If Tª<-20ºC (-4 F) and wind speed >8m/s (18 mph), works will be interrupted.
- If Tª<-20ºC (-4 F) and wind speed >5.4m/s (12 mph), will not be exposed more than 48 min continuously.
- If Tª<-20ºC (-4 F) and wind speed <5.4m/s (12 mph), will not be exposed more than 1h continuously.
- If Tª<-10ºC (14 F) and wind speed >8m/s (18 mph), will not be exposed more than 1h continuously.
- If Tª<-10ºC (14 F) and wind speed >5.4m/s (12 mph), will not be exposed more than 1h 42min continuously.
- If Tª<-10ºC (14 F) and wind speed <5.4m/s (12 mph), will not be exposed more than 3h continuously.

Light works Inside (metabolic light consumption 100W/m2: supervision of works afoot, manipulating small materials, etc…)

- If Tª<-30ºC (-22 F), works will be stopped.
- If Tª<-20ºC (-4 F), will not be exposed more than 1h continuously.
- If Tª<-10ºC (14 F), will not be exposed more than 3h continuously.

2. Preventive measures to adopt

- The recovery times will last between 1h and 3h, in a place with a temperature between 22 (71 F) and 25ºC (77 F), where it is possible to take off outer clothes and to have warm drinks. The time of recovery can be minimized if light work is performed.
- Avoid getting clothes wet or damp, as this will speed up heat loss and will facilitate the emergence of symptoms of hypothermia. Remove clothing if your physical activities increase and are likely to sweat. Also, remove wet or damp clothing after a break.
- Take regular breaks in a warm area. Adjust the amount of clothing worn to your environment. Have

recomendamos que tome bebidas calientes y dulces (recomendable así mismo, las bebidas para deportes). Evite las bebidas con cafeína (café, té, chocolate caliente) y por supuesto el alcohol.

hot and sweet drinks (recommended also, sports drinks). Avoid drinks with caffeine (coffee, tea, hot chocolate) and alcohol.

- Siempre que sea posible, protéjase del viento, realizando sus trabajos en zonas cubiertas o apantalladas.

- Whenever possible, protect yourself from wind, doing your work in areas that are protected.

- No toque con la piel descubierta, materiales metálicos que puedan estar a una temperatura inferior a los -7ºC (19 F). Utilice guantes anticontacto.

- Do not touch metallic materials that may be at a temperature below -7 º C (19 F) with bare skin, wear gloves to protect against contact.

- No realice trabajos en solitario. Programe sus trabajos diarios en función de los límites de exposición establecidos en base a las condiciones meteorológicas a las que esté expuesto.

- Do not work alone. Schedule your daily work in terms of exposure limits based on weather conditions to which you are exposed.

- Evite permanecer de pie o sentado completamente quieto. A menor requerimiento físico (consumo metabólico) mayor protección se necesita frente al frío.

- Avoid standing or sitting still. When there is less physically demanding work (metabolic consumption), greater protection is needed against the cold.

- Si la zona de trabajo está nevada o con hielo, utilice gafas para protegerse frente a las radiaciones ultravioletas.

- If the work area has snow or ice, use goggles to protect against ultraviolet radiation.

- Si toma alguna medicación, lea los prospectos y asegúrese que la exposición a bajas temperaturas no está contraindicado.

- If you take any medication read the warnings and make sure that exposure to low temperatures does not have any adverse effects.

3. Actuación en caso de emergencia por CONGELACIÓN PARCIAL

3. First aid in case of PARCIAL FREEZE

- Mueva a la persona a un lugar caliente y seco. No deje a la persona sola.

- Move the person to a warm and dry place. Do not leave the person alone unless to summon help.

- Retire cualquier ropa húmeda o apretada que pueda cortar el flujo de sangre al área afectada.

- Remove any wet or tight clothing that can cut blood flow to the affected area.

- No frotar el área afectada, porque frotar causa daño a la piel y al tejido.

- Do not rub the affected area, rubbing causes damage to the skin and tissue.

- Suavemente, ponga el área afectada en agua tibia y observe la temperatura del agua para calentar el tejido despacio (25-40 min). No vacíe agua tibia directamente sobre el área afectada porque esto calentará el tejido muy rápidamente causándole daño.

- Gently place the affected area in luke warm water and watch water temperature to heat the tissue slowly (25-40 min). Do not pour warm water directly on the affected area because it rapidly heats the tissue causing damage.

- Tras calentar el área afectada, ésta se puede inflamar y pueden salir ampollas. La zona puede adquirir un tono rojizo o parecer entumecida. Cuando el color de la piel le parezca normal, seque el área afectada y envuélvala para mantenerla caliente.

- After heating the affected area, it can swell and may get blisters. The area can get a red tint or appear stiff. When the color of skin appears normal, dry the affected area and cover to keep warm.

- Si hay posibilidad de que el área afectada se enfría otra vez, no caliente la piel. Si la caliente y se enfría otra vez, se pueden causar daños más severos.

- Solicite ayuda médica.

4. Actuación en caso de emergencia por HIPOTERMIA

- Solicite ayuda médica de inmediato.

- Mueva a la persona a un lugar caliente y seco. No deje a la persona sola. Retire la ropa mojada y cámbiela con ropa seca y cálida. Envuelva a la persona en mantas.

- Si el trabajador está consciente, haga que la persona tome bebidas calientes y dulces. Evite bebidas con cafeína o bebidas alcohólicas.

- Mueva los brazos y pies del trabajador. Si la persona no se puede mover, ponga botellas calientes o paños calientes en las axilas, las ingles, el cuello y la cabeza.

- No frote el cuerpo de la persona afectada ni le meta en un baño de agua caliente, esto podría pararle el corazón.

TEMPERATURAS ALTAS EXTREMAS

Las afecciones más comunes en exposiciones a temperaturas altas extremas son:

- *Golpe de Calor*: Ante la sospecha de la existencia de un golpe de calor es imprescindible ofrecer asistencia médica inmediata al afectado, debiendo procederse a su traslado urgente a un centro sanitario. Los primeros auxilios incluyen el traslado del afectado a un área fresca, soltar y humedecer su ropa con agua fría y abanicar intensamente a la víctima para refrescarla.

- *Agotamiento por calor*: El tratamiento en estos casos consiste en hacer descansar a la víctima en un lugar fresco y consumir grandes cantidades de líquido. Cuando no se produzca la recuperación espontánea con este tratamiento es conveniente ofrecer asistencia médica.

- *Calambres*: Los calambres pueden presentarse durante o después de las horas de trabajo. Pueden ser aliviados consumiendo bebidas isotónicas o líquidos ricos en sal.

- If there is a possibility that the affected area is cooled again, do not warm the skin. If you warm and cool it again, you can cause more severe damage.

- Ask for medical help.

4. First aid for HYPOTHERMIA

- Get medical help inmediately.

- Move the person to a warm and dry place. Do not leave the person alone unless it is to summon help. Remove wet clothing and replace with dry and warm clothes. Wrap the person in blankets.

- If the worker is conscious, give the person hot and sweet drinks. Avoid drinks with caffeine or alcohol.

- Move the arms and feet of the worker. If the person cannot move, put hot bottles or hot packs in the armpits, neck and head.

- Do not rub the affected person's body or getting it in a bath of hot water, this could stop his heart.

EXTREME HIGH TEMPERATURES

In case of extreme high temperaturas, the most significant conditions are:

- *Heat Stroke*: Suspecting the existence of a heat stroke is essential to provide immediate medical assistance to the affected and should proceed to their emergency transfer to hospital. First aid includes the relocation of affected to a cool area, loosen and moisten their clothes in cold water and hard fan to cool the victim.

- *Heat Exhaustion*: The treatment is to make the victim rest in a cool place and consume large amounts of liquid. When there is no spontaneous recovery with this treatment, it is desirable to provide medical assistance.

- *Cramps:* Cramps can occur during or after working hours and can be alleviated by consuming sport drinks or liquids with high content of salt.

1. Medidas preventivas en ambientes calurosos

➢ Organización del trabajo

o Desarrollar a primera hora las tareas que requieran mayor esfuerzo o se desarrollen en zonas desprotegidas y a pleno sol.

o Planificar los descansos de forma periódica en algún lugar sombreado. Ciclos breves y frecuentes de trabajo-descanso son más beneficiosos para el trabajador que periodos largos de trabajo y descanso

o Evitar el trabajo en solitario durante el desarrollo de tareas en zonas peligrosas, aisladas o de acceso restringido.

➢ Consumo de líquidos

o Es importante el consumo de líquidos antes, durante y después de la exposición al sol, debiendo incrementarse la ingesta de agua o bebidas isotónicas, que deberán ser consumidas de forma frecuente (sin esperar a tener sed) para compensar la pérdida de agua a través de los pulmones y la piel, y prevenir de este modo una posible deshidratación cuando las temperaturas sean elevadas.

o Evitar el consumo de alcohol y bebidas estimulantes, especialmente aquellas que contengan cafeína, minimizando sobre todo el consumo de café como diurético para disminuir la pérdida de agua y evitar la vasodilatación.

➢ Alimentación

o Deberá cuidarse la alimentación, evitando especialmente la ingesta de alimentos ricos en grasas.

o Proporcionar al organismo un aporte vitamínico (en especial vitaminas B y C) para de este modo combatir la fatiga generada por las altas temperaturas.

➢ Protección solar

o Es recomendable hacer uso de crema protectora evitando el contacto con ojos y mucosas.

o La aplicación de la crema deberá realizarse siguiendo las indicaciones del fabricante. En exposiciones prolongadas es conveniente reaplicar el producto.

1. Preventive measures in the heat

➢ Work organization

o Develop early in tasks that require greater effort or unprotected áreas are developed in full sun.

o Plan breaks periodically in a shady place. Short cucles and frequent work-rest are more beneficial to the worker than long periods of work and rest

o Avoid working alone for the development of tasks in hazardous, remote or restricted areas.

➢ Liquid consumption

o It is important to drink liquids before, during and after sun exposure and should increase the intake of wáter or sports drinks, which should be consumed frequently (without waiting to be thirsty) to compensate the loss of water through the lungs and skin, and thus prevent any dehydratation when the temperatures are high.

o Avoid alcohol and stimulating drinks, specially those with caffeine, minimizing the consumption of coffee as diuretic to reduce water loss and prevent vasodilation.

➢ Feeding

o You should watch his diet, especially avoiding the intake of fatty foods.

o Provide a contribution to the body vitamins (especially B and C vitamins) to thereby combat fatigue caused by high temperatures

➢ Sun protection

o It is recommended to use sunscreen avoiding contact with eyes and mucous membranes

o The sunscreen application should be carried out following manufacturer's recommendations. For safety, prolonged exposure should reapply the product

TRABAJOS EN HORARIO NOCTURNO:

- Quedan prohibidos siempre los siguientes trabajos de mantenimiento en horario nocturno:

▪ Utilización del polipasto salvo que se disponga de iluminación artificial adecuada, es decir, focos o luminarias de carácter fijo o portátil diseñados para tal efecto y que garanticen la correcta iluminación del área de trabajo, de las vías de circulación o de paso, o de todo el recorrido de las cargas suspendidas (no se considerará adecuada la iluminación de la zona de trabajo mediante los faros de alumbrado de los propios vehículos).

▪ Operaciones con grúas y plataformas elevadoras.

▪ Actuaciones programadas y por tanto planificadas cuya duración prevista de entrada se salga del horario solar de la época en la que nos encontremos.

- En lo que a "mantenimientos correctivos" se refiere, en la medida de lo posible se aplazarán hasta el día siguiente siempre que se prevea que no finalizarán antes del horario considerado como nocturno. Excepcionalmente, en el supuesto de encontrarse trabajando en la nacelle y de echarse la noche encima como consecuencia de haberse complicado la reparación, podrá descenderse la herramienta con el polipasto extremando las precauciones. En estos casos, si el trabajo se va a prolongar demasiado, se suspenderá y se reanudará en la siguiente jornada.

- En horario nocturno estarán permitidos los siguientes trabajos tanto en el Ground como en la nacelle.

▪ Mantenimientos correctivos "menores" o pequeños trabajos sin riesgo eléctrico que sólo requieran la utilización de herramientas manuales (excluyendo de las mismas las herramientas eléctricas portátiles), tales como rearme de aerogeneradores, ajuste de inductivos, sustitución de pequeños componentes que quepan en la bolsa portaherramientas del operador, etc. Para realizar estos trabajos se dispondrá de un frontal

▪ Para trabajos nocturnos en parques en construcción, se deberá seguir en todo momento la legislación del país. Además, se solicitará permiso a la propiedad del parque y se redactará un anexo al plan de seguridad.

VELOCIDADES DE VIENTO LÍMITE:

ACTIVIDADES GENERALES

< 25 m/s (55.9mph) para acceso a máquina (ground)

< 20 m/s (44.74mph) para acceso a nacelle

< 12 m/s (26.8mph) para trabajos con plataformas elevadoras

NIGHT WORKS:

- The following maintenance tasks must not be performed at night:

▪ Use of the hoist except in the case where adequate artificial lighting is available, that is, fixed or portable spotlights or designed for this purpose and which guarantee correct illumination of the work area, transit areas and the entire pathway of the suspended load. Vehicle headlights are not considered adequate illumination for this purpose.

▪ Operations with telescopic hoist/cradle and elevated work platforms.

▪ Programmed and planned actions which may have a duration which exceeds the available daylight hours depending on the time of year.

- "Corrective maintenance" will be delayed if needed to the following day if it is not to be completed during daylight hours. Exception: When work is being performed in the nacelle and continues until nightfall as a result of complications, the hoist may be used with extreme caution. In cases where the work will take too much time, it should be suspended until the following day.

- The following operations will be permitted during night hours, both on the Ground and the nacelle:

▪ "Minor corrective maintenance" or small tasks without electrical risk which only requires the use of manual tools (excluding portable electrical tools) such as the rearming of the turbines, adjustment of inductors, substitution of small components which fit in the tool belt of the operator, etc. Protective clothing must be worn for these operations.

▪ Night work on construction sites must local regulatory requirements. Approval of the owner of the site must be asked for and it will be written according to the EH&S Plan .

WIND SPEED LIMITS:

GENERAL ACTIVITIES

< 25 m/s (55.9mph) for accessing the WTG (ground)

< 20 m/s (44.74mph) for accessing the nacelle

< 12 m/s (26.8mph) for working with lifting platforms

< 12 m/s (26.8mph) para trabajos verticales en el exterior

< 20 m/s (44.74mph) para trabajos verticales en el interior.

<25 m/s (55.9mph) para uso del elevador

< 15 m/s (33.6mph) para el uso del Polipasto

OPERACIONES DE MONTAJE

< 12 m/s (26.8mph) para descarga de tramos con 1 grúa

< 15 m/s (33.6mph) para descarga de tramos con 2 grúa

< 15 m/s (33.6mph) para descarga de dovelas

< 15 m/s (33.6mph) para descarga de palas

< 12 m/s (26.8mph) para descarga de nacelle

< 12 m/s (26.8 mph) para premontaje de tramos hormigón

< 12 m/s (26.8mph) para montaje de tramos

< 12 m/s (26.8mph) para montaje de nacelle.

< 15 m/s (33.6mph) para volteo de buje

< 12 m/s (26.8mph) para montaje de buje

< 8 m/s (17.9mph) Montaje Pala con una grúa (Balancín pala L=8m)

< 10 m/s Montaje Pala con una grúa (Balancín pala L=22m)

< 12 m/s (26.8mph) para montaje de palas con dos grúas

< 15 m/s (33.6mph) para la introducción de ferrallas en Juntas verticales en premontaje de tramos de hormigón

< 15 m/s (33.6mph) para retirada puntales y montaje vigas auxiliares de base de torre (Suplidos)

Ante previsiones de fuertes vientos, velocidades superiores a 19m/s, no dejar dovelas aisladas y que no estén directamente unidas entre si.
En caso de dejar montada una dovela aislada, asegurarse que la dovela apoye en las tres placas de nivelación para garantizar que el sistema es estable hasta una velocidad de viento de 19m/s

NO existe limitación de viento en los siguientes casos:

- Tramo T0, en caso de tener 4 o más dovelas unidas entre sí
- Tramos T1, T2 y T3, en caso de tener 3 o más dovelas unidas entre si.
- Tramo T4, en caso de tener 2 o más dovelas unidas entre si.

Limitación de viento para montaje de T5 y nacelle SIN juntas horizontales: 40m/s, **vel máxima de ráfaga**

A partir de 40 m/s las juntas se descomprimen y el sistema es inestable. Si se alcanzan estas velocidades será necesario revisar nivelación de tramos antes de proseguir con el montaje de la turbina

A partir de 50 m/s el sistema colapsa

< 12 m/s (26.8mph) for vertical works outside

< 20 m/s (44.74mph) for vertical works inside

<25 m/s (55.9mph) for the use of the lift

< 15 m/s (33.6mph) for the use of the hoist

ASSEMBLY OPERATIONS

< 12 m/s (26.8mph) for unloading sections with 1 crane

< 15 m/s (33.6mph) for unloading sections with 2 cranes

< 15 m/s (33.6 mph) for unloading keystone

< 15 m/s (33.6mph) for blades unloading

< 12 m/s (26.8mph) for nacelle unloading

< 12 m/s (26.8 mph) for preassembly of concrete sections

< 12 m/s (26.8mph) for sections' assembly

< 12 m/s (26.8mph) for nacelle's assembly

< 15 m/s (33.6mph) for turning the hub

< 12 m/s (26.8mph) for hub assembly

< 8 m/s (17.9mph) for the assembly of blades with one crane (Blade Spreader L=8m)

< 10 m/s (22.37mph) for the assembly of blades with one crane (Blade Spreader L=22m)

< 12 m/s (26.8mph) for the assembly of blades with two cranes

< 15 m/s (33.6mph) for the inclusion of scrap in vertical joints in preassembly of concrete sections

< 15 m/s (33.6mph) for the removal of props and assembly of auxiliary beams at the tower base (suplidos)

In the event of high wind forecasts, wind speeds over 19m/s, do not leave an assembled keystones isolated, with no other keystone joined together.
In case of leaving assembled an isolated keystone, make sure the keystone touches all three levelling plates to guarantee the system is stable_up to a wind speed of 19m/s.

There is not wind limitation in the following situations:

- Section T0, in case of having 4 or more keystones tied together
- Sections T1, T2 y T3, in case of having 3 or more keystones tied together
- Section T4, in case of having 2 or more keystones tied together

Wind speed limit for T5 and nacelle assembly WITHOUT horizontal joints: 40m/s, **máx speed of gusts**

At > 40 m/s the joints decompress and the system is unstable. If wind speed get to these values it will be necessary to review the levelling of tower sections before going ahead with the assembly of the rest of the WTG.

At > 50 m/s the system collapses

OPERACIONES DE MANTENIMIENTO

< 8 m/s (17.9mph) para cambio de palas con una grúa

< 12 m/s (26.8mph) para cambio de palas con dos grúas

< 12 m/s (26.8mph) para manipulación de capota de nacelle

< 12 m/s (26.8mph) para desmontaje de multiplicadora

< 12 m/s (26.8mph) para desmontaje de generador

< 12 m/s (26.8mph) para reparación, mantenimiento o limpieza de palas

- Para el bloqueo del rotor, ver apartado 9

- En caso de que la instrucción para realizar una operación en concreto indique un límite de velocidad de viento inferior, se tomará siempre el límite más restrictivo

- En caso de que la maquinaria utilizada (plataformas elevadoras, grúas, etc…) indique un límite de velocidad de viento inferior, se tomará siempre el límite más restrictivo

- Criterios para limitar los trabajos por viento:

- Los valores se tomarán siempre con la máquina orientada

- Cuando la última media diezminutal sea mayor al límite establecido (entendiendo ésta como la recogida de valores de viento cada diez minutos durante una hora).

- Cuando la última media diezminutal sea menor que el límite establecido, pero se den picos de viento 4 unidades por encima de los límites indicados y además la previsión para las próximas cinco horas sea de un aumento de la velocidad.

Si durante el desarrollo las tareas cambiaran las condiciones, el responsable de la misma valorará si parar o continuar en función del riesgo que suponga una cosa u otra. Las funciones del responsable podrán ser asumidas por personal de la empresa propietaria de las instalaciones capacitado para ello y que se encuentre en el lugar.

MAINTENANCE OPERATIONS

< 8 m/s (17.9mph) for blade changing with one crane

< 12 m/s (26.8mph) for blade changing with two cranes

< 12 m/s (26.8mph) for manipulating the nacelle cover

< 12 m/s (26.8mph) for disassembly of gear box

< 12 m/s (26.8mph) for disassembly of generator

< 12 m/s (26.8mph) for repairing, maintenance or cleaning blades

- For the locking of the rotor, see section 9

- In the case that an instruction for a specific task indicates a lower wind speed limit, the more restrictive limit will always be considered applicable.

- In cases where the equipment used (elevated platforms, cranes, etc) indicate a lower wind speed limit, the more restrictive limit will always be considered applicable.

- Criteria for limiting work due to high winds:

- The values will always be taken with the machine oriented into the wind.

- Measurement will be taken every ten minutes during one hour if above the established limits.

- When measurements, taken every ten minutes, are below the established limit but registering gusts of wind 4 units above the limit and when the forecast is for increased wind velocity during the next five hours.

If weather conditions change during the performance of the operation, the supervisor will decide if the operations should be suspended or continue depending on the risks involved in either action. The functions of the supervisor can be assumed by qualified personnel of the site proprietor who may be on the site.

3.-EQUIPOS DE PROTECCIÓN A UTILIZAR

3.1 CONDICIONES GENERALES A CUMPLIR POR LOS EQUIPOS

Todos los equipos de protección individual cumplirán las siguientes condiciones generales:

• Se recomienda la utilización de ropa ignifuga.

3.-SAFETY EQUIPMENT TO BE USED

3.1 GENERAL CONDITIONS OF THE EQUIPMENT

All personal protective equipment (PPE) must meet the following general conditions:

• It is recommended the use of fireproof clothing.

• Cumplir con la legislación aplicable (CE, ANSI,…)

• Se conservan y revisan conforme a las instrucciones de montaje.

• Las normas de utilización de los equipos de protección individual, se atenderán a lo previsto en la reglamentación vigente y folletos explicativos de cada uno de sus fabricantes.

• Los usuarios han recibido información sobre su correcto uso y mantenimiento

• Los equipos de protección individual en uso que estén rotos o sufran cualquier desperfecto, serán reemplazados de inmediato.

3.2 RELACIÓN DE EQUIPOS DE PROTECCIÓN INDIVIDUAL A UTILIZAR

Además de los indicados en cada instrucción de trabajo, en la evaluación de riesgos y en la normativa de seguridad del propietario de las instalaciones, los equipos de protección individual (EPI's) a utilizar serán:

• Para subir y bajar por el interior del aerogenerador, independientemente que exista elevador, y para trabajos en alturas superiores a 2 metros:

- Casco con barbuquejo.
- Arnés integral.
- Anticaídas (ANTEC. Modelo CAB MAX o VI-GO) para línea ANTEC.
- 2 cabos de seguridad con absorbedor de energía, de longitud máx. 1,5 m (5 pies) y mosquetón de seguridad de gran apertura.
- Guantes.
- Cabo retráctil de 6 metros
- Botas de seguridad.

ATENCIÓN: Con objeto de evitar posibles accidentes, durante los trabajos en suelo o en plataformas en los que no sea necesario estar amarrado (Ejem: interior de los tubos), los elementos sueltos que cuelguen de los arneses deberán estar correctamente fijados a los mismos. Se deberá evitar que queden colgando, pudiendo golpear al trabajador. Si esto no es posible y siempre que no vayan a utilizarse, serán retirados de los arneses

• Para trabajos en el suelo son:

∗ Casco con barbuquejo
∗ Guantes.
∗ Botas de seguridad.
∗ Chaleco o ropa de alta visibilidad en todo momento en parques en construcción o en grandes correctivos (con grúas) en parques en mantenimiento

• Comply with applicable regulation/standard (CE, ANSI,…)

• Equipment must be stored and inspected in accordance with instructions manual.

• Personal protective equipment will be used according to applicable regulation and manufacturers' instructions.

• The users will be provided with information about the correct use and maintenance of this equipment.

• Personal safety equipment showing signs of wear, damage or defect of any kind must be replaced immediately.

3.2 DESCRIPTION OF THE PPE TO BE USED

In addition to those listed in each work instruction, in the risk assessment and safety regulation of the owner of the installations, personal protective equipment (PPE) will be used to:

• To ascend and descend within the wind turbine, regardless if there is a lift and for work at heights superior to 2 meters (6 feet for construction, 4 feet for general industry):

- Hard hat with chin strap.
- Full safety harness.
- Fall arrest device (ANTEC. Model CAB MAX or VI-GO) for ANTEC safety lines.
- 2 energy absorbing safety lanyards with a maximum length of 1.5 m (5 ft.) and large safety hooks or carabineer.
- Gloves.
- Retractile hook of 6 meters long.
- Safety boots.

WARNING: In order to avoid possible accidents during work on the ground, or on platforms where safety lines are not required (E.g.: inside the tower sections), elements which are hanging from harnesses and belts must be correctly secured. Keep these elements from swinging free to avoid injuries. If this is not possible, and when not being used, they should be removed from the harness.

• For work on the ground:

∗ Hard hat with chin strap
∗ Gloves.
∗ Safety boots.
∗ High visibility safety vest or clothes at all times, during construction or in great corrective tasks (with cranes) in O&M wind farms.

• Para realizar MANIOBRA DE CELDAS;

∗ Guantes aislantes: Clase acorde a la tensión de la celda.
∗ Guantes de protección térmica bajo los guantes dieléctricos
∗ Alfombrilla aislante
∗ Traje de protección contra arco eléctrico
∗ Pantalla facial
∗ Equipo de puesta a tierra: Conforme a legislación o estándares aplicables siguiendo siempre la IU de AW correspondiente
∗ Equipo para detección de la ausencia de tensión según IU de AW correspondiente.

• For work with SWITCH CABINET:

∗ Insulated gloves: Class according to the tension of the switch cabinet.
∗ Fire resistant gloves under the dielectric gloves
∗ Insulating mat
∗ Protective clothing against electric arc
∗ Face shield
∗ Grounding equipment: according to applicable norms or standards. Always complying with the correspondent IU from Acciona Windpower.
∗ Tension measurement equipment, always complying with the correspondent IU from Acciona Windpower

• Para realizar trabajos eléctricos en baja tensión;

∗ Guantes dieléctricos. Clase acorde a la tensión de la celda.
∗ Pantalla facial de protección.
∗ Calzado aislante.

• For work with low tension electrical systems;

∗ Dielectric Gloves. Class according to the tension of the switch cabinet.
∗ Face shield
∗ Insulated footwear.

En general;

* Se utilizarán protecciones auriculares cuando se realicen tareas ruidosas tales como el apriete de tornillería en general con maquinaria semiautomática. Tanto las personas que lo estén realizando como las que se encuentren en el entorno.

* Se utilizará mascarilla de partículas durante todas las operaciones que se generen partículas y polvo; limpieza, taladrados, uso de radial, etc.

* Se utilizará mascarilla de filtros específicos cuando se utilicen productos químicos o disolventes. Según ficha de seguridad del producto

* Se utilizarán guantes de protección mecánica cuando se realice cualquier operación en la que resulte conveniente proteger las manos de cortes, golpes o abrasiones. En especial para el manejo de elementos con aristas cortantes o no rematadas. Se utilizarán siempre que usen herramientas hidráulicas o se manipulen circuitos hidráulicos que tienen o han podido tener presión

* El uso de las gafas de seguridad es recomendable durante todos los trabajos, y obligatorio en las siguientes circunstancias:
1. Siempre que se realicen tareas o se utilicen herramientas en la que exista exposición a proyección de partículas.
2. Todas las operaciones en las que se utilicen los traccionadores.
3. Utilización de aire comprimido (soplados).
4. Intervenciones en circuitos hidráulicos que tienen o han podido tener presión
5. Corte de flejes metálicos y plásticos
6. Utilización de disolvente.

In general;

* Hearing protection must be worn when performing work which generates noise or using semiautomatic machinery, such as bolt tightening. This applies to the person performing this work and those nearby.

* Face masks will be worn during operations which cause dust and particles; cleaning, drilling, use of radial saws, etc.

* When using chemical products or solvents, the appropriate filter masks will be used as indicated in the product specifications and MSDS/SDS.

* Protective gloves will be worn when performing any task which involves the risk of cuts, abrasions or impacts. Safety gloves are especially recommended when using hydraulic equipment or circuits which are or have been under pressure.

* Safety glasses are recommended at all times, but must be worn in the following cases:
1. When performing tasks or when handling toolswhere there is a risk of exposure to flying particles.
2. When performing operations using winches.
3. Using compressed air equipment (blowers).
4. Handling hydraulic equipment or circuits which are or have been under pressure.
5. Cutting metal or plastic materials.
6. Using any type of solvent.

3.4 USO Y MANTENIMIENTO DEL ARNÉS



Uso: Para la retención de caídas, sujeción al trabajo y sistema de retención. Ajustárselo lo máximo posible, sin que nos reste movilidad. El anticaídas se sujeta a los anclajes pectorales.

La cuerda de seguridad con disipador, al frontal o al dorsal (trasero superior entre omoplatos).

Las anillas laterales no están diseñadas para la protección anticaídas. Su uso está indicado para anclarse a una estructura y poder disponer de ambas manos para realizar una labor.



OK

Mantenimiento: Inspección ocular, prestar especial atención a las costuras y elementos metálicos. Lavado con jabón neutro y secado en lugar ventilado y fresco (sin calefacción). No exponer a productos químicos ni fuentes de calor.

3.5 CABOS ANCLAJE DISIPADOR DE ENERGÍA

Uso: Para anclarnos a un punto de anclaje y minimizar los efectos de una eventual caída. Siempre con mosquetones de seguridad.

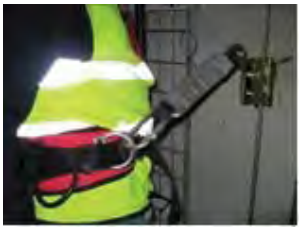
Mantenimiento: Inspección ocular, prestar especial atención a las costuras. Hacer que lo revisen en caso de sufrir una caída, aunque aparentemente no presente daños. Lavado con jabón neutro y secar en lugar ventilado sin calefacción. No exponer a productos químicos ni altas fuentes de calor

3.4 USE AND MAINTENANCE OF HARNESS

Use: To prevent falls and provide support when working and the fall arrest device. Adjust the harness as tight as possible without any free movement. The harness should be attached using the “D” rings.

The energy absorbing safety lanyards at the back (Dorsal “D” rings).

The lateral rings are not designed to support falls. These are used to secure the harness to anchor points on the structure and allow hands to be used freely.



NOT OK

Maintenance: Visual inspection, pay special attention to stitching and metal elements. Wash with neutral soap and dry in a cool and ventilated area (without heat). Do not expose to chemical products or heat sources.

3.5 ANCHOR LINE ENERGY ABSORBING LANYARDS

Use: To attach to a secure anchor point and reduce the effects of a possible fall.

Maintenance: Visual inspection, pay special attention to stitching. After a fall take lanyards out of service immediately and send to be reviewed. Wash with neutral soap and dry in a cool and ventilated area (without heat). Do not expose to chemical products or heat sources.

2 X 

1X 

3.6 MOSQUETONES DE SEGURIDAD

Uso: Como conectores. Siempre que se usen, con el cierre roscado. Evitar palancas, golpes y cargas transversales.

No conectar el mosquetón del anticaídas sobre otro mosquetón, anclarlo directamente sobre los anclajes del arnés.

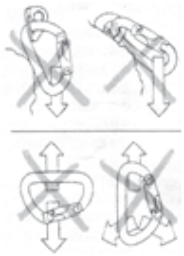
Mantenimiento: Inspección ocular. Limpiar con jabón neutro, aclarar y secar. Engrasar cierre con cuidado de no contaminar los elementos textiles del E.P.I. Hacer que lo revisen en caso de sufrir una caída, aunque aparentemente no presente daños.

3.6 LOCKING CARABINERS

Use: As connectors. Always use these with the gate screwed closed. Avoid leveraging, impacts or transversal loads.

Do not connect the carabineer to another clasp; secure it directly to the harness anchor points.

Maintenance: Visual inspection for proper operation. Lubricate the closure with care to not contaminate the fabric. These should be removed from service immediately after a fall.





3.7 ANTICAIDAS (ANTEC. Modelo CAB MAX o VI-GO)

Uso: Conexión a la línea de vida vertical. Probarlo manualmente antes de usar (no colgándose de él). Recordar de nuevo no anclar el mosquetón del anticaídas sobre otro mosquetón, conectarlo directamente sobre los anclajes del arnés.

Mantenimiento: Limpiar con jabón neutro, solo en caso de extrema suciedad, secar y engrasar. Hacer que lo revisen en caso de sufrir una caída, aunque aparentemente no presente daños.

3.7 FALL ARREST DEVICE (CAB MAX or VI-GO)

Use: Connect to a vertical life line. Test manually before use (do not hang from line). Remember not to connect the hook of the system to another hook or clasp. Always connect it directly to the harness anchor points.

Maintenance: Inspect for proper function. Remove from service in the event of a fall.



CAB MAX



VI-GO

3.8 MOSQUETÓN GRAN APERTURA

Uso: Autoaseguramiento para acceder y salir del tubo en altura. Autoaseguramiento en la nacelle.

Mantenimiento: Inspección ocular. Limpiar con jabón neutro, aclarar y secar. Engrasar cierre con cuidado de no contaminar los elementos textiles del E.P.I. Hacer que lo revisen en caso de sufrir una caída, aunque aparentemente no presente daños. Evitar palancas.

3.8 WIDE GATE OPENING CARABINEER

Use: Connect to an anchor point when accessing or exiting the tower at height.

Maintenance: Visual inspection for function. Wash with neutral soap and dry. Grease closure and care not to contaminate the textile elements of the PPE. Remove from service in the event of a fall. Avoid levers.



3.9 CASCO

3.9 HARD HAT



Uso: Protección contra golpes en la cabeza por objetos caídos y en caso de caída del portador. Utilizarlo en cuanto estemos bajo el aerogenerador y siempre que exista riesgo de caída propia o de objetos situados por encima. El barbuquejo siempre atado.

Mantenimiento: Lavar con jabón neutro y secar en lugar fresco y ventilado. Hacer que lo revisen en caso de sufrir una caída, aunque aparentemente no presente daños.

Use: Protection against head injuries from falling objects. Wear when under the turbine or where there is a risk of falls or of falling objects overhead. The chin strap should always be attached.

Maintenance: Wash with neutral soap and dry in a cool ventilated place. Remove from service in the event of an impact.

CABO RETRACTIL DE 6 METROS

RETRACTABLE 6-METRE LIFELINE



Uso: Para anclarnos a un punto de anclaje y minimizar los efectos de una eventual caída en el acceso al buje o

Use: For securing the harness to an anchor point to minimise the effects of a possible fall on accessing the

al exterior de la nacelle en tareas de mantenimiento. Siempre con mosquetones de seguridad.

Mantenimiento: Inspección ocular, prestar especial atención a las costuras. Hacer que lo revisen en caso de sufrir una caída, aunque aparentemente no presente daños. Lavado con jabón neutro y secar en lugar ventilado sin calefacción. No exponer a productos químicos ni altas fuentes de calor

outside of the hub or nacelle for maintenance work. Carabineers must always be used.

Maintenance: Visual inspection. Pay special attention to the stitching. Send it to be checked if a fall occurs, even if it does not appear to be damaged. Wash with neutral soap and dry in a ventilated place with no heating. Do not expose to chemical products or heat sources.

CABO REGULABLE DE POSICIONAMIENTO PARA CAMBIO DE PALAS

ADJUSTABLE LIFELINE FOR BLADE CHANGING



Uso: Para la tarea de cambio de pala en tareas de mantenimiento o cambio de posición de pala en construcción. Se deberá anclar a un punto de anclaje seguro para minimizar los efectos de una eventual caída en la operación.

Mantenimiento: Inspección ocular, prestar especial atención al estado de la cuerda. Hacer que lo revisen en caso de sufrir una caída, aunque aparentemente no presente daños. Lavado con agua fría y con jabón neutro. Secar en lugar ventilado sin calefacción. No exponer a productos químicos ni altas fuentes de calor

Use: For changing blades during maintenance work or changing blade position on construction. It must be secured to a safe anchor point to minimise the effects of a possible fall during operation.

Maintenance: Visual inspection. Pay special attention to the state of the lifeline. Send it to be checked if a fall occurs, even if it does not appear to be damaged. Wash it in cold water and a neutral soap solution. Dry it in a ventilated place with no heating. Do not expose it to chemical products or heat sources.

3.3 RELACIÓN DE EQUIPOS DE PROTECCIÓN COLECTIVA A UTILIZAR

Además de los indicados en cada instrucción de trabajo, en la evaluación de riesgos, en la normativa de seguridad del propietario de las instalaciones, o en el plan de seguridad y salud (parques en construcción), las protecciones colectivas a utilizar serán:

∗ Señalización en la puerta de la Nacelle: *"PROHIBIDO EL PASO. Máquina en proceso de energización y/o personal trabajando en el interior"* indicando un número de teléfono de contacto.

∗ Señalización en el Ground: *"ATENCION, PROHIBIDO MANIPULAR EL AEROGENERADOR. Máquina con tensión y/o personal trabajando en el interior"* indicando un número de teléfono de contacto.

∗ Descensor de emergencia (adecuado a la altura del aerogenerador), recomendable con volante recuperador

∗ Extintores de incendios

∗ Teléfono inalámbrico / talki

∗ Botiquín

3.3 DESCRIPTION OF THE GENERAL SAFETY EQUIPMENT TO BE USED

In addition to those listed in each work instruction, in the risk assessment and safety regulation of the owner of the installations, or in the H&S Plan (where applicable) collective protective equipment to be used will be:

* Signage on the door of the Nacelle: "NO TRESPASSING. Machine in the process of energizing and/or staff working inside" indicating a contact telephone number.

* Signage on the Ground: *"ATTENTION. DO NOT HANDLE THE WIND TURBINE. Machine with tension and/or staff working inside"* indicating a contact telephone number.

∗ Emergency descent device (appropriate for the height of the wind turbine), recommended with wheel.

∗ Fire extinguishers

∗ Wireless telephone / walkie talkie

∗ First Aid kit

3.10 PUNTOS DE ANCLAJE

Sea cual sea el punto de anclaje escogido, este deberá de ser totalmente fiable. De disponer de varios puntos fiables, los criterios para su elección serán:

- Preferentemente el más elevado (disminuye el factor de caída).

- El que menos “comba” deje en la cuerda de seguridad (siempre y cuando no provoquemos un péndulo peligroso).

- En el caso de disponer de un cabo regulable, ajustarlo para evitar combas innecesarias en él.

- No usar los que obliguen a palancas sobre el mosquetón.

- En la escalera, anclar el mosquetón sobre el lateral en vez de usar un peldaño hueco.

3.10 ANCHOR POINT

Whatever anchor point is chosen, this should be entirely reliable. If various points are available, use the following criteria:

- Preferably the highest point (reduces the fall factor).

- The one which leaves the least amount of slack in the line (avoiding a dangerous pendulum effect).

- In the case of adjustable lifelines, tighten to reduce unnecessary slack.

- Do not use points which place leverage or lateral stress on the clasp or carabineer.

- On the ladder, anchor the clasp on the side rather than a free rung of the ladder.



3.11 FACTOR CAÍDA, FUERZA DE CHOQUE, CADENA DE SEGURIDAD

SUJECIÓN DEL CABO ANCLAJE A PUNTOS ELEVADOS/FACTOR CAIDA

Cuanto más alto anclemos nuestra cuerda de seguridad, menor será una eventual caída (factor de caída). Por supuesto, ello no supondrá usar un punto de anclaje inadecuado. Esta situación se nos puede dar a la hora de entrar o salir del tubo en altura, cuando anclamos el cabo para quitar/poner el anticaídas.

3.12 ABSORBEDOR ENERGÍA/ FUERZA DE CHOQUE

La cuerda de seguridad y el arnés, no absorben la suficiente energía en caso de caída, por lo que parte de la misma es transmitida a la persona pudiendo provocarle lesiones. El absorbedor minimiza los efectos de la fuerza de choque sobre el organismo de la persona que cae. Nunca debe superar los 11/12 KN.

3.11 FALL FACTOR, SHOCK AND SAFETY LINE

ATTACHMENT TO ELEVATED ANCHOR POINTS/FALL FACTOR

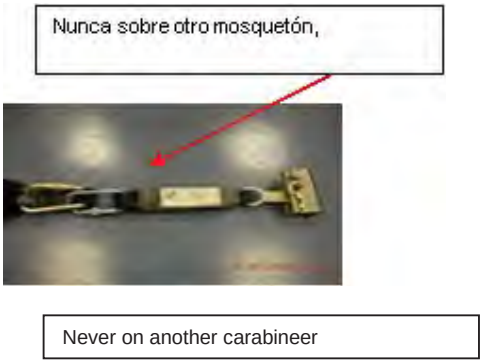
The higher the lifeline is anchored, the less the distance of a possible fall (fall factor). Of course, this should not mean using an inappropriate anchor point. This situation may occur when entering or leaving the tower at height, when attaching a lifeline and removing/attaching the fall arrest device.

3.12 SHOCK ABSORBER

The lifeline and harness do not absorb sufficient energy in the case of a fall. Part of the force is to be transmitted to the person causing injuries. The energy absorber line minimizes the effect of the shock on the body of the person falling. This should never exceed 11 KN.

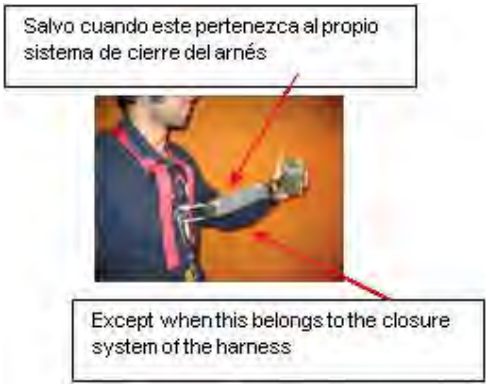
3.13 MOSQUETÓN SOBRE MOSQUETÓN/ CADENA DE SEGURIDAD

Cuantos más elementos tiene la cadena de seguridad, más probabilidad de fallos existe en ella. Es mejor anclarse el anticaídas directamente a los anclajes pectorales que introducir un nuevo mosquetón en la cadena (entre el mosquetón del anticaídas y los anclajes pectorales del arnés) que pueda trabajar transversalmente. En una cadena, su resistencia es igual a la del elemento más débil de ésta. Esta cadena de conexiones no está permitida en Estados Unidos.



3.13 CARABINEER ON CARABINEER / SAFETY CHAIN

The more elements that make up the safety chain, the greater the possibility of a failure. It is better to secure the fall arrest device directly to the pectoral hooks of the vest than to attach another carabineer (between the fall arrest device and the pectoral hooks of the harness) which may move transversally. A chain is only as strong as its weakest link. Carabineer on carabineer connections are considered “incompatible” connections and not allowed in North America.



3.14 USO DEL DESCENSOR DE EMERGENCIA

<u>Evacuación por el Exterior:</u>

Con el fin de garantizar la evacuación segura de personas que desde el interior de un aerogenerador, se dispondrá de un descensor de emergencia modelo PSA Hub AG 10K o similar

Las instrucciones de uso son las indicadas a continuación:

1. Colocar el descensor en el cáncamo de la puerta trasera; cerrar el cierre de seguridad del mosquetón; dejar caer la cuerda por el exterior, asegurándose que la cuerda está completamente extendida y sin ningún nudo

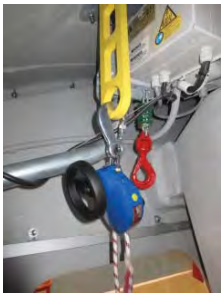
3.14 USE OF THE EMERGENCY DESCENT SYSTEM

<u>Evacuation by the exterior:</u>

In order to ensure the safe evacuation of persons from inside of a turbine, an emergency descent system will be used, such as the PSA Hub AG10 K or similar.

The instructions for use are provided below:

1. Place the descent device in the back door eyebolt; close the safety device of the carabineer; let the rope go down by the exterior, ensuring the rope is completely extended and without any knot.



2. Asegurar el descensor con la cuerda de seguridad a un cáncamo del generador

2. Ensure the descent device with the safety rope to an eyebolt of the generator



3. Atar el mosquetón situado en el extremo de la cuerda, al arnés por el pecho y cerrar el cierre de seguridad

3. Tie the carabineer at the end of the rope, to the harness at breast height and lock it.



4. Salir al exterior y dejarse caer, el descensor mantendrá una velocidad constante de 0,7 m/s (1.57mph). Una vez en el suelo, soltarse el mosquetón y una segunda persona podrá comenzar el descenso. Según la altura de la torre, la persona que queda arriba deberá recuperar algunos metros de cuerda para que el mosquetón quede en la parte superior y así poder comenzar el descenso.

4. Exit the nacelle and step off, the descent will maintain a constant speed of 0,7 m/s (4 y/s) Once on the ground, loose the carabineer and a second person can start the descent. According to the height of the tower, the person up in the nacelle will need to recover a few meters of rope so that the carabineer is at the top so can begin the descent.

<u>Evacuación por el Interior:</u>

<u>Evacuation of the Interior:</u>

1. Proteger a la víctima para evitar nuevas lesiones y avisar a los servicios de emergencia.

1. Protect the victim from further injury and notify the emergency services.

Este procedimiento sólo es de aplicación si la persona a evacuar está consciente y sus lesiones no revisten gravedad. Para evacuarle éste deberá poder cooperar. En caso de estar inconsciente mantener sus vías aéreas abiertas, colocarlo sobre nuestro regazo para evitar el efecto arnés y avisar rápidamente a telemando o al servicio de emergencia.

This procedure is only applicable if the victim is conscious and has no serious injuries. To evacuate, the victim must be able to cooperate. In case the victim is not conscious, keep their airways open, put the victim on our lap to prevent the harness effect and quickly notify emergency services.

2. Acceder al petate que contiene el descensor de emergencia y el cabo/eslinga para reasegurarlo.

2. Access the equipment bag containing the emergency descent device and the line/sling to secure it.

Si resulta necesario pasar a nuestro compañero suspendido de su anticaidas más abajo, nos anclaremos a otro punto con nuestra cuerda de seguridad. Soltaremos el anticaidas y lo colocaremos nuevamente sobre la sirga tras superarle. Esta situación puede repetirse posteriormente en sentido contrario.

If it is necessary to go over the victim who is suspended below from his fall arrester, anchor to another point with safety line.

3. Si colocamos el descensor por encima de nuestro compañero, anclado a uno de los peldaños reforzados de la escalera (con soportes a los lados). La cuerda de reasegurar rodeará tanto el peldaño mencionado como el lateral de la escalera

3. Position the emergency line around the injured person, anchored to one of the reinforced rungs of the ladder (with supports on both sides). The securing line will wrap around the mentioned rung and the side bar of the ladder





4. Para evitar problemas de empotramiento del mosquetón de la cuerda libre del descensor, colgaremos la bolsa con la cuerda sin desplegar en su interior de nuestro mosquetón de la cuerda de seguridad

4. To avoid the risk of entanglement by the hook of the free line when descending, hang the satchel with the coiled line inside from the hook of our safety line



5. Portando la cuerda del descensor y asegurados con el anticaídas, descendemos hasta nuestro compañero

5. Holding the descent line and secured with the fall arrest Systems, descend to the injured person.

6. Cuando llegamos a nuestro compañero conectamos la cuerda del descensor a su arnés. Ascendemos hasta el descensor, tensamos la cuerda y pasamos la cuerda libre por un mosquetón añadido a los de sujeción del descensor.

6. When the injured person is reached, connect the descent line to their harness. Ascend to the emergency descent device, tense the line and pass the free end through the clasp added to the anchor lines of the descent device.





7. El accidentado no baja a la velocidad proporcionada por el descensor (0,7 m/s) (1.57mph), pues nosotros asimos el extremo libre de cuerda del descensor para controlar su velocidad de descenso e incluso detenerlo si fuera necesario. Para facilitar este frenado pasaremos la cuerda por un mosquetón anclado a los de sujeción del descensor. La cuerda, al estar recogida correctamente en la bolsa, no nos supondrá ningún problema añadido.

Recuerda que es obligatorio permanecer asegurado en todo momento. Si soltamos nuestro anticaidas, deberemos haber anclado nuestra cuerda de seguridad previamente a un buen punto de anclaje.

7. The victim will not descend at the speed of the emergency descent device (0,7 m/s) (1.57mph), as we hold the free end of the descent line to control the Speedy of descent, even Shopping descent if necessary. To facilitate braking, pass the line through the hook anchored in the descent device. The line, coiled correctly in the satchel, will not pose any additional problem.

Remember it is mandatory remain fastened at any time. If we lose our fall arrest system, we must be previously safely attached with the safety rope, to a good anchor point.

Rescate de buje

Proteger a la víctima para evitar nuevas lesiones y avisar a un segundo rescatador y a los servicios de emergencia si fuera el caso.

Socorrer al herido

Se identifica:

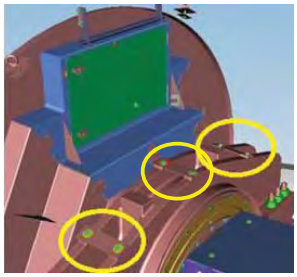
Rescatador 1: el compañero del herido

Rescatador 2: trabajador, que una vez activado el plan de autoprotección del parque, acude a la máquina del accidente para asistir al posible rescate.

Rescate:

1. Una vez llega el rescatador 2 a la máquina coloca el descensor con volante y accede al interior del buje. Lleva el extremo de la cuerda para atar al herido y junto al rescatador 1 preparan al herido para la extracción.

1.1 Colocar el descensor con volante Para que el descensor quede centrado a la abertura al interior del rotor, se colocan dos bagas o elementos de amarre idénticos a ambos cáncamos situados sobre el caballete/eje lento o a las pletinas instaladas en este punto. Se atan ambas bagas al descensor con volante, una al mosquetón del aparato y a otra a un mosquetón que vaya anclado a la orejeta metálica del aparato



1.2 El rescatador 2 pasa el extremo de la cuerda del descensor con volante para atar al herido en el interior del buje.

Rescuing a worker from the hub

Protect the victim from any further injury and inform a second rescuer and the emergency services, where necessary.

Assisting the injured person.

The rescuers are as follows:

Rescuer 1: the injured worker's colleague.

Rescuer 2: a worker going to the turbine on which the accident has occurred once the site self-protection plan is activated, to help with a possible rescue operation.

Rescue:

1. When rescuer 2 arrives at the turbine, put the flywheel descent device in place and access the inside of the hub. Take one end of the lifeline to secure the injured person and, together with rescuer 1, prepare the injured person for descent.

1.1 Put the flywheel descent device in place. Place two identical distance pieces or securing elements on the two ringbolts on the horse/low speed shaft or on the plates installed at this point to centre the descent device on the rotor opening. Fix the two distance pieces to the flywheel descent device, securing one of them to the carabineer on the device itself and the other to a carabineer on the metal lug on the device.



1.2 Rescuer 2 passes the end of the lifeline out from the flywheel descent device to secure the injured person inside the hub.



2 Al llegar el rescatador 2 con el extremo de la cuerda del descensor con volante, atan al herido al punto pectoral del arnés y entre los dos preparan al herido para la extracción. Por un lado para facilitar el paso por la abertura del buje y su interior, y por otro para evitar producir más daños al herido, se gestionan las extremidades del herido, tanto brazos como piernas.

2 When rescuer 2 has passed the end of the line out from the flywheel descent device, the injured person is secured to the harness chest attachment point and both rescuers prepare the injured person for descent. Care must be taken on securing the injured person's arms and legs, to ensure they comfortably fit through the hub opening and in the hub interior, and to prevent further injury.



3. El rescatador 2 sale del buje y vuelve a la posición del descensor con volante quedándose bajo las órdenes del rescatador 1. El rescatador 2 procede a tirar de la cuerda inactiva cuando se lo indique el rescatador 1.

3. Rescuer 2 leaves the hub and goes back to the flywheel descent device position, where they will follow rescuer 1's orders. When told to do so by rescuer 1, rescuer 2 pulls on the slack line.



4. Una vez se ha tensado la cuerda, el rescatador 2 pasa la cuerda inactiva por la cola de cerdo y por las mordazas del descensor con volante

4. When the line has been tightened, rescuer 2 passes the slack part of the line through the pigtail and through the flywheel descent device clamps.





5. Bajo las órdenes del rescatador 1, el rescatador 2 va recuperando cuerda a través del descensor con volante.

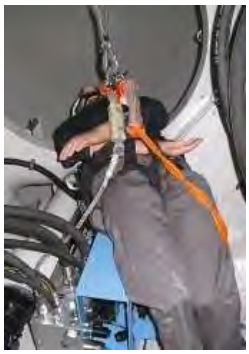
5.1.El rescatador 2 hace girar el volante con las dos manos para recuperar la cuerda que sujeta al herido. Cada poco tiempo, recupera la cuerda que está haciendo comba a través de las mordazas con una mano mientras que con la otra mano sujeta el volante para evitar perder lo ganado.

5.2. Mientras el rescatador 2 recupera cuerda mediante el descensor con volante, el rescatador 1 se asegura de que el paso del herido por el buje es libre y sin obstáculos. Cuando observe cualquier contratiempo da la orden de parada para poder solucionar el problema creado. Cuando esté solucionado o liberado el herido, dará la orden de continuar con la extracción.

5. Following rescuer 1's orders, rescuer 2 pulls in the line through the flywheel descent device.

5.1. Rescuer 2 turns the flywheel using both hands, to pull in the line to which the injured person is attached. At short intervals, pull in the slack line through the clamps with one hand, while securing the flywheel with the other hand to prevent the line from falling back down.

5.2. While rescuer 2 pulls in the line through the flywheel descent device, rescuer 1 makes sure the injured person can pass through the hub freely and without obstruction. If any problems should arise, give the order to stop the process and deal with the incident before continuing. When the problem has been dealt with or the injured person freed, give the order to continue with the rescue process.



6. Cuando el herido esté en el exterior del buje, se le deja apoyado en el pitch de la pala inferior para cambiar el anclaje de la cuerda del descensor. Se utiliza un elemento de amarre auxiliar para poder liberar la cuerda del descensor con volante y hacer el cambio atándola al punto dorsal del arnés.

7. Recuperar al herido por encima del buje

6. When the injured person is out of the hub, leave them resting on the pitch of the lower blade while you change the descent device line anchorage. Use an auxiliary securing element to free the line from the flywheel descent device and make the changeover, securing it to the back of the harness.

7. Take the injured person out over the top of the hub.





8. Bajada del herido desde la cúspide buje hasta el ventanuco entrada nacelle. Para ello el rescatador 1 debe adelantar al herido para poder recibirlo con el rescatador 2 en la salida del rotor a la nacelle

8. Take the injured person down from the hub apex to the nacelle window. To do this, rescuer 1 should go ahead of the injured person to be able to receive them together with rescuer 2 at the rotor exit to the nacelle.

9. Tránsito del herido a través del ventanuco de acceso a la nacelle. Se recibe al herido entre los dos rescatadores y se apoya al herido sobre el suelo del pasillo.

9. Passing the injured person through the nacelle access window. The two rescuers receive the injured person together and lay him down on the floor of the corridor.

10. Traslado del herido a la zona de polipasto

10. Moving the injured person to the hoist area.

11. Evacuación y descenso del herido por la puerta del polipasto mediante el descensor.

11. Evacuating the injured person via the hoist door and taking them down using the descent device.



3.15 FUEGO

3.15 FIRE

Los vehículos de mantenimiento deben llevar dos extintores de polvo ABC 89B como mínimo y aptos para tensiones de hasta 35 kV.

Maintenance vehicles must have at least two ABC powder extinguishers 89B capable for pressures of up to 35kV.

Si es posible, se desconectará la máquina.

If possible, disconnect the turbine.

En caso de que haya personal trabajando dentro de la torre, se procederá del siguiente modo:

If there are staff working in the tower, proceed as follows:

a.- Si el incendio se produce en la nacelle y el personal también se encuentra en ella, intentará sofocar el fuego, abrirá la escotilla y la puerta trasera para evitar en la medida de lo posible la acumulación de humo. Intentará salir descendiendo por la escalera interior de la torre. Si no fuera posible, utilizaría el descendedor de emergencia para evacuar la nacelle por la puerta trasera.

a.- If there is a fire in the nacelle and workers are caught in it, try to extinguish the fire, opening the hatch and the rear door to avoid the accumulation of smoke. Try to exit the tower by going down the ladder inside the tower. If this is not possible, use the emergency descender to evacuate the nacelle through the rear door.

b.- Si el incendio se produce en la base o en cualquier otro tramo del tubo y el personal también se encuentra en la nacelle, abrirá la escotilla y la puerta trasera para

b.- If the fire occurs in the base or any other section of the tower and workers are in the nacelle, open the hatch and the rear door to avoid the accumulation of smoke. Use the

evitar en la medida de lo posible la acumulación de humo. Saldrá utilizando el descendedor de emergencia para evacuar la nacelle por la puerta trasera o la trampilla habilitada para ello.

emergency descender to evacuate the nacelle through the rear door or floor hatch.

Se intentará sofocar el fuego siempre y cuando ello no suponga un riesgo grave para las personas.

Try to extinguish the fire, as long as there is no serious risk for the staff.

Evacuar una zona de 250 m alrededor del aerogenerador.

Evacuate an area of 250m around the wind turbine.

4.- NORMAS BÁSICAS A CUMPLIR DURANTE LA ESTANCIA Y CIRCULACIÓN EN PARQUE

4.- BASIC RULES ON SITE

Las velocidades máximas de circulación para vehículos pesados y ligeros serán respectivamente 20 y 40 Km/h (12 y 24 mph), excepto que el propietario del parque o el plan de seguridad indique una velocidad inferior (Ver normativa de seguridad del parque)

The speed limits for heavy and light vehicles are 20 and 40 Km/h (12 and 24 mph) respectively, except where the site property or the health and safety plan establishes a lower speed. (See site safety norms).

En cualquier caso, extremar las precauciones al aproximarse a otros vehículos y peatones, y adaptar la velocidad de circulación a las condiciones del piso y el camino a seguir.

Take extra precautions when approaching other vehicles and pedestrians, and adjust speed to the conditions of the terrain and the route.

Utilice el cinturón de seguridad en todos los trayectos, por pequeños que sean.

Always wear a safety belt.

No se quede en las proximidades de otros vehículos que puedan estar en marcha, especialmente si está en una zona poco visible para el conductor.

Do not remain in the proximity of other vehicles that may be in operation, especially when in an area of reduced visibility.

No utilice el teléfono móvil cuando esté conduciendo a menos que cuente con sistema de manos libres homologado

Never use a mobile telephone when driving unless it is equipped with a certified hands free system.

Recuerde que está prohibido conducir bajo los efectos del alcohol y las drogas. Cuando deba tomar algún medicamento, verifique si tiene alguna contraindicación que le impida conducir, y en ese caso respétela.

It is strictly prohibited to drive under the effects of alcohol or drugs. When taking medication, check that there are no warnings against driving.

5.- ACCESO AL AEROGENERADOR

5.- ACCESSING THE WIND TURBINE

Antes de acceder a cualquier parque se deberá informar y pedir permiso al responsable de las instalaciones conforme al procedimiento establecido en cada parque. (Ver normativa de seguridad del parque).

Before accessing any site the site supervisor should be notified and permission granted as established in the procedures of each site. (See site safety norms)

Sólo se permite el acceso a la nacelle y/o la permanencia en los tramos de tubo o nacelle para cualquier tipo de actividad, en los siguientes casos:

Access to the nacelle and/or remaining in the tower sections or nacelle will **only** be granted in the following cases:

- Máquina sin energizar.
- Máquina en emergencia.

- The machine is without power.
- The machine is in emergency mode.

- Máquina en manual sin activación de pruebas.

- The machine is deactivated in manual testing mode.

Queda terminante prohibido rearmar la turbina o realizar pruebas de giro si hay personal en la nacelle. Solo se podrán realizar pruebas de giro hasta 250 rpm estando en la plataforma superior de la torre y siempre que haya personal controlando la turbina desde la base de torre.

It is forbidden to start-up the turbine or carrying out rotation tests if personnel are inside the nacelle. Tests at a speed up to 250 rpm are only allowed while staying in the tower top platform and while there are personnel controlling the turbine from the tower base.

Para poner la maquina en manual se seguirá con lo descrito en la instrucción correspondiente.

To put the machine in manual setting follow the corresponding instruction.

Siempre que realice cualquier tipo de tarea en el aerogenerador, el equipo estará compuesto por dos personas como mínimo.

When performing any type of task in the turbine, teams of at least two persons are required.

Asegúrese, antes de subir, que el intercomunicador funciona adecuadamente y su batería va a aguantar toda la maniobra.

Before ascending the turbine ensure that the communication device is functioning properly and the batteries will last for the duration of the operation.

Es obligatorio utilizar los EPI´s indicados en el apartado 3.2 de este documento para acceder a aerogenerador. Antes de utilizarlos, revise que están en buen estado, y sustitúyalos si detecta o intuye el menor deterioro del mismo.

Use the PPE referred to in paragraph 3.2 of this document to access the wind turbine. Before using this equipment ensure it is in good condition. If any defects or damage is detected, remove immediately.

Enrosque la protección de los mosquetones al máximo, no evite este paso por ganar tiempo.

Always screw the carabineer gate closed completely, do not skip this step to save time.

Siempre que se acceda a nacelle se subirá el descensor de emergencia, salvo que la máquina disponga de él.

When accessing the Nacelle always bring up the emergency descent device.

Tenga mucho cuidado al subir y bajar las tapas de las trampillas, ya que pueden caer inesperadamente y atraparle los dedos.

Be very careful when opening hatches as they can fall unexpectedly and trap your fingers.

5.1 ACCESO CON ELEVADOR:

5.1 ACCESS WITH LIFT:

Antes de utilizarlo se deberá aplicar lo establecido en la IC0201 o IC0202 dependiendo del tipo de elvador. Además, revise lo siguiente;

Before using the lift you should check what stablished in the IC0201 or IC0202, depending on the lift model. The following elements should also be checked:

- El manual está accesible en la cabina.

- The manual system is accessible from the cabin.

- El bloqueo electromecánico se encuentra en la posición LOCK y la llave de desbloqueo no se encuentra en la cabina del elevador, de manera que no es posible abrir la puerta salvo cuando el elevador se encuentra en la parada inferior o en la superior.

- Electromechanical lock is in the LOCK position and release key is not in the lift so that you can not open the door unless the elevator is at the lower landing or higher

- En las versiones de máquina en las que las palancas de desbloqueo no son accesibles directamente, existe una llave tipo Allen fijada a una de las tapas de los motorreductores. Esta llave sirve para abrir dichas tapas y acceder a los frenos de los motores en caso de tener que provocar un descenso manual de la máquina.

- In types of machines where the de-blocking mechanism is not directly accessible, an Allen key is fixed to the cover of one of the drive shafts. This key serves to open these covers and access the motor brakes in case manual descent is necessary.

-No se superan las condiciones climáticos establecidas; -10ºC (14ºF) a +40ºC (104ºF) y con una humedad relativa inferior al 90%. (por debajo de -10ºC cabe la posibilidad de que no funcione, aunque si lo hace es totalmente seguro)

- Established climate conditions are not exceeded (-10ºC (14ºF) to +40ºC (104ºF) with a relative humidity below 90%). (below -10ºC it is possible that the lift doesn't work, although if it does it is totally safe)

- No utilizar la máquina en caso de que presente o haya presentado algún defecto en su funcionamiento. No tratar de reparar o mantener los componentes integrados de la máquina (motorreductoras, por ejemplo). Sólo los técnicos especializados pueden realizar una intervención con garantías sobre esos equipos.

- Do not use the machine in case of any defects or malfunction. Do not try to repair or maintain internal machine components (drive shafts, for example). Only specialized technicians should perform maintenance and repair work on these machines.

- El recorrido de la máquina está libre, es decir, no hay ninguna persona ni objeto sobre la escalera, en toda su altura.

- The lift route must be clear, that is, there are no persons or objects obstructing any part of the ladder.

Normas para la utilización del elevador:

Rules for using the lift:

- Su uso queda limitado a personal que haya recibido la formación específica de uso de dicho elevador (al menos, una de las dos personas que lo utilice).

- Use will be limited to those who have received specific training in the use of this equipment (at least one of the two persons using it).

- Debido a la complejidad de colocarse los equipos dentro de la cabina, es obligatorio llevar puestos los EPI´s en todo momento, tanto en el ascenso como en el descenso.

- Given the difficulty in putting on equipment inside the cabin, all PPE must be worn at all times, during both ascent and descent.

Cuando se realiza el paso del elevador a la nacelle, la persona estará asegurada en todo momento a un punto como mínimo. Se seguirá el siguiente procedimiento:

1. Abrir trampilla de elevador
2. Asegurar el anticaidas a la línea de vida
3. Abrir trampilla de la plataforma de la nacelle
4. Cerrar trampilla del elevador
5. Acceder a la plataforma de la nacelle
6. Cerrar la trampilla de la plataforma de la nacelle
7. Soltar el anticaidas de la línea de vida
8. Anclarse con el cabo a la base de la barandilla circular si se tuviera que abrir la trampilla de la plataforma de nacelle (fig 2)

When moving from the lift to the nacelle, personnel must be secured by at least one lifeline at all times. Follow the procedure indicated below:

1. Open lift hatch
2. Fix the fall arrest device to the lifeline
3. Open platform hatch of the Nacelle
4. Close the lift hatch
5. Access the Nacelle platform
6. Close the platform hatch of the nacelle
7. Release the fall arrest device from the lifeline
8. If you have to open the nacelle platform hatch, secure yourself to the base of the circular railing with the lifeline (fig 2)

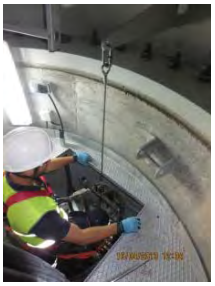


Fig 1



Fig 2

Desplazamientos sobre el techo del elevador:

1. Elevador GOIAN

Solo está permitido viajar sobre la cabina del elevador cuando se realicen tareas de montaje y mantenimiento del aerogenerador y venga indicado expresamente en la instrucción correspondiente. Está terminantemente prohibido hacerlo en cualquier otra circunstancia.

En cualquier caso siempre se seguirán las siguientes indicaciones;

- Solo está permitido que viaje una persona sobre el techo de la cabina, y siempre en sentido descendente. Esta persona controlará en todo momento el elevador mediante la botonera auxiliar bimanual suministrada por el fabricante del elevador.

- Antes de mover la máquina se verificará que en el recorrido no hay ningún saliente con el que se pueda colisionar (descansillos, objetos, etc.)

- Antes de mover la máquina verificar la posición de los pies. En ningún caso posicionarlos en las proximidades de la escalera. No sacar ninguna parte del cuerpo fuera de la protección de la cabina

- Siempre que se acceda al techo del elevador será de obligado cumplimiento anclarse al punto de anclaje existente en la plataforma superior del elevador. En su defecto, se usara la escalera del elevador como punto de fijación, abrazando el larguero ya que este es el elemento que ofrece mayor resistencia (en este caso, el esfuerzo que resiste es superior a 22 kN). Solo se permitirá no estar anclado durante el descenso del elevador, y únicamente si este no dispone de punto de anclaje en la plataforma superior.

- Mientras la máquina esté en movimiento, **NO** apoyar las manos sobre la barandilla en ningún momento, puesto que en ocasiones, en las proximidades de las plataformas intermedias, las holguras de paso son de pocos milímetros.

2. Elevador AVANTI

Siempre que se viaje en el elevador, además de disponer de los EPIs, se recomienda estar anclado al punto de anclaje interior de la cabina

Solo está permitido viajar sobre la cabina del elevador cuando se realicen tareas de montaje y mantenimiento del aerogenerador y venga indicado expresamente en la instrucción correspondiente. Está terminantemente prohibido hacerlo en cualquier otra circunstancia.

Movements on the roof of the lift:

1. GOIAN Lift

It is only permitted to ride on the roof of the lift when performing assembly or maintenance operations on the turbine and only when indicated by the corresponding instruction. Otherwise, riding on the roof is strictly forbidden.

In any case, the instructions provided below must be followed at all times:

- Only one person is permitted to remain on the top of the lift and always descending. This person will control the movements of the lift using an auxiliary control provided by the lift manufacturer.

- Before moving the machine, verify that there are no obstructions or objects which may cause a collision (objects, landings, etc.).

- Before moving the machine, check that feet are kept well clear of the ladder. Never extend any part of the body outside the protection of the cabin.

- When personnel must stand on the roof of the lift, it is mandatory to be anchored to an anchor point in the cage roof. If there is no anchor point, the ladder of the lift will be used as an anchor point, taking the vertical part of the ladder, which is the part with more strength (22kN). It will only be permitted not to be anchored while traveling on the lift and only if it doesn't have the anchor point on the cage roof.

- While the machine is in movement, **do not** place hands on the railing at any time the gap between the intermediate platforms is only a few millimeters at times.

2. AVANTI Lift

Always when travelling in the lift, it is mandatory to use the PPEs and it is recommended to be anchored all the time.

It is only permitted to ride on the roof of the lift when performing assembly or maintenance operations on the turbine and only when indicated by the corresponding instruction. Otherwise, riding on the roof is strictly forbidden.

En cualquier caso siempre se seguirán las siguientes indicaciones;

- Solo está permitido que viaje una persona sobre el techo de la cabina. Esta persona controlará en todo momento el elevador mediante la botonera auxiliar instalada en el kit de barandilla superior.

- Antes de mover la máquina se verificará que en el recorrido no hay ningún saliente con el que se pueda colisionar (descansillos, objetos, etc.)

- Antes de mover la máquina verificar la posición de los pies y manos. En ningún caso posicionarlos en las proximidades de la escalera. No sacar ninguna parte del cuerpo fuera de la protección de la cabina

- Siempre que se acceda al techo del elevador será de obligado cumplimiento anclarse al punto de anclaje existente en la plataforma superior del elevador..

In any case, the instructions provided below must be followed at all times:

- Only one person is permitted to remain on the top of the lift. This person will control the movements of the lift using an auxiliary control installed in the service tool kit.

- Before moving the machine, verify that there are no obstructions or objects which may cause a collision (objects, landings, etc.).

- Before moving the machine, check that feet and hands are kept well clear of the ladder. Never extend any part of the body outside the protection of the cabin.

- When personnel must stand on the roof of the lift, it is mandatory to be anchored to an anchor point in the cage roof..

5.2 ACCESO SIN ELEVADOR:

- Queda terminantemente prohibido utilizar la escalera para subir o bajar a pie por ella, salvo que sea estrictamente necesario por encontrarse el elevador fuera de servicio

5.2 ACCESS WITHOUT LIFT:

- It is strictly prohibited to use the ladder to climb or descend on foot, except where necessary because the lift is out of service.



- No utilizar la escalera para subir o bajar a pie por ella sin tomar previamente las siguientes precauciones necesarias para que el elevador no sea puesto accidentalmente en marcha por otros operarios

* Desconectar el armario eléctrico principal del elevador, situado en la base del aerogenerador.

* Bloquear y etiquetar- LOTO el armario eléctrico principal, cuando se encuentra en la posición “0”.

* Colocar en la puerta del armario eléctrico principal, accesible y con buena visibilidad, el letrero de “No poner en funcionamiento”.

- Tras colocarse el casco y el arnés de forma correcta (ajustado sin restar movilidad) se colocará el anticaídas sobre la sirga que corre paralela a la escalera de acceso, evitando utilizar una cadena de dos mosquetones (no

- Do not use the ladder to climb or descend on foot without taking the following precautions to ensure that the lift is not accidentally started by other operators.

* Disconnect the main power of lift control box, located at the base of the wind turbine.

* Lock Out Tag Out - LOTO the main power of lift control box when it’s in the position “0”.

* A sign must be placed on the cabinet door that states: “Do not operate”.

- With the hardhat and harness attached properly (tight without any movement) the fall arrest device will be attached to the lifeline which runs parallel to the access ladder. Never link hooks or carabineers together in a chain

colocar el mosquetón del anticaídas sobre otro previamente colocado sobre los anclajes del arnés, sino directamente a los anclajes a la altura del pecho).

(do not attach the hook of the fall arrest device to another hook but connect it directly to the harness).

- Durante la subida, sólo una persona podrá estar ascendiendo al mismo tiempo. No debe permanecer nadie bajo una persona que esté ascendiendo por la escalera.

- Only one person should ascend at a time. No one should remain below the person climbing the ladder.

- Cuando se realiza el paso de la escalera a la nacelle, la persona estará asegurada en todo momento a un punto como mínimo, por lo que antes de soltarse el anticaídas, se habrá auto-asegurado con la cuerda de seguridad. Se seguirá el siguiente procedimiento:

- When moving from the ladder to the nacelle, the person must be secured at all times to at least one anchor point. Lifelines should be attached before removing the fall arrest device. The following procedures should be followed:

1. Abrir trampilla de la plataforma de la Nacelle
2. Anclar la cuerda de seguridad a un punto sólido elevado.
3. Retirar el anticaídas. (No dejarlo en la línea)
4. Acceder a la plataforma de la nacelle
5. Cerrar la trampilla de la plataforma de la nacelle
6. Soltar la cuerda de seguridad.

1. Open the hatch of the nacelle platform
2. Secure a lanyard to a secure and elevated point
3. Remove the fall arrest device (Do not leave it attached)
4. Access the Nacelle platform
5. Close the Nacelle platform hatch
6. Let the lanyard fall free

5.3 ACCESO SIN LÍNEA DE VIDA:

5.3 ACCESS WITHOUT LIFE LINE

- En caso de que la línea de vida no pueda ser utilizada (esté rota, destensada,…) de manera excepcional se podrá subir por la escalera utilizando los dos cabos.

- In the case the lifeline cannot be used (if it's broken or it's not tightened) it would be possible to go up the ladder, using the two anchor lines.

En todo momento deberemos estar atados al menos por uno de los cabos; Para ello se engancharán los mosquetones de gran apertura aprovechando los peldaños de la escalera y los pasamanos verticales. Iremos enganchando los mosquetones, siempre en un lugar por encima de nosotros, de manera alternativa, cada uno de los dos cabos.

The employee will have to be connected with at least one of the lines: The wide gate opening carabineers will be engaged using the rungs and the sides of the ladder. Ascend engaging both lines alternatively, always on a higher point.

5.4 ESTANCIA EN LA NACELLE;

5.4 REMAINING IN THE NACELLE;

Siempre que se realicen trabajos sobre la fibra de vidrio en los que se manipulen componentes de más de 15 Kg. (33 lbs) nos fijaremos a un punto seguro, utilizando el arnés de seguridad y la cuerda con absorbedor, evitando el riesgo de caída ante una rotura de la fibra por caída de la pieza.

When performing work on the fiberglass housing and handling items of more than 15 Kg (33lbs). a secure anchor point must be established using the safety harness and a shock absorbing line to prevent the risk of falling materials breaking the fiberglass housing.

5.4.1. Carcasa antigua

5.4.1. Old cover

Siempre que se esté en la parte trasera de la nacelle, y la puerta trasera se encuentre abierta, se deberá estar anclado a un punto fijo, independientemente que esté colocada la cadena de protección de la puerta

Whenever personnel are in the rear of the nacelle, and the rear door is open, they should be attached to the secure anchor point on the generator, regardless if the protection bars are in place



5.4.2. Carcasa nueva

Asegurarse de que están todas las trampillas del polipasto cerradas mientras se permanece en la nacelle.

En el momento en que se vayan a abrir las trampillas de uso del polipasto, asegurarse de que se colocan las barandillas y todo el personal en nacelle se encuentra anclado a un punto fijo.

Sólo se permite la estancia sobre la fibra de vidrio en las zonas ensayadas e identificadas con arena antideslizamiento.

5.5 ACCESO AL BUJE:

Antes de acceder al buje siempre se bloqueará el rotor conforme a lo descrito en la instrucción correspondiente, salvo que se encuentre descompensado como en el pinchado, despinchado o sustitución de pala. Ver aptdo 9

Siempre permanecerá una persona en la nacelle, mientras se realicen trabajos en el interior del buje.

Como norma general, sólo podrán estar 2 personas de manera simultánea en el interior del buje, salvo que la instrucción correspondiente indique lo contrario.

En el acceso al buje o en trabajos realizados en el mismo, se evitará apoyarse sobre la tapa del cono que se encuentra unida mediante tornillería.

Durante los trabajos en el interior del buje, habrá que estar siempre atado a un punto fijo, salvo que la placa pitch esté completamente cerrada.

-

Siempre que se realicen trabajos sobre la fibra de vidrio en los que se manipulen componentes de más de 15 Kg. (33lbs). nos fijaremos a un punto seguro, utilizando el arnés de seguridad y la cuerda con absorbedor, evitando el riesgo de caída ante una rotura de la fibra por caída de la pieza.

5.4.2. New cover

Be sure that all hatches are closed while staying in the nacelle.

In the moment when the hatches are opened, be sure that the railings are installed and all personnel in nacelle is anchored.

It is only permitted to stay on the fiberglass where studied and identified with non-slipping sand.

5.6 ACCESSING THE HUB:

Before accessing the hub always block the rotor as described in the corresponding instruction, except if the rotor is unbalanced, such as in the assembly, disassembly or substitution of blade. (see section 9)

One person must always remain in the nacelle when work inside the hub is being performed.

Only 2 workers will be inside the hub, although the corresponding instruction says the opposite.

When accessing the hub or working in it, avoid putting weight on the attached cone cover.

When working in the interior of the hub, it is mandatory to be anchored to a safe point, unless the pitch plate is completely closed.

-

When performing work on the fiberglass housing and handling items of more than 15 Kg (33lbs). a secure anchor point must be established using the safety harness and a shock absorbing line to prevent the risk of falling materials from breaking the fiberglass housing.

Para acceder al interior del buje, se seguirá la siguiente secuencia:

1. Abrir la puerta de acceso al interior del cono/buje
2. Antes de proceder a la entrada, anclar el cinturón retráctil a un punto seguro y resistente (cáncamo sobre eje lento o pletina instalada en este mismo punto), (Fig.1). Utilizar si fuera necesario una baga o anillo de cinta cosido EN795, como elemento intermedio de anclaje (Fig.2)



Fig.1

3. Anclar el extremo del cinturón al punto anticaidas en el arnés de la persona que vaya a acceder (recomendado punto esternal del arnés)



4. Entrar al interior con la cabeza por delante, colocando el cuerpo de forma que se pueda llegar a los asideros instalados en el recorrido.



To enter the hub, proceed as follows:

1. Open the cone/hub access door
2. Before entering, secure the retractable belt to a safe, resistant point (a ringbolt on the low-speed shaft or a plate installed at this point) (Fig.1). If necessary, use a distance piece or an EN795-compliant stitched belt ring as an intermediate anchorage element (Fig.2).



Fig.2

3. Secure the end of the belt to the fall arrester on the harness worn by the person who will be accessing the hub (it is recommended to use the external attachment of the harness).

4. Enter the hub head first, positioning yourself so that you can reach the handgrips.



5. Una vez alcanzado el punto superior del buje, darse la vuelta para afrontar la bajada al otro lado del buje o a la nariz del cono buscando los apoyos colocados en cada sistema pitch con los pies por delante.



6. Entrar al interior del buje, soltar el cinturón retráctil y atarlo para poder utilizarlo en la salida del interior del buje



7. Para la salida realizar el recorrido inverso. En este caso la conexión del retráctil se hará en el punto pectoral del arnés anticaidas.

5. When you reach the top of the hub, turn round so that you can go down the other side or down the cone tip, feet first to feel for the pitch system supports.



6. Enter the hub, release the retractable belt and fix it in place so that you can use it on exiting the hub.



7. Retrace your steps to exit the hub. The retractable belt will now be connected to the harness chest attachment

5.6 DESCENSO DE LA NACELLE:

Antes de abandonar la nacelle, comprobar que ninguna seta de emergencia ha quedado pulsada, que se han cerrado puertas y escotillas, y se ha desbloqueado el rotor.

Para abandonar la plataforma de la nacelle se repetirá la maniobra de manera inversa, de tal manera que en estemos anclados a un punto fijo en todo momento.

Durante el descenso y por motivos varios es necesario ayudar al anticaídas en su descenso.

5.7 DESCENT FROM THE NACELLE:

Before leaving the nacelle, verify that no emergency button remains activated, that doors and hatches are closed and that the rotor has been unblocked.

To leave the nacelle platform, repeat the maneuver in reverse, ensuring that a lifeline is attached to a secure anchor point at all times.

During descent and for various reasons it may be necessary to use the fall arrest device.

5.7 USO DEL POLIPASTO:

Cada equipo de trabajadores llevara consigo un sistema de señalización, y deberá colocarlo cada vez que se vayan a suspender cargas con riesgo de caída sobre el personal situado en la zona. El sistema de señalizaron debe advertir del riesgo, y delimita la zona prohibiendo el acceso a la misma a todo el personal ajeno a los trabajos.

Esta señalización se colocara siempre antes de comenzar con las operaciones de izado con el polipasto.

El personal participante en las operaciones podrá acceder a la zona si los trabajos a realizar lo requieren, pero respetando siempre la prohibición a colocarse bajo cargas suspendidas.

El operario que maneje el polipasto, SIEMPRE deberá estar anclado a un punto fijo en el interior de la nacelle, de modo que, tomando las debidas precauciones, su situación le permita en todo momento ver la posición del polipasto y la carga, que va a ser o está siendo manipulada.

En las máquinas con carcasa panelable que no disponen de puerta trasera, se deberán colocar las barandillas laterales que impiden el acceso a la fibra durante el uso del polipasto.

En estas carcasas está totalmente prohibido pisar sobre la fibra una vez que se hayan abierto las trampillas del trámex.

En este tipo de nacelles se tendrá especial cuidado para que la carga del polipasto no golpee o se enganche con las trampillas de fibra tanto en la subida como en la bajada de materiales.

Una vez terminado el uso del polipasto se cerrarán las trampillas de fibra y seguidamente se bajarán las de trámex, en este momento el trabajador podrá soltarse del punto de anclaje.

Para obtener un mejor uso del polipasto hay que tener en cuenta lo siguiente:

- Seguir en todo momento las instrucciones marcadas en el manual de uso del polipasto. No exceder nunca la carga máxima permitida de utilización. A la bajada, es aún más peligroso ya que la carga tendería a acelerarse.

- No debe excederse nunca la capacidad del gancho del polipasto, para ello quedando limitado el transporte a un bulto por viaje.

- El polipasto deberá utilizarse siempre con la turbina orientada.

5.8 USE OF THE HOIST:

Each team of workers must carry a communication device, and never be placed under a suspended load fall on the staff in the area. The area must be marked to warn of the risk, and define the area by prohibiting access to all personnel.

Such signs are always placed before starting operations with the lifting hoist.

The employees performing the task will have access but must not be positioned under a suspended load at any time.

The hoist operator SHALL be anchored to a fixed point inside the nacelle. They should be positioned so they can observe the hoist and load.

In wind turbines with the new cover which do not have back door, the lateral protections need to be put when using the hoist, to avoid the entrance of the workers to the fiber.

In these covers is totally forbidden to step on the fiber once the tramex floor is opened

In these nacelles special care will be taken for the load not to hit any part of the hatch during the lifting or the descending of materials.

Once finished the works with the hoist all fiber hatches will be closed, followed by the closing of the tramex hatches. Until both are closed, the worker will need to stay anchored.

Best use of the hoist must be taken into account:

- Follow the instructions at all times marked in the manual of the hoist. No time exceed the maximum weight allowed. In a fall, it is even more dangerous because the load would tend to accelerate.

- Should not exceed the capacity of the hoist hook.

- The hoist should be used with the turbine oriented into the wind.

- La cadena debe estar en buen estado, correctamente posicionada (sin nudos o retorcimientos) y engrasada.

- The chain must be in good condition, properly positioned (without knots or kinks) and oiled.

- La carga será elevada libre de sus apoyos, y no hay obstáculos para elevar.

- The load shall be lifted free from its supports, and there are no barriers to raise.

- Queda prohibido el uso del polipasto como eslinga.

- The use of the hoist as a sling is totally forbidden.

- La vertical del polipasto deberá estar libre de vehículos y personas.

- Vehicles and personnel must remain clear of suspended materials.

Tampoco se utilizará en condiciones de niebla o baja visibilidad, en que no se pueda ver el suelo desde lo alto de la turbina.

Do not use in situations of fog or low visibility.

- Queda prohibido dejar cargas suspendidas del polipasto.

- It is forbidden to leave loads suspended from the hoist.

- Nunca mantenerse directamente debajo de la carga, y no permitir que nadie lo haga.

- Never stay directly below and the load, and do not allow anyone else to do so.

- El polipasto se empleara para manipular cargas de modo que no choque o roce con ninguna persona u objeto que este en reposo o en movimiento.

- The hoist is to be used for handling of loads so that no impact or friction with any person or object that is at rest or in motion.

- Nunca usar ganchos estropeados o abiertos, sin lengüeta de seguridad que asegure la eslinga o que no estén bien sujetos.

- Never use damaged or open hooks without safety latch to secure the sling.

6.- PROCEDIMIENTO DE TRABAJO EN INSTALACIONES ELÉCTRICAS

6.1 CAPACITACIÓN DEL PERSONAL

Para poder intervenir en las instalaciones eléctricas de alta, media o baja tensión de los Aerogeneradores ACCIONA WINDPOWER, cualquier Trabajador, propio o de contrata, debe estar capacitado, como mínimo, como “Trabajador Autorizado” y por tanto debe acreditar ante “ACCIONA WINDPOWER” lo siguiente:

- Haber recibido formación e información sobre riesgos eléctricos; causas y efectos de los contactos eléctricos, directos, indirectos, arco eléctrico, quemaduras y explosiones eléctricas, y caídas o contusiones como consecuencia de arcos eléctricos.

- Haber recibido formación en “medidas de prevención frente al riesgo eléctrico”; medidas que intenten evitar los riesgos (muy específicamente, las cinco reglas de oro), y medidas de protección frente a ellos (uso de EPI’s, etc.)

- Haber recibido formación en “zonas y distancias de proximidad y peligro” a partes activas en tensión, al menos para las tensiones existentes en los

6.- WORK PROCEDURES IN ELECTRICAL INSTALLATIONS

6.1 PERSONNEL TRAINING

In order to perform work on high, medium or low tension electrical installations of ACCIONA WINDPOWER turbines, all Personnel, either contracted or internal, must have qualifications to be considered, at least, as “Authorized Personnel”. These personnel must certify to ACCIONA WINDPOWER (AWP) the following:

- To have received training and information regarding electrical risk: the causes and effects of direct and indirect electrical contact, electrical arcing, electrical burns and explosions and falls or contusions resulting from electrical arching.

- To have received training in “risk prevention measures for electrical risk”; measures which are intended to avoid (specifically the Five Golden Rules) and protection measures for risks (the use of PPE).

- To have received training in “proximity distances and danger zones” (Dprox and Dzone) for elements in tension, at least for the tension levels found in the AWP turbines.

Aerogeneradores AWP.

- Haber recibido formación en “primeros auxilios” en caso de accidentes eléctricos.

- To have received First Aid training in the case of electrical accidents.

- Conocer las normativas y las Instrucciones de las instalaciones de los Aerogeneradores ACCIONA WINDPOWER.

- To know the Rules and Instructions for the installations of ACCIONA WINDPOWER turbines.

Sin esta acreditación mínima, que debe ser personal, queda totalmente prohibida la intervención u operación en las instalaciones de alta, media o baja tensión de los Aerogeneradores ACCIONA WINDPOWER.

Without this minimum personal accreditation, it is strictly prohibited to perform any operations on the high, medium or low tension installations of ACCIONA WINDPOWER turbines.

Los trabajos eléctricos que requieran conocimientos especializados, formación adecuada o experiencia específica en ellos deberán ser realizados o supervisados directamente por un Trabajador capacitado como “Trabajador Cualificado”

Electrical operations which require specialized skills, adequate training or specific experience will be performed or directly supervised by workers designated as “Qualified Personnel”.

Las funciones límites y tareas eléctricas que los Trabajadores pueden desarrollar de acuerdo a su capacitación de Autorizado o Cualificado, se exponen en el Anexo I.

The tasks and functions which personnel are authorized to perform according to their certification as “Authorized” or “Qualified”, are indicated in Appendix I.

Estarán prohibidos los trabajos en el foso de la máquina sin antes haber desenergizado el aerogenerador. Se requiere la desenergización siempre previo al inicio de los trabajos en este espacio. Tras desenergizar se utilizará un generador externo para apoyo en tareas de instalación, puesta en marcha o mantenimiento, siempre que el voltaje sea de 400V o menos.

All work beneath the tower base platform of the machine is forbidden if THE WIND TURBINE IS CONNECTED TO THE COLLECTOR CIRCUIT. De-energizing OR DISCONNECTING THE WIND TURBINE FROM THE COLLECTOR CIRCUIT is required before starting any task in this space. After disconnecting the wind turbine from the collector circuit an external diesel generator may be used to facilitate installation, commissioning and maintenance tasks if the applied voltage will be 400Vac or less.

6.2 LAS INSTRUCCIONES DE USO Y MANTENIMIENTO

6.2 OPERATION AND MAINTENANCE INSTRUCTIONS

Cualquier intervención en el sistema eléctrico de alta, media o baja tensión en el proceso de Operación o Mantenimiento de los Aerogeneradores ACCIONA WINDPOWER, se realizará de acuerdo con las Instrucciones de Uso y Mantenimiento existentes para cada tipo de Aerogenerador.

Any Operation or Maintenance work involving high, medium or low tension electrical installations of AWP turbines will be performed in accordance with the Operation and Maintenance Instructions provided for each type of turbine.

Es obligación de todo personal, propio o de contrata, que intervenga en la operación o maniobra del sistema eléctrico de alta, media o baja tensión de los Aerogeneradores ACCIONA WINDPOWER, conocer y seguir estrictamente las instrucciones contenidas en las citadas Instrucciones de Uso y Mantenimiento que a tales efectos residen en cada una de los centros de trabajo o de control de los parques eólicos que corresponda.

All personnel, internal or contracted, performing operations or handling the high, medium or low tension electrical installations of ACCIONA WINDPOWER turbines, must know and strictly follow the instructions contained in the Operation and Maintenance Instructions indicated. These Instructions are provided in the work or control centers of the corresponding AWP site.

Existen específicamente Instrucciones de Uso y Mantenimiento para los siguientes trabajos:

There are specific Operation and Maintenance Instructions for the following work:

- Manipulación de las celdas
- Retrofits de cualquier tipo en el generador
- Operaciones dentro del equipo de potencia
-.Operaciones dentro del armario Ground (zona de fuerza)

- Handling of Cells
- Retrofits for any type of turbine
- Operations within the power system
- Operations within the Ground cell (power area)

Las Instrucciones de Uso y Mantenimiento, también llamados “Procedimientos de Operación”, son la : “secuencia de las operaciones a desarrollar para realizar un determinado trabajo, con inclusión de los medios materiales (de trabajo o de protección) y humanos (cualificación o formación de personal) necesarios para llevarlo a cabo.”.

The Operation and Maintenance Instructions, also called “Operational Procedures” are: “the sequence of operations to be performed for a specific task, including the required material (work or protection equipment) and human resources (personnel qualifications or training) necessary for its execution”.

Las Instrucciones de Uso y Mantenimiento contienen por tanto la descripción de la secuencia de maniobras ordenadas por pasos para ejecutar una determinada acción (abrir, cerrar, poner a tierra, etc.) para cada uno de los módulos o celdas de alta o media tensión de las instalaciones.

The Operation and Maintenance Instructions contain a description of the sequence of tasks to be performed for a specific operation (open, close, grounding, etc.) for each of the modules or cells of high or medium tension installations.

Con carácter general es de aplicación a los procedimientos operativos, lo siguiente:

The operational procedures are generally applicable as follows:

- Son de obligado cumplimiento para todo el personal, propio o contratado, que opere o intervenga eléctricamente en los Aerogeneradores ACCIONA WINDPOWER

- The compliance of these procedures is mandatory for all internal and contracted personnel performing electrical operations on AWP turbines.

- Un manual con las instrucciones o los procedimientos operativos reside específicamente en cada una de los centros de trabajo o control de los parques citados.

- A manual containing operating instructions and procedures is provided at each of the work or control centers of the AWP sites.

- Es obligación de todo el personal (ya sea propio o de contrata), seguir “paso a paso” las instrucciones que contiene y velar por el buen uso y mantenimiento de estas instrucciones, poniendo en conocimiento del Responsable de Parque, cualquier anormalidad, deterioro, etc., que observara en ellas.

- All personnel (internal or contracted) must follow these instructions “step by step” and ensure the proper operation and maintenance of the same, notifying the Site Supervisor of any detected anomalies, deterioration, etc.

- Es obligación también de todo el personal (propio o de contrata) detener las acciones que esté llevando a cabo y ponerlo inmediatamente en conocimiento del Responsable del Parque, si observa alguna dificultad o imposibilidad de cumplir cualquiera de las instrucciones contenidas en el procedimiento que esté ejecutando.

- All personnel (internal or contracted) must also cease all actions being performed and notify the Site Supervisor immediately in the event of any difficulty or impossibility to carrying out the instructions contained in the procedures.

6.3 ORGANIZACIÓN DE UN “TRABAJO ELÉCTRICO”

6.3 ORGANIZATION OF “ELECTRICAL WORK”

Se entenderá por “trabajo eléctrico”, cualquier trabajo realizado sobre una instalación eléctrica o en su entorno, tal como los ensayos y medidas, reparación, sustitución, modificación, instalación, mantenimiento o verificación.

“Electrical work” will be understood as any task performed on electrical installations or in their proximity, such as testing and measurements, repairs, substitution, modification, installations, maintenance or verifications.

La organización de todo “trabajo eléctrico” implica obligatoriamente, como mínimo, la identificación del “Responsable de la Instalación”, la asignación concreta de un “Jefe de Trabajo” y la delimitación precisa de una

The organization of all “electrical work” must include, as a minimum, the designation of an “Installation Manager” and a specific “Work Supervisor” as well as the precise identification of the “work area”.

“zona de trabajo”.

Responsable de Instalación eléctrica	Electrical Installation Manager
Es el Trabajador que ha sido designado para asumir la responsabilidad última de la explotación de la instalación eléctrica. Cuando sea necesario, parte de esta responsabilidad puede ser delegada en otros.	This is the worker designated to assume final responsibility for the electrical installations. When necessary, part of this responsibility may be delegated to other personnel.
Toda instalación eléctrica debe estar bajo la responsabilidad de una única persona; el Responsable de la Instalación.	All electrical installations must be under the responsibility of a single person: the Installation Manager.
El Responsable de la Instalación y el Jefe de Trabajos deben ponerse de acuerdo antes de cualquier modificación de la instalación eléctrica o antes de la ejecución del trabajo, tanto en las actuaciones a llevar a cabo en la citada instalación eléctrica para permitir la ejecución de los trabajos (maniobras, verificaciones, etc), como en la descripción del trabajo a desarrollar sobre la instalación eléctrica o en su entorno	The Installation Manager and the Work Supervisor must agree on the execution of any modifications of the electrical installations or the performance of any work. This includes actions carried out in the installation to permit the execution of work (operations, verifications, etc.) as well as the description of the work to be performed on the electrical installation and its surroundings.
Jefe de trabajo	Work Supervisor
El Jefe de Trabajo es la persona designada por el empresario para asumir la responsabilidad efectiva de los trabajos. Cuando sea necesario, parte de esta responsabilidad puede ser delegada en otros.	The Work Supervisor is the person designated by the company to assume effective responsibility for the work performed. When necessary, part of this responsibility can be delegated to other personnel.
La responsabilidades del Jefe de Trabajos, serán las siguientes:	The responsibilities of the Work Supervisor are the following:
Coordinar las intervenciones, maniobras, etc., con el Responsable de la Instalación, antes de comenzar los trabajos y una vez concluidos estos.	To coordinate actions, operations, etc. with the Installation Manager before initiation and after they are concluded.
Configurar la zona de trabajo de forma segura (ver punto siguiente) estudiando y evaluando todos los posibles riesgos que pudieran surgir.	To configure the work area safely (see next point), studying and evaluating the possible risks which may arise.
Informar y coordinar a su propio equipo de trabajo, es decir, antes de comenzar el trabajo, debe explicarse a los trabajadores en qué consiste el trabajo, cuales son los aspectos de seguridad, cual es la función de cada uno de ellos, y que herramientas y equipos tienen que utilizarse.	To inform and co-ordinate their work team, that is, before initiating operations, to explain the work to be performed, the possible risks and safety issues, the individual functions of each work team member and the tools and equipment to be used.
Evaluar las condiciones ambientales en el lugar del trabajo	Evaluate the environmental conditions of the work site.
Velar por el correcto uso de los elementos de protección individual y colectiva	Supervise and ensure the correct use of general and personal safety equipment.
Vigilará que se tomen las debidas precauciones con el material y herramientas colectivos de acuerdo con sus fichas técnicas, que los operarios verifican sus dotaciones individuales, y que los guantes se	To supervise and ensure that the appropriate precautions are taken with the materials and equipment, as indicated in the technical files. To ensure operators verify their personal

comprueban por medios neumáticos

safety equipment and the gloves are pneumatically tested.

Zona de trabajo

Work area

La realización de un trabajo eléctrico sin tensión requerirá siempre la configuración de una zona de trabajo concreta y bien delimitada cuyas características serán las siguientes:

The performance of tasks on electrical installations without power requires the configuration of a specific work area, to be properly delimited according to the following characteristics:

- Para conformar una zona de trabajo para trabajar sin tensión se aplicarán siempre las denominadas CINCO REGLAS DE ORO que son:

- To establish a work area for working without power, the FIVE GOLDEN RULES will be applied. These are:

- Corte efectivo de todas las fuentes de Tensión.
- Enclavamiento.
- Detección de ausencia de tensión.
- Puesta a tierra y en cortocircuito.
- Señalizar la zona de trabajo
- Es responsabilidad del Jefe de Trabajos conformar y delimitar la zona de trabajo.

- Effective cut off of all sources of Tension.
- Switch connection.
- Power testing.
- Grounding and short circuiting.
- Sign posting work area
- The Work Supervisor is responsible to confirm and delimit the work area.

La delimitación física de la zona de trabajo quedará definida por las puestas a tierra y en cortocircuito de todas las posibles fuentes de tensión, es decir, de todos los conductores eléctricos que concurran en la zona de trabajo y que tengan la posibilidad, por error, accidente, inducción, falsa maniobra, etc., de ponerse en tensión.

The physical delimitation of the work area will be defined by the grounding and short circuiting of all possible sources of tension. That is, all electrical conductors which are related to the work area and that pose the possibility, through error, accident, induction, false operations, etc to provide tension to the work area.

Por lo general, las puestas a tierra y en cortocircuito que delimitan físicamente la zona de trabajo deben ser visibles por el Trabajador desde dicha zona de trabajo. En el caso de que esto no pudiera ser, el Trabajador, en su zona de trabajo deberá disponer de algún sistema que le garantice que la puesta a tierra y en cortocircuito que no puede ver desde su zona de trabajo, está eficazmente instalada. En este sentido pueden valer, entre otros dispositivos, los siguientes:

Generally, the grounding and short circuiting that physically delimit the work area must be visible to the Worker from this area. In the case that this is not possible, the Worker must have some system which guarantees that the grounding and short circuiting of the work area is effectively installed. For this purpose, the following systems may be used:

- Posesión de llave única de bloqueo y enclavamiento de seccionador de tierras cerrado.
- Llave única de candado que bloquee el seccionador de puesta a tierra cerrado.
- Trabajador específico para vigilar la puesta a tierra
- Materiales y herramientas

- Possession of a single blocking switch and closed grounding selector.
- Single switch that blocks the ground sectional, in closed position.
- Specific worker to supervise the grounding
- Materials and tools

En relación con los materiales o herramientas a usar en los trabajos eléctricos, se seguirán las siguientes instrucciones:

The following instructions must be used with regard to equipment and materials to be used for electrical work:

- Se conservarán en sitio seco y nunca a la intemperie.

- Tools must be stored in a dry location and never left

	outdoors.
- Se transportarán en fundas y estuches apropiados.	- Tools will be carried in appropriate holders or satchels.
- Cada operario dispondrá en la zona de trabajo de un equipo de protección personal que constará de casco aislante, guantes de protección mecánica y gafas de protección, o pantalla facial inactínica. Según el trabajo a efectuar, el operario estará equipado con calzado especial con suela conductora, guantes aislantes, manguitos aislantes y herramientas aislantes.	- Each operator in the work area will have their personal safety equipment consisting of insulated hardhat, protective gloves and safety glasses or arc resistant face shield. Depending on the work to be performed, the operator will be equipped with safety boots with a nonconductive sole, insulated gloves and sleeves and insulated tools.
- Cada operario conservará su equipo personal siguiendo las instrucciones de las fichas técnicas.	- Operators will maintain their personal safety equipment as indicated on the technical files.
- Los materiales y herramientas se manipularán con cuidado y se limpiarán y secarán antes de iniciar los trabajos.	- Materials and equipment will be used carefully and cleaned and dried before use.
- Los materiales y herramientas de protección colectiva, como tensores, tirantes, pértigas, escaleras, telas de alfombrillas, se colocarán sobre caballetes o lonas previstas para este fin en la zona de trabajo.	- General safety equipment and elements such as straps, tighteners, poles, ladders, insulated blankets, etc., will be stored on horses or tarps provided for this purpose in the work area.
- Deberán cumplir, cuando existan, las normas UNE, las recomendaciones UNESA, las publicaciones CEI.	- All UNE norms, UNESA recommendations or CEI publications must be applied where applicable.
- Las condiciones de recepción del material y de las herramientas estarán determinadas según ensayos de aislamiento y de resistencia mecánica.	- The conditions for receiving materials and equipment will be determined by the results of insulation and mechanical resistance testing.
- Se comprobará su estado en ensayos de laboratorio con la periodicidad establecida. Cuando se detecten defectos, se subsanarán antes de devolver los materiales al equipo de trabajo.	- Equipment will be subjected to laboratory testing according to an established schedule. Defects will be repaired or corrected before equipment is returned to service.
- Cuando en el lugar de trabajo se detecten defectos del material, se retirará y se pondrá sobre él una indicación que prohíba su uso.	- When defects in materials are detected in the work area, they will be removed and marked as inappropriate for use.
- Los vehículos especiales estarán dotados de un documento que indique la forma de verificarlos en el lugar de trabajo y permita registrar el resultado de dichas verificaciones, las operaciones de entretenimiento fuera y dentro del lugar de trabajo, y los controles periódicos a efectuar. Toda operación estará fechada y visada por el responsable de la misma.	- Special vehicles will have a document indicating the on-site verification procedures, registration of the results of this verification, operations performed on and off site, and the periodic checks to be performed. All maintenance operations will be dated and signed by the supervisor.
6.4 RÉGIMEN DE OPERACIÓN ELÉCTRICA	6.4 ELECTRICAL OPERATIONS
En función de las condiciones de explotación de las instalaciones, se establecen dos regímenes de operación;	Two modes of operation are established depending on the operational conditions of the installations:
- Régimen de operación normal o no restrictivo	- Normal and non-restrictive operational mode
- Régimen de operación especial o restrictivo	- Special or restrictive operational mode

La declaración del “régimen de operación” es competencia exclusiva del Responsable de cada uno de los parques.

The designation of an “operational mode” is the exclusive responsibility of the Manager of each site.

Las condiciones que determinan el régimen de operación son las siguientes:

The conditions determining the operational mode are the following:

Régimen de operación normal o no restrictivo

Normal and non-restrictive operational mode

Se considerará este régimen de operación cuando las condiciones de explotación del sistema eléctrico a operar no ofrezca dudas de su plena capacidad de maniobrabilidad operativa y funcional, y cuando las condiciones atmosféricas no impliquen riesgos razonables de intervención.

This operational mode is established when the operational conditions of the electrical system do not present any doubts as to its full operational and functional capacity and when atmospheric conditions do not present any reasonable risk.

Se considerará régimen normal de operación cuando:

The conditions of normal operational mode are when:

La instalación ya ha estado sometida a tensión.

The installation has been powered.

Cuando no existan “alarmas” activas en el sistema.

There are no active “alarms” in the system.

Cuando la instalación ha sido revisada y comprobada con éxito de acuerdo con el protocolo de comprobaciones previas a la energización que se tiene establecido para cada tipo de Aerogenerador.

When an installation has been revised and verified successfully prior to powering in accordance with the established protocol for each type of turbine.

Cuando no existan condiciones meteorológicas o atmosféricas adversas entendiendo como tales, las tormentas, lluvias y vientos fuertes.

When there are no adverse atmospheric conditions which may pose risks such as storms, rain or strong winds.

Cuando de la inspección visual de la instalación previa a la intervención no se detecten anormalidades que hagan sospechar incremento de riesgos en la intervención, tales como ruidos anormales, humedades, olores, humo, vibraciones anormales, etc.

When the visual inspection of the installation prior to the execution of work does not detect any abnormalities which may suppose an increase in risk such as abnormal noises, humidity, smells, smoke, abnormal vibrations, etc.

En este régimen de operación normal, serán de aplicación directa las Instrucciones tal y como están definidos sin ninguna otra restricción más que las propias contendidas en las instrucciones y comprobaciones de los propios procedimientos.

In this normal operational mode, the instructions will be applied as indicated without any additional restrictions other than those contained in normal procedures.

Régimen de operación especial o restrictivo

Special or restrictive operational mode

Se considerará régimen de operación especial o restrictivo cuando las condiciones de explotación del sistema eléctrico a operar ofrezcan dudas razonables de su plena capacidad de maniobrabilidad funcional, o cuando las condiciones atmosféricas sean adversas.

This operational mode is established when the operational conditions of the electrical system appears to present doubts as to its full operational and functional capacity or in the case of adverse weather conditions.

Se considerará régimen especial o restrictivo de operación cuando:

Conditions of special or restrictive operational mode are when:

- Es la primera vez que se energiza la instalación.

- It is the first time the installation will be powered.

- Cuando existan alarmas activas en el sistema.

- When there are activated alarms in the system.

- Cuando se maniobra para la detección y localización de una avería en el sistema.

- When attempting to detect and locate a defect or malfunction in the system.

- Cuando la instalación que va a recibir tensión, lleve desenergizada más de tres días seguidos y no haya sido revisada y comprobada con éxito de acuerdo con el protocolo de comprobaciones previas a la energización que se tiene establecido para cada tipo de Aerogenerador

- When the installation to be powered has been without power for more than three days and has not been checked or verified successfully in accordance with the established protocol for each type of turbine.

- Cuando existan condiciones meteorológicas o atmosféricas adversas entendiendo por tales “cuando se vean relámpagos o se oigan truenos, o en caso de inminente aproximación de una tormenta acompañada de relámpagos.

- In the event of adverse weather conditions, understood as “when there is lightning or thunder or in the case of an imminent electrical storm”

- Cuando de la observación visual de la instalación previa a la intervención se detecten anormalidades que hagan sospechar incrementos razonables de riesgo en la intervención, tales como ruidos anormales, humedades, olores, humo, vibraciones anormales, etc

- When the visual inspection of the installation prior to the execution of work detects abnormalities which may suppose an increase in risk, such as abnormal noises, humidity, smells, smoke, abnormal vibrations, etc.

- Cuando a pesar de que la instalación haya sido revisada y comprobada de acuerdo con el protocolo de comprobaciones previas a la energización que se tiene establecido para cada tipo de Aerogenerador, existan dudas razonables de incremento de riesgo en la intervención.

- When the installation has been checked or verified in accordance with the established protocol for each type of turbine there are still reasonable doubts as to the increased risk of the operation.

- En este régimen de operación especial o “restrictivo” se adoptarán las medidas complementarias a las Instrucciones tendentes a la eliminación del “riesgo” para las personas, en primer lugar, y para las instalaciones o las cosas en segundo lugar.

- In this special or “restrictive” operational mode, measures in addition to those indicated in the instructions will be taken in order to eliminate the risk to personnel, firstly, and for the installations or objects secondly.

- En la adopción de estas medidas se dará prioridad a lo siguiente:

- In adopting these measures, priority will be given to the following:

- Que sean maniobradas sin tensión en alta tensión.

- That they are performed without power in the high tension installation.

- Que cuando tengan que ser energizadas esta operación se realice sin presencia de personal en el interior de la misma.

- That when the system is powered, personnel will not remain inside the turbine.

- Que la energización a distancia de la instalación se realice bien desde un interruptor seccionador, si el riesgo es moderado o bajo, o bien desde un interruptor-disyuntor si el riesgo es moderado – alto.

- When powering up from a distance, this is performed using a selector switch when risk is moderate or low and using a circuit-breaker switch if the risk is moderate to high.

6.5 TRABAJOS EN BAJA TENSIÓN

6.5 WORK IN LOW TENSION (LT)

Los tipos de trabajo en baja tensión en los que se deberán seguir los requisitos que se contemplarán en

The requirements included in this section are for the following types of operations in low tension installations:

este capítulo son:

- Conexión y desconexión de la línea en entrada. Por ejemplo para el recambio del cabezal de entrada o de la caja de conexión.

- Connection and disconnection of the power entry line. For example, for the replacement of the entry cable or the connection box.

- Montaje de interruptores de la red y fusibles en líneas de reparto.

- Installation of the network switches and power line fuses.

- Montaje y desmontaje de descargadores de sobretensión.

- Assembly and disassembly of the overload discharger.

- Recambio de bornes en conductores de corriente.

- Replacement of the conductor power terminals.

- Montaje de manguitos en derivación de cables y de empalmes.

- Installation of insulating sleeves for lines and connections.

- Conexión y desconexión de cables en distribuidores.

- Connection and disconnection of power distribution cables.

- Montaje y desmontaje de las partes inferiores de fusibles y laminillas-fusible en distribuidores.

- Assembly or disassembly of the lower fuse parts and laminate-fuses in distribution lines.

- Reapriete de bornes.

- Re-tightening of the terminals

- Recambio de cajas de conexión.

- Replacement of connection boxes.

- Trabajos en cajas de conexión. Por ejemplo, el recambio de las partes inferiores de fusibles.

- Work on connection boxes. For example, the replacement of lower fuses parts.

- Conexión y desconexión de instalaciones de medición. Por ejemplo, para mediciones en tensión, corriente y potencia.

- Connection and disconnection of measuring equipment, for example for power, tension and current.

6.5.1 FORMACIÓN DEL PERSONAL PARA TRABAJOS EN BT

Las personas que efectúen trabajos en baja tensión, deberán haber recibido una formación correspondiente a los fundamentos en los que se basa la realización del trabajo en tensión en baja tensión, y habrán superado una prueba de conocimientos y aptitudes.

Para adquirir la formación suficiente que les capaciten para desarrollar cualquier trabajo concreto o Procedimiento de Operación, bastará con el estudio y ensayo de los Procedimientos de Operación básicos y de un número determinado de Procedimientos de Operación completos que determine la Empresa. No obstante, aquellos que revistan dificultad quedarán recogidos por escrito.

6.5.1 PERSONNEL TRAINING FOR WORK WITH LT INSTALLATIONS

The operators performing tasks in low tension must have received the appropriate training for work with tension in low tension and have passed a test of their knowledge and aptitudes.

In order to acquire sufficient training to perform any type of specific operation or Operating Procedure, the study and testing of the basic Operating Procedures will be sufficient, with a number of completed Operating Procedures as determined by the Company. However, those having difficulties will be noted in writing.

6.5.2 MÉTODOS DE TRABAJO EN BAJA TENSIÓN

- TRABAJOS EN CONTACTO

En este método el operario se aísla del conductor por medio de dispositivos y equipos aislantes.

Protección del operario

Con accesorios aislantes (pantallas, vainas,...) para cubrir conductores desnudos o que presenten aislamiento defectuoso, los aisladores y las masas.

Con dispositivos aislantes (plataformas, banquetas, alfombras).

Utilizando protección personal (guantes, gafas, casco).

Utilizando ropa de trabajo normal que cubra brazos y piernas.

Realización de los trabajos

Deberá revestir los conductores y masas con los que pueda entrar en contacto a medida que avanza en su trabajo.

En cables subterráneos se revestirán las canalizaciones o zanjas y las masas con las que se pueda entrar en contacto al mismo tiempo que con el conductor en tensión.

Toda persona que pueda tocar a un operario directamente o por medio de herramientas, llevará guantes aislantes y se situará sobre una superficie aislante.

- TRABAJOS A DISTANCIA

En este método el operario ejecuta el trabajo a distancia con la ayuda de herramientas montadas en el extremo de pértigas o aislantes.

Protección del operario

Por alejamiento de los conductores a distancias prescritas, por medio de pértigas o dispositivos aislantes.

Utilizando protección personal (guantes, gafas, cascos).

Utilizando ropa de trabajo normal que cubra brazos y

6.5.2 WORK METHODS FOR LT INSTALLATIONS

- WORK IN CONTACT

In this method, the operator is shielded from the conductor by insulating equipment and elements.

Protection of the operator

Insulating elements (screens, covers, etc) for conductors which are bare or have defective insulation, and the mass.

With isolating elements (platforms, shields, blankets, etc).

Personal protection equipment (gloves, safety glasses, hardhat).

Use of appropriate clothing covering arms and legs.

Execution of the work

Conductors and masses with which the operator may come into contact as work progresses must be insulated.

For buried cables, the surfaces of conduits and trenches must be protected as well as the masses with which operators may come into contact at the same time as a live conductor.

All personnel who may come into contact with an operator, directly or through tools, must wear insulated gloves and will be positioned on an insulated surface.

- WORK AT A DISTANCE

In this situation, the operator performs the operation from a distance using tools mounted on the end of poles or insulating equipment.

Protection of the operator

Operators must remain at an established safety distance by using poles or insulated equipment.

Using personal protection equipment (gloves, safety gloves, hardhat).

Use of appropriate clothing covering arms and legs

piernas.

Realización de los trabajos

Entre un conductor y la parte del cuerpo del operario más próxima a aquél no deberá existir menos de 40 cm. Si esta distancia no puede mantenerse, habrá que revestir el conductor.

Execution of the work

The operator must maintain a distance of 40 cm at all times from the conductor. If this distance cannot be maintained, the conductor must be insulated.

- CONDICIONES ATMOSFÉRICAS

Trabajos en contacto

Con precipitaciones atmosféricas, viento o niebla, el trabajo en instalaciones exteriores podrá comenzarse o interrumpirse a juicio del Jefe de Trabajo.

Con tormenta eléctrica no se comenzará el trabajo o se interrumpirá, en caso de haber empezado, tanto en el interior como en el exterior

- ATMOSPHERIC CONDITIONS

Work in contact

In the case of rain, wind or fog, work performed in exterior installations should not be initiated or be suspended according to the judgment of the Work Supervisor.

In the case of an electrical storm, both interior and exterior works should not be initiated or be suspended.

Trabajos a distancia

Con precipitaciones atmosféricas o niebla, el trabajo podrá comenzarse y terminarse, y si hay viento se someterá a juicio del Jefe de Trabajo.

Con tormenta no se comenzará el trabajo, y de haberse iniciado, se interrumpirá.

Work at a distance

In the case of rain or fog, the work may be initiated or continued. In the case of high wind, the decision will depend on the Work Supervisor.

In the case of an electrical storm, work should not be initiated or be suspended.

6.6 TRABAJOS EN ALTA TENSIÓN

Trabajos sin tensión en Alta tensión

Se entenderá por trabajo sin tensión en alta tensión a todo trabajo realizado en instalaciones eléctricas sin tensión y sin carga eléctrica que se realiza después de haber tomado todas las medidas para prevenir el riesgo eléctrico, entre las más fundamentales, la aplicación de las “CINCO REGLAS DE ORO”.

Para la ejecución de las acciones, operaciones o maniobras necesarias para la aplicación de las cinco reglas de oro, es absolutamente obligatorio seguir estrictamente las Instrucciones de Uso que cada instalación tiene elaboradas.

Tanto el Jefe de Trabajos como cualquier Trabajador Autorizado debe pedir al Responsable de Instalación los procedimientos operativos o las Instrucciones de Uso para cada tipo de Aerogenerador en el que van a intervenir.

6.6 WORK IN HIGH TENSION (HT)

Work without power in High Tension

Work without power in high tension includes all work performed on electrical installations without power and without electrical charge. This work is performed after all the precautionary measures for electrical risk have been taken, especially the “FIVE GOLDEN RULES”.

For the performance of actions or operations required for the application of the five golden rules, it is absolutely obligatory to follow the Operation Instructions provided for each installation.

Both the Work Supervisor or any Authorized Worker may request the Installation Manager for the operational procedures or the Use Instructions for each type of turbine on which work is to be performed.

Trabajos en proximidad en Alta Tensión

Se entenderá por trabajo en proximidad, a todo trabajo

Work in the proximity of High Tension

Work in the proximity of high tension installations is

durante el cual el Trabajador entra, o puede entrar, en la zona de proximidad, es decir, invadiendo la distancia Dprox a un punto desnudo en tensión, sin entrar en la zona de peligro, bien sea con una parte de su cuerpo, o con las herramientas, equipos, dispositivos o materiales que manipula.

understood as when a Worker enters, or may enter, into the zone of proximity. That is, when an operator or their tools, equipment or materials, moves within the Dprox distance of a bare element in tension, without entering into the danger area.

Los trabajos en proximidad deben limitarse a los estrictamente imprescindibles, y siempre cumpliendo los siguientes requisitos:

Work in proximity should be limited to when strictly necessary and always meeting the following requirements:

- Todo trabajo en proximidad debe ser expresamente autorizado por el Responsable de Instalación.

- All work in proximity must be expressly authorized by the Installation Manager.

- El trabajo en proximidad debe ser realizado únicamente por un Trabajador Cualificado

- All work in proximity must only be performed by Qualified personnel.

- El trabajo en proximidad debe estar precedido por un plan específico de seguridad para ese trabajo concreto, en donde se determinen claramente los riesgos posibles, los puntos en tensión, el método de trabajo a realizar y las medidas de prevención específica que se adoptan.

- A specific safety plan must be created for each operation in proximity to HT installations, clearly identifying possible risks, points in tension, work methods and the specific risk prevention measures to be adopted.

- Dentro de las medidas de prevención a adoptar estará el nombramiento de un Trabajador Autorizado cuya misión específica será el control de los movimientos del Trabajador o Trabajadores que puedan invadir la zona de proximidad al objeto de velar porque en ningún caso puedan llegar a invadir la distancia de peligro al punto en tensión.

- As part of the adopted prevention measures, an Authorized Worker must be designated to supervise the movements of the operator(s). This person ensures that operators entering into proximity of HT installations in no case encroach on the danger zone of an element in tension.

<u>Trabajos en tensión en Alta tensión</u>

<u>Work in powered high tension installations</u>

Se entenderá por trabajo en tensión en alta tensión, todo trabajo durante el cual un Trabajador entra deliberadamente en contacto con partes en tensión o entra deliberadamente en la zona de trabajo en tensión, es decir, invade la distancia de peligro Dpel1 o Dpel2, bien sea con una parte de su cuerpo o con las herramientas, equipos o dispositivos que manipule.

Work in the proximity of high tension installations is understood as when a Worker deliberately comes into contact with elements in tension or enters the danger zone (Dzone1 or Dzone2) either with parts of the body or tools and equipment being used.

No se consideran como trabajos en tensión las maniobras y las mediciones ensayos y verificaciones definidas a continuación:

The operations, testing, measurement and verification activities listed below are not considered as working in tension:

Maniobra: intervención concebida para cambiar el estado eléctrico de una instalación eléctrica no implicando montaje ni desmontaje de elemento alguno.

Operations: intervention designed to change the status of an electrical installation not involving the assembly or disassembly of any elements.

Mediciones, ensayos y verificaciones: actividades concebidas para comprobar el cumplimiento de las especificaciones o condiciones técnicas y de seguridad necesarias para el adecuado funcionamiento de una instalación eléctrica, incluyéndose las dirigidas a comprobar su estado eléctrico, mecánico o térmico, eficacia de protecciones, circuitos de seguridad o

Testing, measurements and verifications: activities designed to verify the compliance with specifications or technical and safety conditions necessary for the proper functioning of the electrical installation. These include checking the electrical, mechanical or thermal status, effectiveness of insulation, safety or operating circuits, etc.

maniobra, etc.

Únicamente personal especializado y específicamente autorizado para ello, podrá realizar trabajos en tensión en alta tensión, y siempre con la autorización expresa del Responsable de la Instalación.

Only specialized and specifically authorized personnel may perform work in high tension installations and always with the expressed authorization of the Installation Manager.

Está terminantemente prohibido invadir la distancia de peligro Dpel a cualquier punto en tensión de la instalación de alta tensión.

It is strictly prohibited to enter into the danger zone (Dzone) of any element in tension of high tension installations.

Antes de acceder bajo los tramex de la plataforma inferior o a cualquier otro punto, se deberá garantizar que no existe ni puede existir accidentalmente tensión en la instalación

Before accessing below the lower platform or any other point, the system must be checked to ensure there does not and cannot accidentally exist tension in the installation.

6.7 TENSIÓN EN MÁQUINA CUANDO ESTA VA A EMERGENCIA.

El estado de emergencia deja sin tensión varios subsistemas de la máquina pero se deberá tener en cuenta que las siguientes zonas siguen en tensión en dicho caso.

BASE DE TORRE:
- 12kV en cables de entrada y salida de turbina hasta celdas y en embarrados de celdas.
- 12kV/690v/400V en el propio transformador de auxiliares.
- 690V desde el transformador de auxiliares hasta la acometida del convertidor de potencia.
- 400V/230V desde el transformador de auxiliares hasta el convertidor de potencia, y dentro del mismo, el compartimento de acometida de 400V y el compartimento de control. También hay 230V en el cajón de control de las celdas y 400V en el armario del ascensor.

TORRE:
- 400V/230V en los cables de alimentación a top.
- 400V en el cable del ascensor.

NACELLE:
- 400V hasta la acometida de 400V del compartimento de fuerza del top controller.
- 230V hasta la acometida de 230V del compartimento de control del top controller y distribuidos dentro del mismo compartimento.
- 230V en circuito de luminarias.
- 400V de alimentación de polipasto.
- 230V hasta armario de variadores.
- 400V/230V en armario KBT y en aerotermos en la versión bajas temperaturas.

Todos los enchufes permanecen en tensión.

6.7 POINTS WITH VOLTAGE WHEN THE TURBINE IS OPERATING IN EMERGENCY MODE

Emergency state involves removing voltage from some turbine systems, but the following areas will remain energized in such situation.

TOWER BASE:
- 12kV in turbine inlet and outlet power cables and in switchgear bars.
- 12kV/690V/400V in the auxiliaries transformer.
- 690V from the transformer to power converter 690V connection.
- 400V/230V from the transformer to the power converter 400V connection, and inside the converter cabinet, the 400V incoming compartment and the control compartment. Also 230V inside the switchgear control box and 400V in the lift cabinet.

TOWER:
- 400V/230V in top supply cables.
- 400V in lift supply cable.

NACELLE:
- 400V cable to 400V incoming in top controller left compartment.
- 230V cable to 230V incoming in top controller control compartment, and also inside the control compartment
.
- 230V in lighting circuit.
- 400V hoist supply.
- 230V to drives cabinet.
- 400V/230V in KBT cabinet and air heaters in low temperatures version

All sockets remain powered.

7.- **NORMAS BÁSICAS GENERALES**

- Las medidas de seguridad generales recogidas en este documento son adicionales a las medidas de seguridad particulares derivadas de la evaluación de riesgos de cada uno de los trabajos a realizar en el

7.- **BASIC GENERAL NORMS**

- The general safety measures indicted in this document are in addition to the specific safety measures derived from an evaluation of the risks for each task to be performed in the

aerogenerador.

7.1 FORMACION

Además de la relacionada con la actividad a desarrollar, toda persona que ascienda a cualquier parte del aerogenerador deberá haber sido formada en los siguientes puntos:

- Seguridad en parques eólicos. Trabajos en altura en aerogeneradores.

- Plan de emergencias en parques eólicos. Evacuación de emergencia del aerogenerador. Uso del descensor

- Uso de elevadores (cuando se trabaje en máquinas con elevador).

- Normativa de seguridad: Plan de seguridad y salud en fase en construcción y Fichas de Seguridad en fase de mantenimiento.

Esta formación se deberá acreditar en la documentación que se entregue según lo especificado en el procedimiento de “Coordinación de Actividades Empresariales”

7.2 NORMAS BÁSICAS A CUMPLIR EN GENERAL

- Antes de comenzar cualquier trabajo en el aerogenerador se debe colocar la siguiente señalización en la puerta de la Nacelle: “Atención prohibido el paso. Personal trabajando en las instalaciones”

- En todo momento respete las normas y medidas de seguridad para el acceso y permanencia en el parque y en el aerogenerador

- Intente mantener el orden y la limpieza de la zona de trabajo, recoja sus herramientas y materiales una vez finalizado su uso.

- No dé por finalizada una tarea mientras no esté bien recogida la zona de trabajo en la que lo ha realizado. Limpie las salpicaduras de grasa y aceite, recoja los papeles, plásticos u otros materiales de desecho y deposítelos en un contenedor de recogida de residuos

- Se deberá dejar libre de residuos de cualquier tipo, el espacio que queda entre ground y celda, ya que se trata de zona de paso y salida, sobre todo teniendo en cuenta que se pueda producir una emergencia.

- No se podrán almacenar materiales potencialmente inflamables cerca de componentes eléctricos conectados y con tensión.

turbine.

7.1 TRAINING

In addition to the instructions provided for the work to be performed, all personnel accessing any part of the turbine must be trained in the following points:

- Safety in wind farms. Work at heights in wind turbines.

- Wind farm emergency plan. Emergency evacuation of the turbine. Use the descent device.

- Use of lifts (where applicable).

- Safety rules: Health and Safety Plan for the construction phase and the Residual Risks sheets for the operation and maintenance phase.

This training must be certified and the related documentation provided as specified in the procedure “Co-ordination of Business Activities”.

7.2 GENERAL BASIC NORMS

- Before starting any work in the wind turbine, one must place the following sign on the door of the Nacelle: “Attention NO ENRTY. Staff working in turbine”

- Safety norms and measures must be respected at all times when accessing the site and in the turbine.

- Keep work areas clean and tidy; store tools and materials after use in assigned area or tool box.

- A task is not considered complete until the work area has been cleared of materials and tools. Clean remains of oil and grease, collect papers, plastic or other waste materials and deposit them in the appropriate containers for disposal.

- The place between the ground and switch cabinet must be free of any type of waste as it is a passage and exit way in the event of an emergency.

- It is forbidden to store potentially flammable materials near electrical components connected and energized.

- No está permitido fumar durante la estancia en la máquina

- It´s forbidden to smoke during you stay in the windturbine.

- No se trabajará en las proximidades de aquellas torres que cuenten con nieve o hielo en la nacelle, buje o palas, ya que ante cualquier movimiento esta puede caer bruscamente.

- Work will not be performed in the area of turbines with snow or ice on the nacelle, blades or hub, as any sudden movement can cause it to fall.

- Esta terminantemente prohibido hacer fuego en el interior del parque eólico. Si ha de realizarse una tarea específica que implique riesgo de incendio, se dispondrá al menos un extintor en las proximidades de la zona de trabajo. En cualquier caso se deberá solicitar autorización expresa del propietario de la instalación.

- It is prohibited to make any fire on the site. When performing a specific task which implies the risk of fire, at least one fire extinguisher will be located in the proximity of the work area. These activities will require the express authorization of the site owner.

7.3 NORMAS BÁSICAS A CUMPLIR CON HERRAMIENTAS MANUALES Y MÁQUINAS PORTÁTILES

7.3 BASIC SAFETY NORMS FOR HAND TOOLS AND PORTABLE EQUIPMENT

- Las herramientas manuales se utilizarán en aquellas tareas para las que han sido concebidas. Al realizar aprietes, evite colocar la mano entre el mango del brazo de apriete y al pared del tramo. Le recomendamos que agarre el mando metiendo los dedos por el hueco que dispone al extremo.

- Manual tools must only be used for the tasks for which they were designed. When tightening bolts, avoid placing hands between the handle of the wrench and the wall of the section. It is recommended to hold the handle placing fingers into the holes provided at the end of the tool.

- Antes de su uso se revisarán, desechándose las que no se encuentren en buen estado de conservación. Se mantendrán limpias de aceites, grasas y otras sustancias resbaladizas.

- All tools must be checked before use, discarding those which are not in good condition. Keep tools free of grease, oils and other slippery substances.

- La trampilla de la nacelle se mantendrá cerrada en todo momento. Para evitar caídas, cortes o riesgos análogos, las herramientas se colocarán en portaherramientas o estanques adecuados. Durante su uso se evitará su depósito arbitrario por los suelos.

- The hatch of the nacelle must remain closed at all times. To avoid falls, cuts or other risks, tools must be carried in the appropriate tool belts or bags.

- Las herramientas portátiles eléctricas dispondrán de marcado CE / ANSI y estarán protegidas contra contactos directos e indirectos. Los motores eléctricos estarán protegidos por la carcasa y resguardos propios de cada aparato. Las transmisiones motrices por correas estarán siempre protegidas.

- Portable electrical tools must be CE / ANSI / UL / FM certified and protect against direct and indirect contact. Housings and cords must be inspected for defects. Drive chains and belts must have a guard at all times.

- Las máquinas con capacidad de corte tendrán el disco protegido mediante carcasa antiproyecciones. Se prohíbe dejar las herramientas eléctricas de corte o taladro abandonadas en el suelo, o en marcha, aunque sea con movimiento residual en evitación de accidentes.

- Cutting tools must have a shield around the blade to guard against flying particles. It is prohibited to leave electric cutting tools or drills on the ground or running even if it is merely the residual movement to avoid accidents.

- Sólo se permitirá el uso de cutters de cuchilla retráctil

- Only utility knives with retractable blade will be permitted.

7.4 USO DE TRACCIONADORES Y ATORNILLADORES HIDRÁULICOS (CASSETTE)

- No utilizar traccionadores si antes no se ha recibido la formación adecuada

- Siempre que se utilicen traccionadores, se comprobará que las partes que trabajan con presión no están dañadas.

- Una vez que se aplique presión, bajo ningún concepto se colocará el personal delante del traccionador. Deberá evitar en la zona en la que ante una rotura, la trayectoria de la pieza despedida pueda colisionar con el trabajador.

- Siempre que se observe un funcionamiento anómalo o sospechoso se retirará el traccionador y se dejará fuera de servicio, hasta que sea revisado por el suministrador del mismo.

- Antes de enroscar el traccionador sobre el perno, compruebe que esté galgado con la medida correcta.

- No aplique nunca presión hasta que el traccionador esté perfectamente asentado en todo su perímetro y firmemente roscado al perno.

- De igual modo, nunca intente desconectar un elemento mientras el equipo se encuentre sometido a presión.

Ante cualquier incidente con un traccionador no se debe tocar nada y se debe dar aviso al encargado o al Jefe / gestor del parque

7.4 USE OF HYDRAULIC TENSIONERS AND WRENCHES (CASSETTE)

- Tensioners should only be used by qualified personnel

- When using tensioners, verify that the parts working under pressure are in perfect condition without any sign of damages.

- Once pressure is applied, under no circumstances will personnel position themselves in front of the tensioning head. Personnel must stay clear of the area directly in front or over the tensioning head.

- If any defects or improper operation is observed remove the tensioner from service immediately until it can be checked by the supplier or manufacturer.

- Before screwing the tensioner on the bolt, ensure that it is set with the correct bar/PSI setting.

- Never apply pressure until the tensioner is perfectly placed all around the perimeter and firmly screwed on the bolt

- Never try to disconnect any of the elements while the equipment is under pressure.

In the case of any incident with the tensioner, do not touch anything and notify a supervisor or maintenance personnel immediately.

7.5 SOLDADURAS Y SOPLETES

- Queda totalmente prohibido su utilización. Si debido a la naturaleza de los trabajos a desempeñar, es imprescindible su uso, se deberá presentar un procedimiento con las medidas de seguridad a tomar y solicitar autorización expresa del propietario de la instalación.

7.5 WELDING AND TORCHES

- The use of this equipment is prohibited. If the nature of the task requires their use it must be authorized by the site owner and hot work procedures followed.

7.6 IZADO Y MANIPULACION DE MATERIALES

- Priorice siempre el uso del polipasto para izar materiales hasta la nacelle. Cuando se utilice el polipasto, seguir las indicaciones del apartado 5.3.

- Los materiales que se suban por el polipasto se colocarán en bolsas resistentes y adecuadas que no permitan la posible caída de los mismos.

- Si se utiliza el elevador para subir y bajar herramientas y objetos, nunca se sobrepasará la carga nominal del

7.6 HOISTING AND HANDLING OF MATERIALS

- The hoist is the primary tool to lift materials to the nacelle. When using the hoist follow the steps as described in section 5.3.

- Materials lifted will be placed in a closable bag to prevent possible falling material.

- If using the lift to transport materials and equipment, never exceed the maximum weight restriction (indicated in the lift

mismo (indicada en el propio elevador) ni se deteriore la estructura o los mecanismos del elevador

itself). Prevent any damage to the lift structure and mechanisms.

- Evite colocar las manos bajo una carga. Si la transporta entre dos o más personas esté atento a las indicaciones recibidas, dado que si no retira en su debido momento las manos, éstas pueden quedar atrapadas entre la carga y la superficie de apoyo.

- If transporting a load between two or more people pay attention to hand placement to avoid the crushing of fingers between the load and the support surface.

- Priorice el uso de las ayudas mecánicas (polipasto, grúas, carros, etc) en el movimiento de cargas. Si ha de mover manualmente algo muy pesado o muy voluminoso, solicite ayuda a algún compañero. Siempre que esté cargado, mantenga la espalda recta, si ha de agacharse, hágalo flexionando las piernas y no la espalda.

- Use mechanical hoisting equipment (hoists, cranes, lifts, etc.) in the lifting of heavy loads when possible. If a heavy or cumbersome load must be moved manually, request help from a colleague. Keep the back straight when lifting. If you must bend over, flex the legs rather than the back.

- Evite permanecer mucho tiempo en posturas forzadas que le obliguen por ejemplo a mantener la espalda o el cuello curvados. Cuando se vea obligado a adoptar estas posturas, haga pequeñas pausas en una posición adecuada o intente alternar con otras tareas más livianas a este respecto.

- Avoid remaining in the same position for extended periods of time. When required to adopt these positions, take short pauses to change position or try to alternate with other easier tasks.

7.7 MANIPULACIÓN DE OBJETOS Y HERRAMIENTAS EN EL INTERIOR DE LA TORRE

7.7 HANDLING OF OBJECTS AND EQUIPMENT INSIDE THE TOWER

- Si no puede hacer uso del polipasto, suba las cargas bien amarradas y en bolsas portaherramientas homologadas que le permitan tener las manos libres.

- If hoists can't be used, carry loads in approved tool bags which leave the hands free.

- Siempre que se trabaje o se manipulen objetos o herramientas en el interior de la torre se tomarán las siguientes medidas de seguridad;

- When working with or handling objects or tools inside the tower, the following safety precautions must be taken:

* los objetos y herramientas se subirán en una bolsa portaherramientas específica homologada

* Objects and tools are carried up in an approved tool bag.

* Ningún trabajador se situará en un nivel inferior al del lugar donde se encuentran los objetos o herramientas.

* The area below the work area is clear of personnel at all times.

* Se colocará señalación en la puerta del aerogenerador, prohibiendo el acceso al mismo.

* Safety signage must be posted on the door of the turbine, barring access to the same.

* si se accede a la plataforma del tercero, la trampilla se mantendrá cerrada en todo momento

* When accessing the third platform, the hatch should remain closed at all times.

* en ningún caso se manejaran de forma manual cargas superiores a 20kg

* Never manually handle loads above 20 kg.

7.8 USO DE GRUAS

7.8 USE OF CRANES

- Debido a la peligrosidad del trabajo con grúas autopropulsadas se deberán extremar las medidas de protección adaptándose a la legislación vigente.

- Due to the dangers inherent in work with self-propelled cranes, extra safety precautions should be taken in accordance with applicable regulations.

- Nunca se superarán los límites de viento a la hora de

- Never hoist loads when maximum wind speeds are

levantar las cargas y no se iniciará el trabajo si la plataforma de apoyo de la grúa no es la adecuada. Se evitará trabajar con condiciones atmosféricas adversas.

exceeded and never being work if the support platform or base for the crane is not appropriate. Avoid working in adverse atmospheric conditions.

- Este tipo de tareas requieren la presencia de un recurso preventivo. (Ver apartado 7.11)

- This type of operation requires the presence of a Loss Prevention Officer. (See section 7.11)

- En cada una de las operaciones se establecerá la persona que puede dar las órdenes al gruista, y el cual contará con la formación y medios adecuados.

For each operation, a supervisor will be designated to give orders to the crane operator. The supervisor will have the appropriate training and equipment to perform this task.

- El personal para el manejo de grúas deberá tener la formación adecuada para su uso, además de estar en posesión de los permisos pertinentes.

- Crane operators must have appropriate training for their work and have all required licenses and permits.

- Se tomarán las medidas necesarias para señalizar y evitar que personas ajenas a los trabajos se acerquen a la zona de influencia de la grúa.

- The appropriate steps will be taken to ensure that the area has the proper signs posted to prevent unauthorized or external persons from entering the crane area.

- Nunca se permanecerá ni se transitará bajo el área de influencia de la carga.

- Never remain or pass beneath suspended loads or the load path.

- Durante los trabajos no deberá permanecer persona alguna en el radio de acción de las máquinas.

- No personnel should be in the radius of action of the cranes during hoisting operations.

- El maquinista no debe abandonar la cabina si tiene una carga suspendida.

- The operator must not leave the cabin while a load is suspended.

Acopios de materiales

Stockpiling of materials

- Los acopios se realizarán en zonas lo mas horizontales posible, intercalando piezas de madera que eviten deslizamientos, mantengan la horizontalidad y permitan el posterior enganche. Estos separadores deben colocarse en la misma vertical. Debe evitarse el apilado a gran altura.

- Materials will be stacked in areas which are as horizontal as possible. Pieces of wood should be used to prevent falls. Maintaining level piles and allowing materials to be easily removed later. These separators should be introduced in the same direction of the materials. Avoid creating high stacks of materials.

- En el caso de que por la naturaleza del acopio exista peligro de incendio, se instalará un extintor cercano.

- A fire extinguisher should be at hand if the materials pose a risk of fire.

7.9 USO DE PLATAFORMAS DE TRABAJO EN LAS INMEDIACIONES DEL AEROGENERADOR:

7.9 USE OF WORK PLATFORM ON THE SURROUNDINGS OF THE WIND TURBINE;

- Para aquellos trabajos que sea necesario acceder por el exterior a cualquier parte elevada del aerogenerador se utilizarán plataformas elevadoras homologadas, y con un mantenimiento preventivo adecuado.

- Certified work platforms will be used for work requiring operators to access the exterior of any turbine.

- El uso de plataformas elevadoras queda restringido a personal autorizado y con la formación suficiente. Las instrucciones marcadas en el manual de uso serán de obligado cumplimiento en todo momento. Cuando en un mismo parque concurran diversas plataformas elevadoras, se tendrá en cuenta las instrucciones del fabricante de cada una de ellas.

- The use of a work platform will be restricted to authorized personnel only. The instructions marked in the instruction manual must be followed at all times. When there are different platforms on the same wind farm the manufacturer's instructions will be followed for each one

- Se verificará que la plataforma está nivelada, evitando las irregularidades del terreno, y no se podrán realizar trabajos al pie de taludes que presenten síntomas de inestabilidad. Si se utilizan estabilizadores, comprobar que están correctamente colocados y que no se puede actuar sobre ellos mientras la plataforma esté funcionando.

- It will be verified that the platform is leveled; avoiding irregularities in the terrain, and work will not be done next to slopes. If outriggers are used, ensure they are properly.

- Como norma general y salvo que en las instrucciones de la plataforma se indique una velocidad inferior, la velocidad de viento máxima permitida para su uso es de 12,5 m/s (28mph). Quedan prohibidos los trabajos por encima de esta cifra, así como en condiciones atmosféricas extremas.

- Unless the platform instructions indicate a lower speed, the highest speed allowed is 12.5 m/s (28mph). Operations are forbidden above this speed. Operations are forbidden in severe weather conditions.

- Previo a la puesta en marcha de la plataforma, se deberá comprobar el correcto funcionamiento de los controles

- Prior to starting of the platform, it must be inspected to ensure the correct operation of the controls.

- Comprobar la posible existencia de conducciones eléctricas de A.T. en la vertical del equipo. Habrá que mantener una distancia mínima de seguridad, aislarlos o proceder al corte de la corriente mientras duren los trabajos en sus proximidades.

- Check for electric wires overhead. It is necessary to maintain a minimum safe distance, isolating or switch off the line for the duration of the current work.

- No sobrecargar la plataforma de trabajo.

- Do not overload the platform

- No trepar por la barandilla ni utilizar elementos auxiliares para ganar altura.

- Do not climb over the railing or use other equipment or materials to gain height.

- No se podrá abandonar o acceder a la barquilla cuando ésta se encuentre en posición elevada, salvo que el manual de instrucciones indique lo contrario.

- You shall not leave or enter the platform when it is at high position. Except if the instructions manual states it must be done to perform the work.

- Se deberá estar anclado en todo momento, a los puntos de anclaje especificados en la plataforma antes de ponerla en funcionamiento, y no se soltará hasta que la maniobra se haya terminado y la máquina vuelva a estar en el suelo.

- You shall be anchored at all times to the anchor points in the platform before starting and not released until the maneuver is completed and the machine is back on the ground with the platform in the lowest position.

- Mientras se trabaja con la plataforma se deberá bloquear el movimiento de las turbinas (sistema yaw y rotor), según las instrucciones correspondientes, de manera que impidamos colisiones o interferencias durante la maniobra. Atención! el giro del yaw solo se anula con la máquina en modo emergencia!

- While working on a platform the turbines movement must be locked out (yaw and rotor system), according to the instructions. (Warning! the turning of the yaw is only locked with the turbine in “emergency” mode).

- Se deberá delimitar y balizar la zona de trabajo.

- The work area must be identified and barricades in place.

- En todo momento se garantizará una correcta comunicación entre el personal de suelo y el de altura.

- Ensure appropriate communication between staff at heights and staff on the ground at all times.

- Para realizar trabajos suspendidos se deberá presentar un procedimiento con las medidas de seguridad a tomar y solicitar autorización expresa para hacerlas al propietario de la instalación.

- For suspended work, a procedure indicating safety measures must be submitted and authorized by the site owner.

- Queda prohibido el uso de cestas de trabajo suspendidas de eslingas o cadenas. Solo en casos excepcionales se podrá usar cestas de trabajo fijadas al brazo de la grúa. En estos casos se deberá solicitar autorización expresa al propietario de la instalación para hacerlas, y será necesario:

- Work cages must not be suspended by slings or chains. Only work cages designed to be fixed to crane arms are be used. In these cases the authorization of the site owner is required and the equipment must:

* Que cumpla con la legislación vigente en todo momento.

* Comply with current legislation.

* Cumplir los requisitos sobre disposiciones mínimas de seguridad y salud para la utilización por los trabajadores de los equipos de trabajo.

* Meet the requirements established as the minimum workplace health and safety measures.

- Justificar su utilización como caso excepción. (Trabajo en alturas elevadas, el mercado no dispone de medios suficientes)

- Justify use for exceptional circumstances (Work at heights and no other equipment available).

- Disponer de un certificado realizado por técnico competente (Resistencia de la cesta y del acoplamiento). Proyecto en el que se indica la resistencia de la cesta, la resistencia de la unión, la velocidad de viento con la que se puede trabajar…

- Be certified by a qualified inspector (safety of the cage and connection). This must indicate the capacity of the cage, the connection and the maximum permitted wind speed for outdoor use.

- Elaborar las instrucciones de colocación, comprobación, utilización y revisión de la cesta, que permitan la formación del usuario y sus revisiones periódicas.

- Include instructions for connecting inspection and revision of the cage and provide adequate training to users and establishing periodic revisions.

- En las cestas de trabajo deben indicarse de forma permanente y clara, en un emplazamiento fácilmente visible:

- Work cages must indicate the following:

* Carga nominal en kilogramos;

* weight of cage in kilograms/pounds;

* Carga nominal expresada en el número autorizado de personas y del equipo en kilogramos;

* Maximum weight of cage and number of persons and equipment in kilograms and/or pounds;

* Velocidad máxima admisible del viento en metros por segundo;

* Maximum permitted wind speed in meters per second and/or miles per hour;

- Disponer de un medio de comunicación fiable operador de la cesta – gruista.

- provide a reliable communication system between the crane operator and the cage.

- Se dispondrá de un descensor de emergencia de manera permanente en la plataforma.

- Workers must be equipped with fall protection at all times while on the platform.

- Que se establezca una instrucción de trabajo, con la evaluación de los riesgos y las medidas preventivas.

- A work instruction must be created identifying and evaluating risks and determining prevention measures.

7.10 DESCAPOTADO DE LA NACELLE

7.10 REMOVING NACELLE HOUSING

- Durante la realización de trabajos que requieran descapotar la nacelle, se utilizará el arnés y se trabajará asegurado a un punto fijo de la máquina en todo momento (orejetas de la multiplicadora, del generador,

- If the work requires the Nacelle housing to be removed, personnel must wear a safety harness attached to secure anchor points on the machine at all times (hooks of the gear shaft, generator, etc) regardless of the existence of safety

etc.) independientemente de que existan barandillas o parapetos.

railings and platforms.

7.11 PRESENCIA DE RECURSOS PREVENTIVOS

7.11 PRESENCE OF SAFETY TECHINICIAN

La presencia de recursos preventivos en el centro de trabajo será necesaria en los siguientes casos:

The presence of Safety Technician in the workplace will be required under the following circumstances:

• Cuando los riesgos puedan verse agravados o modificados por la concurrencia de actividades que se desarrollen sucesiva o simultáneamente y que hagan preciso el control de los métodos de trabajo.

• When risks can be modified as a result of the concurrence of activities performed successively or simultaneously and which make the supervision of work methods necessary.

• Cuando se realicen actividades o procesos que reglamentariamente sean considerados como peligrosos o con riesgos especiales.

• When performing actions or processes which are considered as hazardous or with special risk according to applicable regulations.

• Por requerimiento de la Inspección de Trabajo.

• Inspection requirements must be complete as required by all applicable regulatory agencies.

Así será necesaria la presencia de recurso preventivo (al menos) en los Grandes Correctivos, Tareas en las que sea necesaria la presencia de Grúas, plataformas elevadoras y/o trabajos simultáneos de varias contratas, Trabajos en Alta o Media tensión y Trabajos "en caliente" (soldadura, oxicorte,..) en aerogeneradores.

A Loss Prevention Officer / Safety Technician must be present for "Large Corrective Actions", requiring the use of cranes, work platforms and/or simultaneous performance of various tasks, work with High or Medium voltage and hot work (welding, etc.) in the turbine.

Los recursos preventivos deberán tener la capacidad suficiente, disponer de los medios necesarios y ser suficientes en número para vigilar el cumplimiento de las actividades preventivas, debiendo permanecer en el centro de trabajo durante el tiempo en que se mantenga la situación que determine su presencia.

The Loss Prevention Officers / Safety Technician should be qualified, have proper equipment and have enough personnel to oversee compliance with risk prevention actions and remain on the site for as long as required by the work being performed.

LISTADO DE ACTIVIDADES, OPERACIONES Y PROCESOS NO EXCLUYENTES QUE PUEDEN DAR LUGAR A LA PRESENCIA DE RECURSOS PREVENTIVOS	LIST OF ACTIVITIES, OPERATIONS AND PROCESSES WHICH REQUIRES THE PRESENCE OF THE LOSS PREVENTION OFFICER / SAFETY TECHNICIAN (NOT EXCLUSIVE).
Aparatos de Elevación (distintos de ascensores y montacargas): Trabajos de instalación, mantenimiento y reparación	Hoisting equipment (other than lifts and freight elevators): Installation, maintenance and repair operations.
Trabajos en Espacios Confinados: (galerías de servicio, fosos, túneles, alcantarillas, silos, tanques, tinajas, recipientes, contenedores, cisterna, calderas de vapor, tolvas de almacenamiento o de mezcla, vertederos y depósitos de aguas residuales, etc)	Work in confined spaces: (service bays, pits, tunnels, sewers, silos, tanks, jars, cisterns, containers, recipients, boilers, storage or mixing sheets, dumps, waste water deposits, etc.).
Mantenimientos: Trabajos con riesgo de caída de altura (caída de más 2 metros, uso de técnicas de acceso y posicionamiento mediante cuerdas y montaje/desmontaje de redes de seguridad)	Maintenance: Work posing the risk of falls from heights (more than 2 metres, use of access techniques and positioning using lines and the assembly/disassembly of safety nets).
Equipos de trabajo automotores y de elevación de cargas (maniobras peligrosas como retroceso, etc)	Self-propelled and hoisting equipment (hazardous manoeuvres such as reversing, etc.).
Equipos Automotores de Manutención (maniobras peligrosas como retroceso, etc)	Self-propelled Maintenance Equipment (hazardous manoeuvres such as reversing, etc.).
Electricidad: Trabajos con instalaciones en tensión (alta y media tensión)	Electricity: Work with installation in voltage (high and medium tension)
Trabajos en proximidad de elementos en tensión	Work near elements with voltage
Acceso a recintos de servicio y envolventes de material eléctrico (centros de transformación, etc)	Access to service areas and electrical installations (transformers, etc.)

Trabajos en proximidad a líneas aéreas, subterráneas u otras instalaciones eléctricas	Work in the proximity of overhead, underground or other power lines
Trabajos en zonas con riesgo de explosión	Work in areas with a risk of explosion
Trabajos en Caliente: generación de calor, chispas, llamas etc (soldadura, esmerilado, taladrado, etc) en proximidad de líquidos o gases inflamables, o en recipientes de gases licuados	Hot work: producing heat, sparks, flame, etc. (welding, grinding, drilling, etc.) in the proximity of flammable liquids or gases or their recipients
Productos Peligrosos: Trabajos con amianto	Hazardous products: Work using asbestos
Agentes Cancerígenos, Mutágenicos o Tóxicos para la Reproducción En circunstancias en las que puedan causar daños	Using carcinogenic, mutagenic or toxic agents under circumstances which may be harmful.
Sustancias que puedan ocasionar accidentes mayores	Substances which may cause serious accidents
Agentes Químicos Peligrosos en general: En circunstancias en las que puedan causar daños	Hazardous chemicals in general: under circumstances which may be harmful.
Otras	Other

Se consideran recursos preventivos:

• Uno o varios trabajadores designados.

• Uno o varios miembros del servicio de prevención propio de la empresa.

• Uno o varios miembros del o los servicios de prevención ajenos concertados por la empresa.

• Cualquier trabajador asignado por la empresa distinto de los anteriores con los conocimientos, la cualificación y la experiencia necesarios, y con una formación preventiva correspondiente, como mínimo, a las funciones del nivel básico.

Loss Prevention Officers / Safety technicians are considered:

• Designated personnel.

• Members of the Loss Prevention Service of the company.

• One or various members of the external Loss Prevention Service contracted by the company.

• Any employee designated by the company other than the above with the knowledge, qualifications and experience necessary and with a minimum of Basic level training

8- SITUACIÓN DE LAS SETAS DE EMERGENCIA

La máquina dispone de 5 botones de parada de emergencia, localizadas en los siguientes puntos:

- ARMARIO DE GROUND

- PLATAFORMA SUPERIOR DE TORRE

- GRUPO HIDRÁULICO O GENERADOR

- ARMARIO DE TOP

- SOPORTE DELANTERO EJE LENTO O GENERADOR

8- LOCATION OF EMERGENCY BUTTONS

The machine is equipped with 5 emergency stop buttons located at the following points:

- GROUND BOX

- TOP PLATFORM OF THE TOWER

- HYDRAULIC SYSTEM OR GENERATOR

- ELECTRICAL BOX

- FRONT SUPPORT OF LOW SPEED SHAFT OR GENERATOR



Para todas las versiones de TOP de la AW3000: El freno mecánico (disco de freno) es un freno de parking que solo se activa si una seta de emergencia es pulsada. La activación del freno se produce de las siguientes formas:

- Instantáneamente si:
  - Se presiona cualquiera de las setas de emergencia situadas en la nacelle o en la plataforma superior de la torre.
  - Se presiona la seta situada en el armario de Ground, el aerogenerador se encuentra en modo “MANUAL” o “EMERGENCIA” y la velocidad del generador es menor que 250 rpm.
- Con un retardo de 45 segundos en los aerogeneradores AW3000 si se presiona la seta situada en el armario de Ground en cualquier estado de máquina excepto en modo “MANUAL” o “EMERGENCIA” y la velocidad del generador es menor que 250 rpm.
- La aplicación del freno ocurrirá, en cualquier caso y ante un posible error en la medición de velocidad por parte del PLC, solo si la velocidad del rotor es menor al 50% de la sobrevelocidad TOG definida para la turbina.

All versions of the AW3000 TOP: The mechanical brake (disc brake) is a parking brake activated only if a stop button is pressed. Brake activation occurs in the following ways:

- Instantaneously if:
  - Press any of the emergency stop button located in the nacelle or in the upper platform of the tower.
  - Press the stop button located in the Ground, the turbine is located in "MANUAL" or “EMERGENCY” and the generator speed is less than 250 rpm.
- With a delay of 45 seconds in AW3000 wind pressing the emergency stop button located in the Ground at any stage of machine except in "MANUAL" or “EMERGENCY” and the generator speed is less than 250 rpm.
- The brake will be only applied when the rotor speed is lower than 50% of the TOG over-speed value, in case of a failure of the PLC on the speed measurement or in any other case.

Existen tres tipos de paradas de Emergencia:

- Parada de Emergencia 1 (SS1): Parada aerodinámica mediante freno aerodinámico (pitch) instantánea.
- Parada de Emergencia 2 (SS2):
  - Parada aerodinámica mediante freno aerodinámico (pitch) instantánea, más
  - Parada con el freno de disco, después de un tiempo de retardo (45s en AW3000)
- Parada de Emergencia 3 (SS3):
  - Parada aerodinámica mediante freno aerodinámico (pitch), más
  - Parada con el freno de disco instantánea.

There are three types of emergency stops

- Emergency Stop 1 (SS1): Stop by aerodynamic braking aerodynamic (pitch) instantly.
- Emergency Stop 2 (SS2):
  - Stop by aerodynamic braking aerodynamic (pitch) instant,
  - Stop with the brake disk, after a delay time (45s in AW3000)
- Emergency Stop 3 (SS3):
  - Stop by aerodynamic braking aerodynamic (pitch), more
  - Stop the disc brake instantly.

Para resetear una parada de emergencia y volver a poner en marcha la máquina se seguirá con lo descrito en la instrucción correspondiente.

En caso de necesitar detener el rotor urgentemente por un atrapamiento o similar, es necesario presionar una seta de emergencia y a continuación aplicar presión mediante la bomba manual para asegurar que el freno

In order to reset the emergency stop and re-start the wind turbine it must be done as described in the corresponding instruction.

In the case that the rotor must be urgently stopped due to a trapping or similar situation, it will be necessary to press an emergency button and straight forward apply pressure by means of the manual pump in order to keep the brake

queda aplicado en caso de una pérdida de red.

applied in the case of a grid loss.

8.1 SETAS DE EMERGENCIA EN EL ELEVADOR

8.1 LIFT EMERGENCY BUTTONS

Los armarios de alimentación del ascensor situados en la parte inferior y superior de torre respectivamente, van equipados con sendos pulsadores de emergencia que al ser pulsados sólo detienen el ascensor y no provocan la transición de la turbina a EMERGENCIA. Esto se indica junto al propio botón mediante una pegatina de advertencia.

Lift power supply cabinets, located in the bottom and the upper part of the tower, have emergency buttons that will only stop the lift, without activating the turbine emergency stop. This is indicated next to the button by a warning sticker.

9.- SISTEMA DE FRENADO Y BLOQUEO DEL ROTOR

9.- ROTOR BLOCKING AND BRAKING SYSTEMS

Para proceder de una forma segura al bloqueo de la turbina y previendo las distintas situaciones que puedan presentarse, se seguirá con lo descrito en la instrucción correspondiente.

To proceed safely when blocking the turbine and anticipate any possible situations which may arise, follow the corresponding instruction.

9.1.- FRENADO DESDE EL EJE RÁPIDO

9.1.- HIGH SPEED SHAFT BRAKE

El freno desde el eje rápido de la turbina se activa únicamente de tres casos diferentes:

The turbine high speed shaft brake is only activated in the following three cases:

Al accionar una de las setas de emergencia,

When one of the emergency buttons has been activated.

Al aplicar la orden accionar de frenado del generador a través de los Modos manuales de la pantalla de mantenimiento.

When instructed to activate the brake of the generator using the manual mode of the maintenance screen.

En el Ensayo de la turbina, para realizar los cálculos de polo inicial, y antes de acoplar a Red

During the Testing stage of the turbine to make the initial pole calculations before connecting to the network.

Este sistema de freno NO es suficiente para el acceso al interior del buje. La turbina no se detiene con el freno hidráulico.

The braking system does NOT provide adequate safety protection to access the interior of the hub. The hydraulic brake does not stop the turbine.

9.2.- AW3000; SISTEMA DE BLOQUEO DE LA TURBINA

9.2.- AW3000; BLOCKING SYSTEM OF THE TURBINE

- Se debe bloquear el rotor siempre que se acceda o permanezca en el buje o las palas del aerogenerador, independientemente de que venga o no recogido en la instrucción correspondiente.

- The Shaft must be locked whenever someone enters or stays in the hub or the blades of turbine.

- Salvo que el rotor esté descompensado, como en el pinchado, despinchado o sustitución de palas.

- Except when the rotor is unbalanced, such as in the assembling, disassembling or substitution of blades.

- Se debe bloquear el rotor siempre que se vaya a trabajar sobre el tren de potencia del aerogenerador (eje lento, multiplicadora, disco, generador, etc.), independientemente de que venga o no recogido en la instrucción correspondiente. Para cambio de la multiplicadora se aplicará siempre el bloqueo de eje lento.

- The Shaft must be locked whenever someone is going to work on the drive train of the turbine (low speed shaft, gear box, disc, generator, etc.). To change the gear box the hub must be locked in the low speed shaft locking system.

- Se debe bloquear el rotor siempre que se trabaje en las inmediaciones del aerogenerador con plataforma

- The Shaft must be locked whenever someone is near the

elevadora o con cesta suspendida, independientemente de que venga o no recogido en la instrucción correspondiente.

turbine on an elevating platform or in a suspended basket.

- Se debe bloquear el rotor siempre que se vaya a realizar trabajos suspendidos en el exterior de la nacelle o de la torre, independientemente de que venga o no recogido en la instrucción correspondiente.

- The Shaft must be locked whenever working suspended outside of the Nacelle and/or the tower.

- Prohibido realizar cualquier operación de bloqueo si la velocidad de viento > 15m/s.

- It is forbidden to carry out any locking operation if wind speed > 15m/s.

- Solo es posible aplicar y mantener el bloqueo de rotor del eje lento en las siguientes condiciones:

- it is only possible to lock the low speed shaft locking system in the following conditions:

- Cuando las tres palas se encuentran en posición de bandera y la velocidad de viento es igual o inferior a:
  a) 15 m/s (33.3 mph) para AW 100/3000, AW 109/3000, AW 116/3000 y AW 125/3000.
  b) 14 m/s (32 mph) para AW 132/3000
- Cuando 2 palas estén en bandera y la velocidad de viento sea igual o inferior a 8 m/s (17.8 mph).

- When all three blades are in feather position and the wind speed is equal or less than the following values:
  c) 15 m/s (33.3 mph) for AW 100/3000, AW 109/3000, AW 116/3000 and AW 125/3000.
  d) 14 m/s (32 mph) para AW 132/3000
- When two blades are in feather position and the wind speed is equal or less than 8 m/s (17.8 mph).

- Solo es posible aplicar y mantener el bloqueo de rotor del eje rápido en las siguientes condiciones:

- it is only possible to lock the high speed shaft locking system in the following conditions:

- Cuando las tres palas se encuentran en posición de bandera y la velocidad de viento es igual o inferior a 13 m/s (28.9 mph).
- Cuando 2 palas estén en bandera y la velocidad de viento sea igual o inferior a 8 m/s (17.8 mph).
- Cuando 2 palas estén en bandera y la velocidad de viento sea igual o inferior a 15 m/s (33.3 mph), siempre que se instale una reductora de giro de rotor para montaje pala a pala.

- When all three blades are in feather position and the wind speed is equal or less than 13 m/s (28.9 mph).
- When two blades are in feather position and the wind speed is equal or less than 8 m/s (17.8 mph).
- When two blades are in feather position and the wind speed is less than 15 m/s (33.3 mph), as long as a drive train turning drive for single blade assembly is installed.

- Los bloqueos se realizarán en todo momento conforme a las instrucciones correspondientes.

- Lockout/Tagout must be done following the correspondent instruction.

- El eje rápido sólo se bloqueará si la Tª ambiente supera los -20ºC (-4ºF)

- The high speed shaft will only be locked if ambient temperature is higher than -20ºC (-4ªF).

10.- SEÑALIZACIÓN DE LOS RIESGOS

10.- RISK SIGN POSTING

Como complemento de la protección colectiva y de los equipos de protección individual previstos, se empleará señalización normalizada que recuerde en todo momento los riesgos existentes a todos los que trabajan en el aerogenerador.

In addition to the general and individual protection equipment provided, authorized signs will be posted wherever risks are present in the turbine.

10.1.- SEÑALIZACIÓN DE SEGURIDAD EN LA TORRE DEL AEROGENERADOR

10.1.- SAFETY SIGNAGE IN THE TOWER

Prohibido subir a plataformas y Nacelle sin haber pasado antes la turbina a modo MANUAL.

It is forbidden to get into platforms and Nacelle without switching to the MANUAL mode.

Interdite de monter aux plate-formes et Nacelle sans avoir mis d´avance la turbine en mode MANUEL

10.1.1 LINEA DE VIDA

10.1.1 LIFELINES



Indica el riesgo de caída y el uso obligatorio de casco, arnés y guantes.

Indicates the risk of falls and the mandatory use of safety helmets, harness and gloves.

10.1.2 CIERRE TRAMPILLA

Advierte del peligro de caída y la obligación de cerrar la trampilla de la última plataforma.

10.1.2 CLOSING THE HATCH

Sign indicates the risk of falling and the mandatory closing of the hatch on the final platform.



10.1.3 PEGATINA APERTURA TRAMPILLA

Indica el riesgo de caída y la obligación de asegurarse antes de abrir la trampilla de la última plataforma.

10.1.3 SIGNAGE OPENING THE HATCH

Indicates the risk of falls and the mandatory use of the lifeline before opening the hatch on the final platform.



10.1.4 ALTA TENSION

Indica el riesgo de alta tensión en la puerta de la cabina del transformador

10.1.4 HIGH VOLTAGE

Indicate the risk of high voltage on the door of the cabin for the transformer



10.1.5 VOLTAJE CAJA DE CONEXIONES LUMINARIAS

Informa sobre el voltaje correspondiente a cada luminaria

10.1.5 LIGHTS JUCTION BOX VOLTAGE

Indicates the voltage for each light.

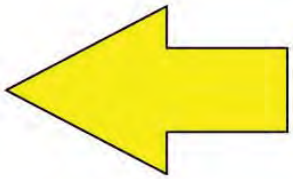


10.1.6 PUNTOS DE ANCLAJE

Informa sobre puntos de anclaje

10.1.6 TIE OFF POINTS

Indicates the tie off points



PUNTO DE ANCLAJE

TIE OFF POINT

POINT D'AMARRAGE

10.1.7 ANCLAJE AL LARGUERO DE LA ESCALERA

Informa sobre puntos de anclaje (larguero de la escalera)

10.1.7 LADDER STRINGER TIE

Indicates the tie off points (ladder stringer)



Todo el larguero de la escalera puede usarse como punto de anclaje

The whole stringer of the ladder can be used as tie off point

Tout le montant de l'échelle peut être employé comme point d'amarrage

10.1.8 CARGA MÁXIMA DE LA PLATAFORMA

Informa sobre la carga máxima de las plataformas

10.1.8 MAXIMUM PLATFORM LOAD

Indicates the maximum load for each platform

Carga máxima en cada sector de plataforma: 150 kg puntuales ó 3 personas

Maximum platform load in each sector: 150 kg in one point or 3 people

Charge maximale plate-forme à chaque secteur : 150 kg dans un point ou 3 personnes

10.2.- SEÑALIZACIÓN DE SEGURIDAD EN LA NACELLE DEL AEROGENERADOR

10.2.- SAFETY SIGNAGE IN THE NACELLE

10.2.1 APERTURA PUERTA TRASERA

Indica el riesgo de caída, el uso obligatorio de arnés y la obligación de anclarse a un punto seguro antes de abrir la puerta trasera de la nacelle

10.2.1 OPENING REAR HATCH

Indicates the risk of falls and the mandatory use of a harness and to attach a lifeline to a secure point before opening the rear hatch of the nacelle.



10.2.4 MÁXIMO NÚMERO DE PERSONAS EN EL CONO

Se prohíbe que haya más de 3 personas apoyadas sobre la fibra del cono nariz

10.2.4 MAXIMUN NUMBER OF PERSONS IN THE NOSE CONE

Maximum of three persons are allowed to lean against the nose cone fiber at a time.

Se prohíbe que haya más de 3 personas apoyadas sobre la fibra del cono nariz

Maximum of three persons are allowed to lean against the nose cone fibre at a time

Interdit a plus de trois personnes de s'appuyer sur la protection en fibre de verre du moyeu

10.2.5 BLOQUEO AW 3000 PARA AW 100/3000, AW 109/3000, AW 116/3000 Y AW 125/3000

10.2.5 AW 3000 STICKER OF LOCKING DEVICE FOR AW 100/3000, AW 109/3000, AW 116/3000 AND AW 125/3000

Prohibido realizar cualquier operación de bloqueo con velocidad media diezminutal superior a 15m/s.

- Uso de bloqueo eje lento en las siguientes condiciones:
  (1) 3 palas en bandera y velocidad media diezminutal hasta 15 m/s
  (2) 2 palas en bandera y velocidad media diezminutal hasta 8 m/s
- Uso de bloqueo eje rápido en las siguientes condiciones:
  (3) 3 palas en bandera y velocidad media diezminutal hasta 13 m/s
  (4) 2 palas en bandera y velocidad media diezminutal hasta 8 m/s
  (5) 2 palas en bandera y velocidad media diezminutal hasta 15 m/s siempre que, además del bulón de bloqueo, se instale una reductora de "útil giro rotor para montaje pala a pala" (IU0178) y sin alimentación eléctrica.

Si la temperatura ambiente <-20ºC, uso **obligatorio** del bloqueo eje lento si además se cumple la condición (1). En caso de no cumplirse, **prohibido** el bloqueo a esta temperatura.

It is **forbidden** to carry out any locking operation if 10-minute average speed higher than 15m/s.

- Conditions to use the low speed shaft locking device:
  (1) 3 blades in feather position and 10-minute average speed up to 15 m/s
  (2) 2 blades in feather position and 10-minute average speed up to 8 m/s
- Conditions to use the high speed shaft locking device:
  (3) 3 blades in feather position and 10-minute average speed up to 13 m/s
  (4) 2 blades in feather position and 10-minute average speed up to 8 m/s
  (5) 2 blades in feather position and 10-minute average speed up to 15 m/s when, in addition to the locking pin, one of the gears of the "rotor turning tool for single blade installation" (IU0178) is installed and with no power supply.

If the ambient temperature <-20ºC, it is **mandatory** to use the low speed shaft locking device whenever condition (1) is fulfilled. If this condition is not fulfilled, it is **forbidden** to lock at this temperature.

Interdit de réaliser toute opération de blocage avec 10-minutes moyenne vitesse superieur à 15m/s.

- Conditions pour l'utilisation du blocage de l'arbre lent:
  (1) 3 pales en position de sécurité et 10-minutes moyenne vitesse jusqu'à 15 m/s
  (2) 2 pales en position de sécurité et 10-minutes moyenne vitesse jusqu'à 8 m/s
- Conditions pour l'utilisation du blocage de l'arbre rapide :
  (3) 3 pales en position de sécurité et 10-minutes moyenne vitesse jusqu'à 13 m/s
  (4) 2 pales en position de sécurité et 10-minutes moyenne vitesse jusqu'à 8 m/s
  (5) 2 pales en position de sécurité et 10-minutes moyenne vitesse jusqu'à 15 m/s, à condition d'installer, en plus du bulon de blocage, une réductrice de «outil tour rotor pour montage individuel de pale» (IU0178) et sans alimentation électrique.

Si la température ambiante <-20ºC, usage **obligatoire** du blocage de l'arbre lent si s'accomplie aussi la condition (1). Au cas de ne pas s'accomplir, **interdit** de bloquer à cette température.

10.2.6- BLOQUEO AW 3000 PARA AW 132/300

10.2.6 AW 3000 STICKER OF LOCKING DEVICE FOR AW 132/3000

Prohibido realizar cualquier operación de bloqueo con velocidad media diezminutal superior a 15m/s.

- Uso de bloqueo eje lento en las siguientes condiciones:
  - (1) 3 palas en bandera y velocidad media diezminutal hasta 14 m/s
  - (2) 2 palas en bandera y velocidad media diezminutal hasta 8 m/s
- Uso de bloqueo eje rápido en las siguientes condiciones:
  - (3) 3 palas en bandera y velocidad media diezminutal hasta 13 m/s
  - (4) 2 palas en bandera y velocidad media diezminutal hasta 8 m/s
  - (5) 2 palas en bandera y velocidad media diezminutal hasta 15 m/s siempre que, además del bulón de bloqueo, se instale una reductora de "útil giro rotor para montaje pala a pala" (IU0178) y sin alimentación eléctrica.

Si la temperatura ambiente <-20ºC, uso **obligatorio** del bloqueo eje lento si además se cumple la condición (1). En caso de no cumplirse, **prohibido** el bloqueo a esta temperatura.

It is **forbidden** to carry out any locking operation if 10-minute average speed higher than 15m/s.

- Conditions to use the low speed shaft locking device:
  - (1) 3 blades in feather position and 10-minute average speed up to 14 m/s
  - (2) 2 blades in feather position and 10-minute average speed up to 8 m/s
- Conditions to use the high speed shaft locking device:
  - (3) 3 blades in feather position and 10-minute average speed up to 13 m/s
  - (4) 2 blades in feather position and 10-minute average speed up to 8 m/s
  - (5) 2 blades in feather position and 10-minute average speed up to 15 m/s when, in addition to the locking pin, one of the gears of the "rotor turning tool for single blade installation" (IU0178) is installed and with no power supply.

If the ambient temperature <-20ºC, it is **mandatory** to use the low speed shaft locking device whenever condition (1) is fulfilled. If this condition is not fulfilled, it is **forbidden** to lock at this temperature.

Interdit de réaliser toute opération de blocage avec 10-minutes moyenne vitesse supérieur à 15m/s.

- Conditions pour l'utilisation du blocage de l'arbre lent:
  - (1) 3 pales en position de sécurité et 10-minutes moyenne vitesse jusqu'à 14 m/s
  - (2) 2 pales en position de sécurité et 10-minutes moyenne vitesse jusqu'à 8 m/s
- Conditions pour l'utilisation du blocage de l'arbre rapide :
  - (3) 3 pales en position de sécurité et 10-minutes moyenne vitesse jusqu'à 13 m/s
  - (4) 2 pales en position de sécurité et 10-minutes moyenne vitesse jusqu'à 8 m/s
  - (5) 2 pales en position de sécurité et 10-minutes moyenne vitesse jusqu'à 15 m/s, à condition d'installer, en plus du bulon de blocage, une réductrice de «outil tour rotor pour montage individuel de pale» (IU0178) et sans alimentation électrique.

Si la température ambiante <-20ºC, usage **obligatoire** du blocage de l'arbre lent si s'accomplie aussi la condition (1). Au cas de ne pas s'accomplir, **interdit** de bloquer à cette température.

10.2.6 PEGATINA DE PROHIBIDO SALIR AL TECHO DE LA NACELLE

10.2.6 STICKER TO FORBIDDEN TO ACCES THE TOP OF THE NACELLE



10.2.7 PEGATINA ACCESO A BUJE

10.2.7 STICKER HUB ACCESS

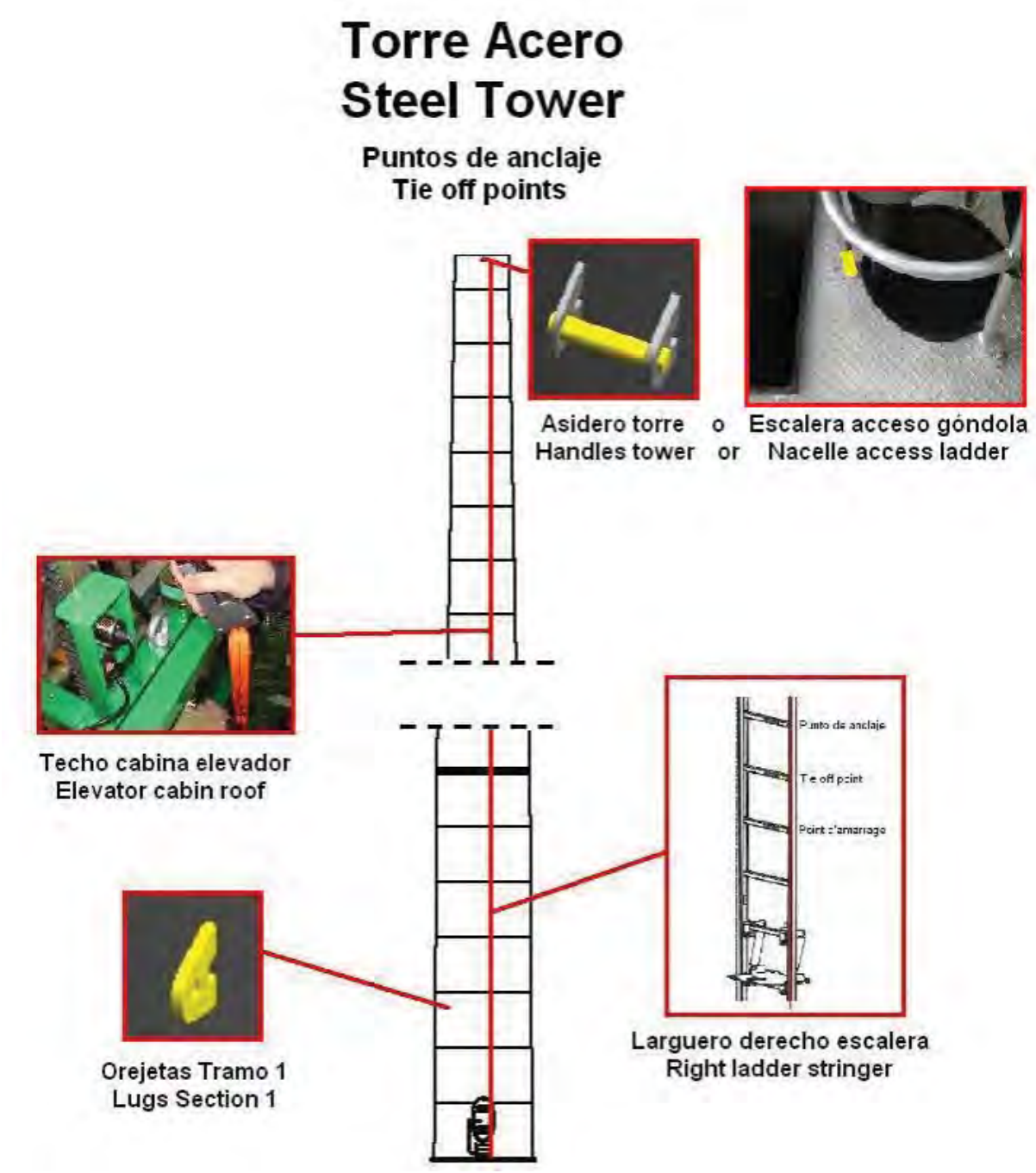


10.2.8 PEGATINA PUERTA CORREDERA DE NACELLE

10.2.8 STICKER NACELLE SLIDING DOOR



11.- PUNTOS DE ANCLAJE DEL AEROGENERADOR **11.- ANCHOR POINTS IN THE WTG**



Torre Hormigón
Concrete Tower

Puntos de anclaje
Tie off points

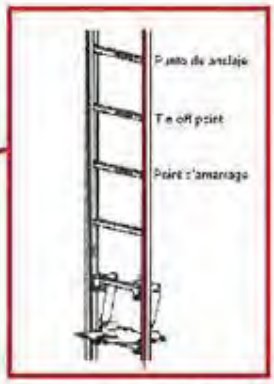


Asidero torre o Escalera acceso góndola
Handles tower or Nacelle access ladder

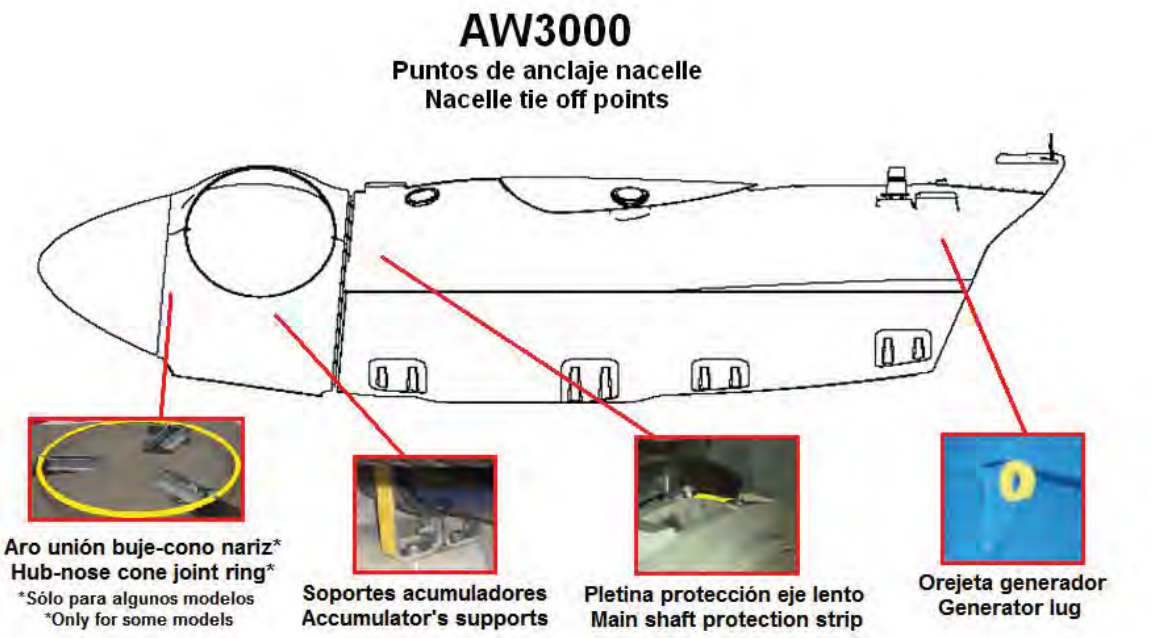




Techo cabina elevador
Elevator cabin roof



Larguero derecho escalera
Right ladder stringer



ANEXO I.- CAPACITACIÓN DE TRABAJADORES PARA LA REALIZACION DE TRABAJOS CON RIESGO ELECTRICO

Trabajador AUTORIZADO;

- Operaciones y maniobras para dejar sin tensión instalaciones, antes de iniciar el "trabajo sin tensión" y la reposición de la tensión al finalizarlo, en instalaciones de BT

- Reposición de fusibles en BT, cuando el dispositivo portafusible conlleve la desconexión del fusible y el material de aquel ofrezca una protección completa contra los contactos directos y los efectos de un posible arco eléctrico

- Maniobras locales y mediciones, ensayos y verificaciones en instalaciones de B.T.

- Auxiliar a trabajadores cualificados en mediciones, ensayos y verificaciones en A.T.

- Preparación y análisis de un trabajo en proximidad en BT

- Realización de trabajos en proximidad cuando no existan medidas suficientes de protección en BT y en AT (bajo la vigilancia de un trabajador cualificado)

APPENDIX I.- QUALIFICATION OF WORKERS FOR WORK WITH ELECTRICAL RISK

AUTHORISED Operator:

- Operations and actions to cut power to the installations before initiating "work without tension" and later re-powering of Low Tension (LT) installations.

- Replacement of fuses in LT installations when the fuse box requires the disconnection of the fuse offering complete protection from direct contact and possible electrical arcing.

- Local operations and measurements, testing and verification of LT installations.

- Assistance to qualified operators in measuring, testing and verifying high tension (HT) installations.

- Preparation and analysis of an operation in proximity in LT installations.

- Execution of work in proximity when there are not sufficient guarantees of protection in LT and HT installations (under the supervision of qualified operators).

- Acceso a recintos eléctricos y vigilancia de trabajadores no autorizados que accedan a los mismos después de haber sido previamente informados de los riesgos existentes y las precauciones a tomar.

- Trabajos en emplazamientos con riesgo de incendio.

Trabajador CUALIFICADO;

- Operaciones y maniobras para dejar sin tensión instalaciones, antes de iniciar el “trabajo sin tensión” y la reposición de la tensión al finalizarlo, en instalaciones de AT

- Reposición de fusibles en AT cuando la maniobra del dispositivo portafusible se realice a distancia, utilizando pértigas que garanticen un adecuado nivel de aislamiento y se tomen medidas de protección frente a los efectos de un posible cortocircuito o contacto directo (siempre siguiendo un procedimiento previamente estudiado)

- Maniobras locales y mediciones, ensayos y verificaciones en instalaciones de A.T.

- Preparación y análisis de un trabajo en proximidad en AT

- Realización y vigilancia de trabajos en proximidad cuando no existan medidas suficientes de protección. Velar por el cumplimiento de las medidas de seguridad y controlar movimiento de trabajadores y objetos en la zona de trabajo.

- Acceso a recintos eléctricos y vigilancia de trabajadores no autorizados que accedan a los mismos después de haber sido previamente informados de los riesgos existentes y las precauciones a tomar.

- Trabajos en emplazamientos con riesgo de incendio y explosión.

- Access to electrical installations and supervising unauthorized personnel accessing the same after having been informed of the existing risks and the precautions to be taken.

- Work in areas with a risk of fire.

QUALIFIED Operator:

- Operations and actions to cut power to the installations before initiating “work without tension” and later re-powering of High Tension (HT) installations.

- Replacement of fuses in HT installations when the operation requires working from a distance, using poles which guarantee a sufficient level of protection and taking measures to prevent possible short circuits or direct contact (always following a previously designed procedure).

- Local operations and measurements, testing and verification of HT installations.

- Preparation and analysis of an operation in proximity in HT installations.

- Execution of work in proximity when there are not sufficient guarantees of protection. Ensure compliance with safety measures and supervise workers and objects in the work area.

- Access to electrical installations and supervising unauthorized personnel accessing the same area after having been informed of the existing risks and the precautions to be taken.

- Work in areas with a risk of fire and explosion.

ANEXO II.- PLANO EVACUACIÓN AW3000

APPENDIX II.- AW3000 EVACUATION PLAN

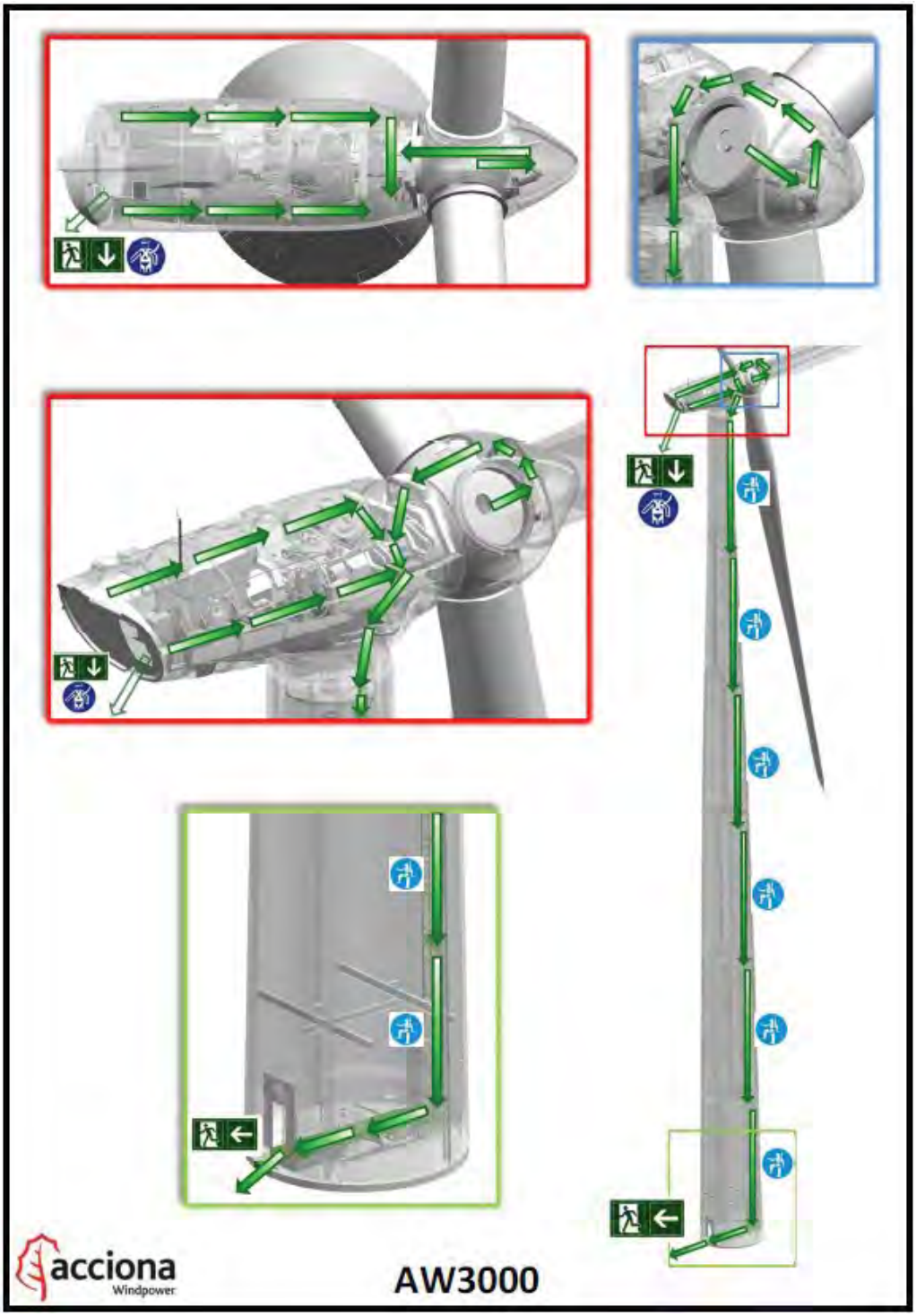


Exhibit W

Siemens Gamesa Environmental Health and Safety Plan for Project Execution

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Date Filed: July 2, 2018



Siemens Gamesa Renewable Energy – Onshore North America

Environmental Health and Safety Plan for Project Execution

Project: [Project Name] – Project No: [Project No]

Project Address: [Local Address, Town, Zip Codes, Country]

Author: [Name] – Date of Issue: [DD.MM.YYYY] – Rev No: [ ]

Role	Name	Signature	Date
Project Manager			
Regional Project Manager			
EHS Manager in Projects			
Country EHS Officer			

Site Manager		(will sign at mobilization)	

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Abbreviations and Definitions

Abbreviation	Definition
CAR	Corrective Action Request
Client	Employer in respect of the Contract conditions
CoSHH	Control of Substances Hazardous to Health (Regulations)
DRA	Design Risk Assessment
EHS	Environmental, Health and Safety
EHSA	EHS Advisor
EHS Function	A member of the site management team fulfilling the role and responsibility of the EHS Advisor, when the EHS Advisor is not on-site.
EHSMiP	EHS Manager in Project
ERP	Emergency Response plan
GWO	Global Wind Organisation
HAVS	Hand Arm Vibration Syndrome
HH	Hub Height
IF	Installation Foreman
IL	Installation Lead
IPM	Installation Project Manager
ISO	International Organization for Standardization
JHA	Job Hazard Analysis
Km	Kilometre
KRIMA	Krisen Management (Siemens EHS incident reporting system)
kV	Kilo-Volt
LOTO	Lock out/Tag out

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MSDS / SDS	Material Safety Data Sheet / Safety Data Sheet
MU	Market Unit
MW	Megawatt
NCN	Non Compliance Notice
O&M	Operation and Maintenance
PAT	Portable Appliance Testing.
PM	Project Manager
POB	People on board
PPE	Personal Protective Equipment
PTP	Pre-Task Plans
PTW	Permit to Work
QA	Quality Assurance
QMiP	Quality Manager in Project
RAMS	Risk Assessment & Method Statement, part of the SSoW
Reg.	Regulation
SCADA	Supervisory Control and Data Acquisition
SM	Site Manager
SMS	Safety Management System
SSoW	Safe System of Work which includes relevant Risk Assessment and Work Methodology, Work Instructions,

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	Permit to Work / LOTO, Drawings . This is also known as a "work package"
SWP	Siemens **Division** Wind Power
Taking Over	As defined in the Contract
TBT	Toolbox Talk
Tel.	Telephone number
TMSE	Turbine Mounted Safety Equipment
TP	Transition Piece
TPM	Technical Project Manager
TSA	Turbine Supply Agreement
SMS	Safety Management System
Work Crew	A group of technicians or contractors undertaking a single Work Order

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List of References (Linked)

Siemens Standards

DOC 17291 E W Health and Safety Management Standard

Siemens Divisional Procedures

PRO 13838 Personal Protective Equipment
PRO 15578 Internal Audits and Assessments
PRO 15833 Appendix 6 - visitors in the Turbine
PRO 16745 KRIMA EHS Software Application
PRO 18412 Continuing Personal EHS Development
PRO-18669 Risk Assessment
PRO 18811 Ap1 ”Form for Request of EHS Evaluation of Chemicals
(PRO) 18914 Control of Hazardous Energies
PRO 19631 Product Safety Procedure’
PRO 19394 SWP Wind Technician Competence Framework
PRO 19736 Projects to Service Handover
PRO 20210 EHS Incident Investigation
PRO 20237 Supplier Qualification Management
PRO 20386 Identification and Evaluation of Compliance with EHS requirements
PRO 21228 Prohibited and Limited Substances
PRO 29853 Safety Induction
PRO 29992 Health and Safety Performance Measurement
PRO 29711 Water and Soil Protection Procedure
PRO31731 Ap01 Determining Significant Environmental Aspects

Siemens Market Unit Onshore Instructions

INS 14541 Site Waste Management.
INS 27706 Permit to Work
INS 28691 Contractor EHS Management
INS-30768 - Control of Hazardous Energy (ON).

Siemens Local Specific Procedures

LSP 23317 Site Management Competency Framework
LSI 22195 Lockout / Tagout (LOTO) (AM)
LSF 17234 EHS Advisor (Lead) Daily Report
LSF 21292 EHS Advisor (Inspector) Daily Report
LSP 13054 Electrical Safe Work Practices
LSF 11.11 Vehicles Accident Form (AM)
LSP 05.04 Respiratory Protection (AM)
LSP 05.78 Drug Free Workplace (AM)
LSP 14549 Fleet Vehicle Management (AM)
LSP 16143 Bloodborne Pathogens (AM)
LSP 19560 Accidents / Incidents Reporting and Investigations (AM)

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LSP 20720 Fall Protection (AM)
LSP 21855 Transportation of Dangerous Goods (AM)
LSP 13730 Confined Space Procedure (AM)

Siemens Referenced Forms

FORM 13023 Form for Safety Method Statement
FORM 17373 Loaned PPE
FORM 20913 Critical Quality / EHS Announcement
FORM 21958 Lessons Learned

Useful Internal Links

Siemens Basic Rules Health and Safety Rules
Assembly Manual
Market Unit Onshore Workspace
Onshore EHS Safety Alert Site
Safety Walk & Talk Booklet
Turbine Mounted Safety Equipment (TMSE)

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1. INTRODUCTION

1.1. Purpose

a. The Siemens objectives for the Project are to complete our work safely with no detriment to the health of our employees, subcontractors, and third parties, to take due care of the environment, and to produce a quality product sustainably, efficiently, and economically, that meets our clients requirements.

b. This EHS Plan is specific to the project and does not contain the complete management system for Health, Safety, and the Environment. This system is detailed in our Safety Management System Document House.

c. The controls detailed in Document House are minimum requirements. However specific projects or regional requirements can be added as long as they meet or exceed the basic minimum requirements. Any enhancements to the minimum requirements must be included within the relevant EHS Plan sections.

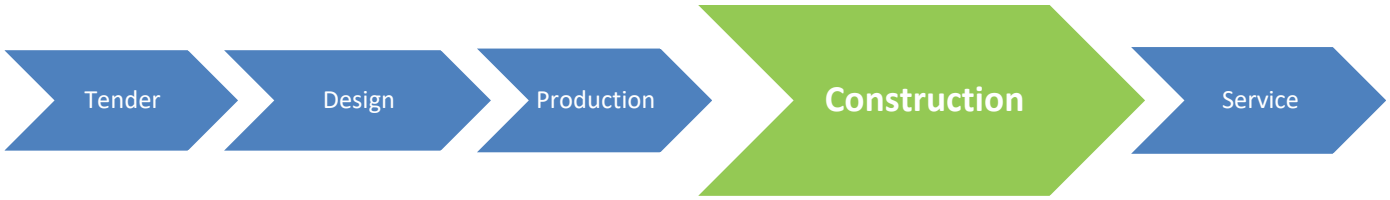
d. The EHS Plan outlines our EHS requirements which complement our Siemens Wind Power EHS Policy, and conform to our ISO 14001 Environmental Management System Certification and to our OHSAS 18001 Occupational Health and Safety Management System.

e. The objective of Siemens Wind Power Zero Harm and Zero Defect campaigns is to ensure Zero Injuries, Zero Damage, and Zero Defects to our personnel and products.

f. The SWP Project Manager (PM) is responsible for development/review of this plan and to ensure that it is aligned with all other EHS Plans relevant to the project i.e. Customer, Main Contractor, SWP sub-contractors and other stakeholders.

1.2. Scope of application and validity

a. The Environment, Health and Safety Plan (hereafter referred to as the EHS Plan) has been developed specifically for [Project Name] and outlines the EHS requirements for all Siemens employees, Siemens subcontractors and subsequent tier of subcontractors as well as visitors to the site during construction activities.



b. This EHS Plan is not an independent document; - it must be used in conjunction with other documents.

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1.3. Implementation of the EHS Plan

Implementation of the EHS Plan at the project site is the collective responsibility of the Project Management Team and the Site Execution Team, as detailed in Appendix 01 Organisation, Roles and Responsibilities.

1.4. Project Specific EHS Targets / Benchmarks

a. PRO 29992 Health and Safety Performance Measurement and Monitoring outlines how Siemens Wind Power measures EHS performance. Below are the Divisional EHS benchmarks or targets that have been developed for the Project site:

Metric	Benchmark	Target	Units
LTIR (Lost Time Injury Rate)	0.39	0	(Lost Time Injuries x 200,000 hours) / project site work hours.
TRIR (Total Recordable Injury Rate)	1.47	0	(Lost Time,Restricted Work, and Medical Treatment x 200000)/ Project site work hours
CPQSD Points Per month	10	10	Per month by Site Manager
Weekly EHS Inspections per month	4	4	Documented inspections of site by EHS
EHS KRIMA Entries per month	4	4	4/mo for equipment only projects: 12/mo for full scope

b. Each month the EHS performance of the project site shall be presented to the segment management team during the Project Status Meeting (PSM).

1.5. Changes Made to EHS Plan During the Project Construction Phase

a. The EHS Plan is a working document that shall be developed and reviewed as the construction works progress. Changes or updates to this document must be recorded below. This document and any Siemens EHS documentation used in the project must be updated, changed and maintained according to Siemens procedures.

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Paragraphs / Page no.	Description	Change made by	Date	Rev. no.
Paragraphs concerned or added	Describe briefly which part of the EHS Plan is affected by the new revision, including what was reviewed	Name	yyyy.mm.dd	XX

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2. SITE INFORMATION AND ENTERPRISE DESCRIPTION

2.1 Site and Contact Information

Stakeholders	Name & Company	Address	E-Mail	Telephone No.
Client				
Client Representative				
Designer				
Main Contractor				
Siemens PM				
Siemens SM				
Enforcing Authority (Safety)				
Enforcing Authority (Environment)				
Siemens Contractor (Transport)				
Siemens Contractor (Crane)				
Siemens Contractor (Installation)				

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2.2 Enterprise Information

State the Project Name, Project Address and Client, and highlight the contractual relationship between Siemens and the Client i.e. Principal Contractor / Turnkey / Subcontractor / Contractor / Partial Scope. Where Siemens are fulfilling specific contractual requirements, those responsibilities should be summarised in section **3.2 Project Specific Requirements**.

Upon completion (Estimated dd.mm.yyyy), this project consisting of [insert number] wind turbines will deliver a maximum capacity of XX MW electric power. The turbine components for the project consist of:

Component	Type
Number of Tower Sections	
Controller Type (SICS / WTC3)	
Geared / Direct Drive	
Rotor Diameter	
Hub Height	
Internal or external TU	

Detail of the Siemens Transport, Installation Drawings and Work Instructions are available on the Project Workspace.

The "Name of Windfarm" is located in an area of Summarize the project area including:

1. **Security of the Site** - Location of public footpaths within the site boundary, perimeter fencing and gates between land owners within the site boundary, location of residential properties in the site boundary, and sporting activities that directly impact site operations i.e. shooting.
2. **Site Boundaries & Access** - Including temporary access (for example), narrow streets/roads, bridges with weight restrictions, lack of parking areas, turning or storage space
3. **Communication** - Mobile Phone Network Provider – coverage over site and note black-spots
4. **Adjacent Land Use** - Schools, busy roads, railway crossing, bridges with height restrictions or weight limits outside of the site boundary
5. **Existing Land Use** - Forestry (detail logging activities including planned felling, and frequency of vehicles), livestock and other farming activities
6. **Restricted Access Areas** - Details of 'no go' areas or areas that require authorization to enter i.e. logging areas
7. **Existing Infrastructure** - Note existing buildings (industrial / commercial) – impacts on traffic management, existing roads and tracks – do any of the tracks allow alternative access / egress from the site? Are roads on site private or county
8. **Ground Conditions** - Such as Peat requiring stringent fire precautions, underground structures, floating roads or water courses that result in weight limits

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9. **Existing Services** - Location of existing services such as power lines (height limits & voltage), and concealed services such as gas mains, water etc
10. **Previous Project Works** - Health and Safety information contained in pre-construction information regarding earlier phases of work, previous land use (particualry important for industrial areas such as Ports)
11. **Existing Health Hazards** - Asbestos, including results of surveys, hazardous materials, structures containing hazardous materials, or additional risks from adjacent works
12. **Wildlife** - Detail special arrangements for wildlife on-site i.e. restricted areas, specific times of year when additional precautions may be necessary, protected areas
13. **Environmental Considerations** - Location of streams, ponds, and lakes that have the potential to be harmed in the event of a loss of containment on access roads and hardstands

IT IS ESSENTIAL THAT THE CONTROLS NEEDED TO MITIGATE THE POTENTIAL HAZARDS IDENTIFIED IN THE DESCIRPTION ABOVE ARE DETAILED IN THE RELEVANT SECTIONS OF THE EHS PLAN

INSERT SITE PLAN WITH TURBINE LOCATION REFERENCE.

3. LEGAL REQUIREMENTS AND OTHER DOCUMENTATION

3.1. Legal Requirements and other documentation

a. PRO 20386 Identification and Evaluation of Compliance with EHS requirements Ap03 Legal Compliance outlines how Siemens Wind Power Onshore identifies and evaluates applicability of EHS requirements.

b. If Siemens Wind Power does not have an EHS organization in the Country, then a Siemens Country EHS Officer shall review and sign this EHS plan ensuring it meets the applicable EHS requirements.

c. This EHS Plan has been developed based on applicable regulations to the scope of work performed.

d. A copy of the signed EHS Plan shall be stored on the Project Workspace.

3.2. Project Specific Requirements

In addition to above mentioned requirements, the EHS Plan is tailored to meet the project specific requirements outlined in the contract between the Client and Siemens.

a) (Insert client specific requirements)

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4. PROJECT ORGANIZATION AND RESPONSIBILITIES

4.1 Organization

The project organization at the construction site is detailed in Appendix 01

4.2 Onsite EHS Staffing

The minimum requirements for EHS Advisor Staffing can be seen in Appendix 02 – Minimum Global Requirements for EHS Support on Projects.

4.3 Site Responsibilities

Site Roles and Responsibilities are detailed in Appendix 01, Project Organisation, Roles and Responsibilities

5. EDUCATION, SAFETY TRAINING, VISITORS

5.1. Basic Education and Training

a. PRO 19394 SWP Wind Technician Competence Framework[1] outlines the training requirements for the different job roles required to perform installation and commissioning work.

b. Roles and Responsibilities for specific tasks that are not covered by the Wind Technician Competency Framework must provide certificates of competency for the task to be undertaken.

c. Certification is collated and initial checks are undertaken by the Group Acount Team, with a certification matrix provided for the project. It is the responsibility of supervisory personnel (IL, CT-I / CT-C) to confirm that Technicians allocated to a task have the correct certification.

d. Training Certification shall be reviewed at the induction stage to ensure that personnel arriving at site have had certification checked by Group Account.

e. The EHS Function at site shall sample individual training certification to ensure that personnel undertaking tasks at site have the correct training.

5.2. Site EHS Induction Training

a. All personnel, subcontractors and visitors arriving on-site shall receive a site induction that introduces and reinforces Siemens and the general site EHS requirements, as per the requirements of PRO 29853 Safety Induction.

[1] PRO 19394 does not apply for fixed priced contractors in Segment America

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b. On arrival each day, all Siemens personnel, contractors and visitors shall sign onto the site using **Appendix 04, Form 01 Daily Sign In Sheet,** located at the Coumpound office entrance.

c. On larger projects, with multiple access points and / or remote gathering points, supervisors shall ensure that personnel arriving at their work site sign onto the PTP(s) for the tasks(s) being undertaken in those areas.

d. Signing in will keep SWP informed of who are on site, and in the case of emergency evacuation, the list can be used for roll call.

The Site Manager or designee (refer to Appendix 01 Organisation, Roles and Responsibilities) shall deliver the site induction including:

- The Siemens Wind Power DVD presentation covering the standard conditions and situations that are common to SWP contracts; and
- A project specific induction covering site rules and reinforcing any items of specific legislation that control on-site tasks (PRO 29853 Safety Induction Ap01 EHS Safety Induction)

When the Safety Induction is completed, the individual inductee's must complete PRO 29853 Appendix 3 "Safety Induction Record" and Appendix 4 "Safety Induction Acknowledgement". The documentation is managed by the inductor and stored locally at site.

- The Inductor shall complete spot checks on certificates confirmed with Group Account.

- The inductee shall be provided with an induction pack containing the Site Briefing Sheet, Induction Helmet Sticker, and Site Map.

- Personnel putting technicians to work shall ensure that certification is checked at the time of induction, against the task that the technician shall be undertaking.

- All personnel issued with a site vehicle must provide a copy of their drivers licience.

e. Visitors / Delivery Drivers

- Shall be made aware of any site specific rules that may affect their task, and finally sign onto PRO 29853 Appendix 3 "Safety Induction Record" and Appendix 4 "Safety Induction Acknowledgement". The Induction Training provided to visitors and transport personnel shall be applicable to their activities.

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6. COMMUNICATION AND ENGAGEMENT WITH THE WORKFORCE

6.1 Site Kick-Off Meeting

a. Erection and Installation Contractor - A documented site kick off meeting using the agenda in Appendix 4 of INS 28691 Contractor EHS Management[2] shall be held prior to any erection and installation contractor beginning work on-site. This meeting shall be documented on **Appendix 04, FORM 02 Safety Briefing Acknowledgement** and stored on the project specific Workspace folder.

b. Transportation Contractor - A documented site kick off meeting in accordance with Appendix 5 of INS 28691 Contractor EHS Management shall be held prior to any wind turbine component transportation contractors deliver components to the site. This meeting shall be documented on **Appendix 04, FORM 02 Safety Briefing Acknowledgement** and stored on the project specific Workspace folder

6.2 Communication of Hazards and Risk Controls for the Project

a. Siemens employees , and Siemens directly supervised contractors shall review and understand the risk assessments and method statements (RAMS) or Job Hazard Analysis (JHAs) for their job profile. Each technician shall sign **Appendix 04, FORM 2 RAMS / JHA Briefing Acknowledgement** for each Part of the Assembly Manual.

b. All erection and installation contractors shall show evidence their technicians have reviewed and understood the risk controls for the tasks their job profiles are assigned.

c. Note that RAMS / JHA's can be summerised, with key hazards and controls highlighted to the teams.

6.3 Daily Meeting / Morning Brief

a. At the start of each shift, a documented EHS topic should be covered with all crews during the morning meeting, where applicable. This shall be documented on **Appendix 04, FORM 02 Safety Briefing Acknowledgement**

6.4 Pre-Task Plans / Tool Box Talks

a. Prior to starting work, the task supervisor shall brief all personnel involved in the task, including relevant information that may have been highlighted during the daily brief, and ensure that all personnel in the work area sign to acknowledge their attendance and understanding. Further information on Pre-Task Plans (PTP) is detailed in Section 10.

6.5 Weekly EHS Meeting / Site Safety Committee

a. As a minimum, one documented weekly EHS meeting using **Appendix 04, Form 03, Weekly EHS Meeting** shall be held at the project site with at least one representative from each contractor on site and at least one Siemens technician.

[2] If the scope of the project is equipment only, the requirement for a site kick off meeting is not applicable

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b. The Weekly EHS Meeting shall be led by either the Siemens Site Manager or Installation Lead and the EHS Site Advisor should attend the meeting as a resource and support the Site Manager or Installation Lead.

c. The meeting minutes shall be stored in the project specific workspace EHS folder.

6.6 Monthly Safety Meeting

a. On a monthly basis a documented meeting shall be held between the EMiP and the Project Manager (others can attend as needed/ required) to update the PM on the project EHS Performance.

6.7 Handover of EHS Responsibility

a. If during the performance of the project site, a break of more than 10 (ten) consecutive working days occur, a formal EHS meeting shall conducted using **Appendix 03 Handover of EHS Responsibilitiy**. Agenda items shall be amended to ensure project specific mitigation measures linked to EHS Support demobilizing from site are clearly communicated and understood.

b. The Site Manager or designee shall be appointed as per the Roles and Responsibilities detailed in **Appendix 01b, Project RACIE Matrix**

c. The Site Manager shall ensure that **Appendix 03 – Hand over of EHS Responsibilities** is completed and signed by all parties, prior to the EHS Advisor leaving site.

6.8 Making Safety Personal Meetings / Campaigns

a. INS 26800 Making Safety Personal[3] requires that at four project milestones a safety campaign focusing on the specific risks is delivered to site personnel. The four milestones and associated topics are:
   - Mobilization – Driving or ad hoc
   - Main Crane Erection – Mobile Cranes or Mobile Equipment
   - Cabling – Working at Heights or Falling Object Protection
   - Commissioning – Electrical Safety or Lock Out / Tag Out

b. The Site Execution Management Team are also responsible for monitoring Safety Observations at site, and where trends are identified at Project Level, Safety Campaigns shall be used to highlight incident / safety observation trends to project personnel, and the risk controls required to mitigate those trends.

[3] Supporting material for Making Safety Campaigns for each milestone is managed on the MU Workspace

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6.9 Environment, Safety and Health Site Information Board

a. Environment, Safety, and Health Site Information Board shall be positioned in the Main Compound Office. The boards shall, as a minimum, display the following information:

ISO Certification	Siemens / Contractor EHS Policies
Insurance Certificate (Employers Liability)	Performance Statistics
First Aid Arrangements	Site Rules
Applicable Safety Alerts and Information[4]	Weekly EHS Inspection Reports with corrective actions[5]
Lessons Learnt	Site Organisational Chart with contact information

b. In addition to the above notice board, Environment, Health and Safety Posters that must be displayed to comply with statutory requirements, shall be displayed in the Site Office.

c. A Safety Observation Cards Post Box, with spare cards, shall be positioned in the Welfare Area.

6.10 Safety Alerts and Safety Awareness's

a. Safety Alerts

- Onshore EHS shall maintain a communication package[6] of all valid safety alerts that are applicable to Onshore. This communication package will delivered as part of the site induction material.

- EMiP shall send all Safety Alerts released after mobilization to the Site Manager and EHS Advisor. The Site Manager and EHS Advisor will ensure the alert is covered with all employees during the daily safety meeting and documented on **Appendix 04, FORM 02 Safety Briefing Acknowledgement**

- All safety alerts released after mobilization and the associated sign off form shall be posted at the site compound to ensure everyone on site is aware of safety alerts released not part of the site induction.

[4] Safety Alerts recently issued must be communicated to the work foce and displayed on the EHS Notice Board. A file shall be retained on-site detailing all applicable Safety Alerts, Safety Awareness, and Stop Work noticfications

[5] Safety Observations made by the Project Team shall be included within the Weekly EHS Inspection Report, with owners, closeout date(s), and actions

[6] The presentation is located: Onshore EHS Safety Alert Site. As new alerts are issued and as old alerts are removed, the communication package will be updated to ensure the site induction covers all valid safety alerts

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b. Safety Awareness

- EMiPs shall send all safety awareness to the Site Manager and EHS Advisor and they shall present the safety awareness as part of the next morning safety meeting and documented on **Appendix 04, FORM 02 Safety Briefing Acknowledgement**

c. Critical Quality / EHS Announcement (CQEA)

- If a situation should occur on a project site that would pose an imminent danger to personnel or equipment, the work shall be stopped and site management notified. If the issue cannot be resolved in one day, a local **FORM 20913 Critical Quality / EHS Announcement** shall be completed and communicated to the project EMiP, segment EHS Manager, and the business unit Technical Safety Representative.

- Critical Quality/EHS announcement may be used as a project site/location specific instruction. Multiple sites/locations can be included if signed off by a manager with corresponding accountability, in accordance to SWP Q/EHS Stop Work process.

- The business units Technical Safety Representative must be notified upon completion, for further evaluation.

d. General

- **Appendix 04, FORM 02 Safety Briefing Acknowledgement** forms completed for Safety Alerts, Safety Awareness Notices, Critical Safety Announcements and Stop Work notices shall be uploaded onto the project workspace, when all technicians on the project have signed.

6.11 Exchange of design information between the customer, designers, and other interested parties

SWP maintain a design risk register summarizing any residual EHS hazards and risks identified in the design. This register will be used as a mechanism for providing traceability to show that risks identified in the design have been addressed and any necessary residual risk information is communicated to relevant parties.

The design risk assessment (DRA) shall demonstrate that designers have considered significant hazards during both the construction and operation & maintenance phase, and removed or controlled them as part of the design process.

Information regarding residual risks associated with the design of the WTG shall be included within the technical documentation (e.g. installation manual, work instructions, drawings, checklists and as-built documentation, and RAMS / JHA / Method Statements).

If due to unforeseen circumstances there are aspects of the design which require modification, Siemens Wind Power shall notify and submit information to the Customer (Client).

SWP shall develop the modification or change on the basis of risk assessment following our Engineering Change Management process (ECM) to ensure that any new hazards are identified and controlled.

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Should any aspects of the WTG design be identified as a significant product safety concern, these shall be handled in accordance with Siemens Wind Power procedure 'PRO 19631 Product Safety Procedure'.

6.12 Communication on Site

a. At no point shall work commence in a turbine where two-way communications between the Site office and the turbine cannot be established and verified. If loss of communication occurs, the work activity shall stop until communication can be re-established.

b. The international language for Siemens is English however, where required SWP and our contractors may need to implement arrangements for workers who have limited knowledge of spoken or written English.

c. All work teams shall have at least one employee (i.e. the translator or interpreter) who speaks and reads proficient English so that the risks identified are communicated and managed. The translator/interpreter for each work crew will be identified by means of a hard hat sticker or other suitable means.

6.13 Safety Signage and Information on Site

a. On initial mobilization to the site, Siemens shall assess those areas of the site under our control, and display signage and information as required by the EHS Plan and Appendices. As a minimum, pictorial signage and information should be displayed to indentify:

- The type of PPE that is required to access the site
- Specific hazards or requirements on entering an area i.e. Site Compound areas where telehandlers are operating, speed limits, height restrictions, etc
- Location of first aid and rescue equipment
- Emergency muster points

b. All safety signage and information must meet ISO 7010 Safety Signs and Symbols.

c. Inadequate, damaged, or poorly positioned signage and information under Siemens, client, contractor, or other stakeholder control, must be reported to the appropriate party.

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7. CONTRACTOR MANAGEMENT

7.1 Contractor EHS Management

a. All erection and installation contractors performing work on site shall be evaluated in accordance with PRO 20237 Supplier Qualification Management to ensure they have an EHS Management System in place to safely perform work on the site.

b. INS 28691 Onshore Contactor EHS Management program outlines the EHS requirements and required forms that shall be used by a Siemens contractor to perform the work on site.

c. All contractors who are in violation of the requirements contained in INS 28691 shall be issued an EHS Non-Compliance Notice (NCN) in accordance with **INS 28691 Appendix 02, Form 03.**

d. NCN's shall be documented and tracked within **INS 28691 Ap06 Onshore Project Contractor Evaluation.**

8. PROJECT EHS PERFORMANCE MONITORING

The following formal inspections augment the Supervisors day to day checks and examinations which occur as a part of any task. These inspections follow a designated checklist for the systematic inspection of the workplace, item of plant or equipment.

8.1. Mobile Equipment Arrival Inspections

a. All Siemens rented forklift trucks, tele handlers, aerial lifts and generators shall be inspected using **INS 28691, Appendix 02, FORM 10 - Mobile Equipment Arrival Inspection** prior to being operated on Site. All deficiencies shall be entered into KRIMA and corrected prior to using the equipment.

8.2. Documented Daily (Pre-Use) Equipment Inspections

a. All Siemens rented fork trucks, telehandlers and aerial lifts shall have a documented daily inspection performed on those days the equipment will be used, by completing pre-use checks on all mobile plant using **Appendix 04, Form 04 Telehandlers, Form 05 MEWP's, or Form 06, Portable Generators.**

b. **Crane Pre-Use** and **Lifting Accessories** Inspections shall be completed by the contractors, and submitted to Siemens weekly.

c. At the end of each week, **Appendix 04, Form 04 Telehandlers, Form 05 MEWP's, or Form 06, Portable Generators** shall be provided to the EHS Site Advisor and stored locally at the project site.

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d. No power industrial mobile equipment on the project sites shall be operated if site conditions prevent the safe operation of the equipment.

e. The corrective maintenance undertaken to resolve deficiencies identified during inspections shall be documented on the Inspection Record / Maintenance Log for the mobile plant.

f. All deficiencies shall be entered into KRIMA and corrected prior to using the equipment.

8.3. Safety Walk and Talk Reviews[7]

Safety Walk and Talk Reviews are scheduled at projects to ensure management personnel undertake guided sampling of EHS performance. Observations raised are recorded within KRIMA and tracked locally by the project.

8.4. Continuing Personnel EHS Development (CPSD)

PRO 18412 Continuing Personal EHS Development ensures that managers and site based personnel are actively engaged in a range of proactive / collaborative EHS improvement activities throughout the fiscal year, and is designed to create discussion and focus on EHS issues during day to day operations.

8.5. Safety Observation Cards / Near Miss Booklets

a. Siemens Zero Harm campaign encourages open and honest discussion regarding health and safety issues identified on the project. The Safety Observation Card / Near Miss Booklet provides a quick and easy format for personnel to report EHS non-conformances to the site management team.

b. Safety Observations are recorded on the Weekly EHS Inspection Form, and assigned an owner, mitigation controls, and action dates that are tracked locally and on the Krima reporting system.

8.6. Weekly EHS Inspections

- As a minimum, one documented EHS inspection using **Appendix 04, Form 07 Weekly EHS Inspection**[8], shall be performed by the EHS Advisor.
- Findings identified during the weekly inspection shall be entered in to KRIMA following PRO 16745 KRIMA EHS Software Application.

8.7. Weekly Vehicle Inspections

- Siemens / Contractors personnel who have been issued Siemens vehicles shall perform a documented inspection using FORM 18666 Weekly Vehicle Inspection**.**
- Completion of the inspection is the responsibility of the user of vehicle.

[7] EMEA use the Safety Walk & Talk booklet to facilitate Management Inspections

[8] Fire Assessments are required in EMEA using **Appendix 04, Form 09, Weekly Fire Checklist.** Globally fire assessments are incorporated in the weekly inspection

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- These inspections shall be stored locally at the project site.

8.8. Monthly Specific Equipment Checklists:

a. The following pieces of equipment shall be inspected monthly. All deficiencies found during these inspections shall be entered on to KRIMA.

b. Fire Extinguishers:

- On a monthly basis all fire extinguishers[9] on site shall be visually checked. Completed checks listing all fire extinguishers and their monthly inspection status shall be recorded. All fire extinguishers not in technician vehicles (such as on 690V Generators and other equipment / stations) shall be accounted for on **Appendix 04, Form 08, Safety Equipment Register.**

c. Lifting Equipment

- During mobile crane operations, a minimum of five different lifting accessories / rigging shall be inspected on a monthly basis using **INS 26846 Ap3 Rigging Periodic Inspection Form**. One of these inspections must be of a lifting bag.
- Rigging Periodic Inspections are addition to pre-use checks and inspections completed by the Erection Team.

d. Portable Ladders:

- All portable ladders shall be inspected prior to each use in accordance to the manufacturers warning instruction labels. Any ladder found with deficiencies including labeling that is not legible shall be removed from service, quarantined, and tagged “Do not use”.
- If the equipment cannot be repaired the ladder must be rendered unusable and disposed of in accordance with site requirements.

e. Nacelle Service Crane

- The operation, inspection and maintenance of nacelle service crane shall comply with **INS 28846, Appendix 12**.
- Prior to leaving the tower for turn over to Service, new units crews shall install Weather proof tag indicating “Standby Crane Do Not Use Until Performing Required Inspections” A specific climb of the WTG is not required to conduct inspections instead the service crane will be inspected on the first regular climb of the WTG.

f. Safety Equipment

- On a monthly basis **Appendix 04, Form 08, Safety Equipment Register**[10] shall be completed for all Milan A24 devices, Siemens rescue kit (backboard), Spec-pak (if on site), eye wash bottles, first aid kits, and AEDs located in the site compound, remote storage areas or in response vehicles.

[9] Fire extinguishers in EMEA are integrated into the weekly checks

[10] Safety Equipment located in the turbines shall be inspected and recorded as part of the QI TMSE checks

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- Eyewash bottles, first aid kits, and fire extinguishers located in technician vehicles shall be covered by the weekly vehicle inspection.

8.9. Semi-Annual Inspections

a. Portable Power Tools

- All Siemens provided portable power tools shall have a formal inspection every 6 months and have a calibration inspection marking indicating the date it was inspected and its expiration date.
- In the event a portable power tool becomes out of date, it will be quarantined until the tool can be returned to the Siemens Warehouse.

b. Fall Protection Equipment

An inspection shall be performed by a competent person, as per local statutory requirements, and each piece of fall protection equipment will be marked and a certificate be provided to indicate when the next inspection is due. (In lieu of a formal certificate, an electronic database / tracking system may be used).

8.10. EHS Audits / Assessment

a. Throughout the project the EHS Management System may be audited or assessed in accordance with PRO 15578 Internal Audits and Assessments, to ensure compliance with current legislation, Client requirements and Siemens standards.

b. Market Unit (MU) EHS Assessments can be performed to ensure compliance with the Project EHS Plan. This is normally based on the Divisional audit and assessment plan however, MU or Segment EHS Management can request an assessment for a specific project.

8.11. Turbine Mounted Safety Equipment (TMSE)

a. Turbine Mounted Safety Equipment includes the following items:

- Anchor points
- Tower Ladder
- Ladder climbing device system (Glideloc / ICM)
- Evacuation system (A20/A24/A29)
- Service Lift (if equipped)
- Service Crane and Hoist

b. Inspections are undertaken by Siemens certified TMSE personnel during the construction phase of the project. Inspections are recorded and stored locally by the Quality Inspector.

9. REPORTING

a. AM - Daily EHS Reports

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Each work day the EHS Site Advisor shall complete **LSF 17234 Projects EHS Daily Report**. This report shall be sent to the following people as a minimum:

- Project Manager
- Site Manager
- EHS Manager in Projects

If this report is attached to the Site Manager's daily report, it does not need to be sent directly to the EHS Manager in Projects and the Project Manager.
If there is going to be an EHS Inspector to assist the EHS Site Advisor (Lead) on the project, the inspector will submi the LSF 21292 EHS Inspector Daily Report the EHS Advisor (Lead)

b. Monthly EHS Reports

The EHS Advisor shall send to the EMiP the EHS statistics using **INS 28691 Appendix 2 FORM 1 Contractor Monthly Report.** Or the local system for collecting statistics as directed by the EMiP.

d. Onshore Project Contractor EHS Evaluation

INS 26891 Ap06 shall be completed at the end of the project to evaluate the EHS Performance of all tier one contractors on the project. The project team shall ensure that the contractor recieves feedback based on the evaluation, and that the evaluation is uploaded onto the MU Workspace.

10. RISK ASSESSMENT (Job Hazard Analysis) / METHOD STATEMENT (RAMS)

a. In accordance with PRO-18669 Risk Assessment, detailed risks assessment / Job Hazard Analysis have been created for all tasks outlined in the installation manual in order to identify and mitigate any hazards.

b. In countries that require safety method statements, a safety method statement shall be created for each risk assessment / task using FORM 13023 Form for Safety Method Statement.

c. Any project specific task risk assessments created at the project site shall be sent to the EMiP for review and issued to Market Unit to be included in the Workspace RAMS library.

d. RAMS/JHAs developed by erection and installation contractors shall comply with INS 28691 Appendix 2 Required Forms for Transport, Erection and Installation Contractor and checked by Siemens.

10.1. Pre-Task-Plans

PRO-18669 Risk Assessment, Ap 04 PTP-TRA Form shall be used to as a supplementary local assessment of risks associated with a task, or a temporary risk assessment to ensure that controls are assessed, communicated, and implemented for unforseen tasks.

The completed Pre-Task Plan forms the basis of a pre-job briefing / tool box talk, and all personnel involved in the task must sign the PTP to acknowledge their understanding.

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The PTP shall be kept at the work site for additional technicians, contractors or visitors, to sign on when they arrive at the work site. This can be used as a method of signing into the area where the work is being undertaken, and to acknowledge that they have been informed of the risks associated with the task.

On completion of the task, the PTP shall be handed over to EHS Function at site to be stored locally.

10.1.1. Non Crane Operation Pre-Task-Plans

a. Prior to the start of any non-crane operation task, each crew (2 or more workers) will develop a documented Pre-Task Plan using FORM 5 Pre-Task Plan – Non Crane Work of Appendix 2 of INS 28691

b. The foreman / supervisor / lead are responsible for the completion of the PTP with the assistance of his/her crew members. The crew should utilize the Risk Assessments to assist in the development of the PTP.

c. The PTP and any associated permit to work forms shall remain at the task location along with the RAMS / JHA for that portion of the project work.

d. At the end of each task, the PTP will be returned to the Site EHS Advisor. The PTP/TBT shall be stored locally on site.

e. Each new job (i.e. offloading team moves to rotor build) requires the development of a new PTP. Each work location shall have an individual PTP in the event that one crew is working at two different locations.

f. Technicians and / or visitors arriving at the location where work is being performed shall review the PTP, and sign to confirm their understanding and awareness of the hazards associated with the task. The PTP review must be completed before the task starts.

10.1.2. Crane Operation Pre-Task-Plans

a. Prior to the start of any mobile crane operation, a documented pre-task plan using FORM 6 Pre-Task Plan – Crane Work of Appendix 2 of INS 28691 shall be completed.

b. Prior to any man basket / personnel basket operations FORM 8 Crane Suspended or Attached Platform Form of Appendix 2 of INS 28691 shall be completed.

c. The foreman / lead person is responsible for the completion of the PTP with the assistance of his/her crew members. The crew should use the risk assessment / JHA to assist in the development of the PTP.

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d. The PTP and any associated permit to works shall remain at the task location along with the risk assessment / JHA for that portion of the project's work.

e. At the end of each task, the PTP will be turned into the EHS Site Advisor. The EHS site advisor should review the PTP for completeness and provide positive or negative feedback during the site induction. The PTP shall be stored locally at site.

f. Personnel arriving at a location where work is being performed shall review the PTP to become aware of the hazards associated with the work and sign-in on the PTP.

10.2.3. Work Packages

a. Prior to the start of a task, the Installation Lead should ensure that a Work Package has been created and handed over to the team undertaking the work. As a minimum, the Work Package should include:
- Pre-Task Plan for discussion and sign-off, detailing the key hazards and controls. The PTP should reference all the documentation required to complete the task, and provide the sign off for all the work package.
- Applicable Risk Assessment(s) / Method Statement(s) / JHA's
- Applicable Work Instruction(s)

b. The task may require additional documentation and controls including:
- Permit (applicable to the specific task); or Energy Isolation Procedure (EIP)
- Applicable Diagrams i.e. E-Plan

11. GENERAL SAFETY AND HEALTH REQUIREMENTS

a. Siemens prohibits anyone under the age of 18 to work on the construction project.

b. All personnel must adhere to all smoking requirements / restrictions that are in place for each project Site. When cigarettes are extinguished, they must make certain that the cigarette is properly extinguished and cannot start a fire. Ashtrays must be present at all designated smoking areas.

c. All personnel must conduct themselves in an orderly and safe manner and conform at all times to the EHS Requirements. Fighting, engaging in horseplay, being under the influence of or possessing alcohol or drugs, gambling, soliciting, stealing, immoral or otherwise undesirable conduct is not permitted.

d. Siemens Basic Rules Health and Safety Rules state that there is Zero Tolerence to being under the influence or possessing drugs or alcohol on a Siemens site.

e. Regional Segments shall implement a Drug and Alcohol testing regime compatible with local legislative and contractual requirements.

- LSP 05.78 Drug Free Workplace (AM) applies in the United States

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11.1. Basic Health and Safety Rules and Assembly Manual

a. The Assembly Manual references SI 545781-EN Basic Health and Safety Rules which outline the minimum EHS requirements for performing work on site which expands on the requirements in this EHS Plan.

b. All work conducted on Site covered by the Siemens installation manual and/or related work instructions must have the applicable portions of those documents present at the work location (see section 10.2.3. Work Package).

c. Any deviation from the installation manual and/or related work instruction must be reviewed by Siemens Site management. The site manager shall ensure that documented approval of the deviation provided.

d. The EHS Advisor, with assistance from the IL and other technical personnel, shall develop a PTP / Risk Assessment for the deviation, to ensure appropriate risk controls are implemented before the work proceeds.

11.2. Visitor Requirements

a. All visitors must go through Visitor Site induction and sign in upon arrival at the project Site, and sign out at the end of each day.

b. Visitors are never permitted to leave the Site office area without an escort and must follow all the instructions / directions given by their escort.

c. All visitors who plan to leave the Site office shall wear the required clothing and personal protective equipment (PPE).

d. No visitor is permitted to climb a wind turbine without written approval from Siemens Site Management and meeting requirements for visitors climbing, based on local requirements and, as a minimum PRO 15833 Appendix 6 - visitors in the Turbine.

e. No Contractor shall take any photos without having written approval to be allowed to take photos by the appropriate communications organization.

11.3. Communication on Site

d. At no point shall work commence in a turbine where two-way communications between the Site office and the turbine cannot be established and verified. If loss of communication occurs, the work activity shall stop until communication can be re-established.

e. All work teams shall have at least one employee (i.e. the translator or interpreter) who speaks and reads proficient English so that the risks identified are communicated and managed. The translator/interpreter for each work crew will be identified by means of a hard hat sticker or other suitable means.

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11.4. Housekeeping and Welfare Facilities

a. Drinking Water

- Clearly mark the drinking water supply
- An adequate supply of drinking water shall be provided at all work locations.
- Any container used to distribute drinking water shall be clearly marked as to the nature of its contents and not used for any other purpose.
- Portable containers used to dispense drinking water shall be capable of being tightly closed and equipped with a tap. Water shall not be dipped from containers.

b. Toilets

- Portable toilets shall be strategically placed on the Site where the work is being performed.
- Toilets shall be cleaned as a minimum once a week or more frequent as needed.
- There must be adequate sanitary facilities made available at the toilet such as wash water or hand cleaner.

c. Handwash Facilities

- Adequate handwash facilities shall be provided inaccordance with local requirements and /or Siemens requirement(s) for employees who are engaged in the use and handling of chemicals during daily tasks.

d. Housekeeping

- Everyone is responsible for good housekeeping and segregating the waste according to the site plan at all times.
- No electrical cables shall be run through the turbine entry door or the stairs to the turbine.
- The access and egress path shall be free of obstructions
- Emergency exits must be free of obstructions at all times
- All equipment and materials that are not in use at active work areas (i.e. hard stands) shall be organized. All work areas shall be clear of debris, projecting nails, and sharp objects not necessary for the work in progress.
- Storage containers shall be kept in order including a clear passageway for getting into and out of the containers.
- All combustible material shall be removed as a minimum once a week during the course of construction.
- Containers shall be provided for the collection and separation of waste, trash, oily and used rags, and other wastes.
- Tools and equipment shall be properly stored or secured, especially in mobile vehicles or trailers. This is especially critical to prevent loose supplies and hazardous tools from becoming airborne missiles in the event of a sudden stop or vehicle accident.

e. Welfare Facilities

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- Suitable facilities shall be provided for taking breaks and meal breaks. The facilities must provide shelter from wind / rain / direct sun and contain table and chairs (with backs), kettle or urn for boiling water, and a means of warming food.
- The site should have arrangements in place for storing clothing not worn on site, and storing PPE needed for site work
- Ensure that wet clothing can be dried. If electrical heaters are used, ensure they are properly ventalisated and, if possible, fitted with a high temperature cut out device.
- Do not store plant, equipment, or materials in the rest areas.

11.5. Mobile Equipment

a. Preventative Maintenance

- All Siemens rented fork trucks, tele-handlers and aerial lifts shall be part of a preventative maintenance program based on the equipment manufacturers' requirements. Preventative maintenance shall be documented as shown in INS 26846 Ap2.
- Pre-use inspections shall be completed and filed within the Siemens EHS Plan

b. Fork Trucks / Tele Handlers

- All forklift trucks / tele handlers' operators shall have a certificate providing proof of training in the operation of the equipment.
- Slings shall not be attached directly to the tines (forks) for hoisting purposes.
- A manufactured attached system must be used when using the tines to hoist, and must be rated / designed for the particular piece of equipment that it is being used with. Attachments must be marked with their rated capacity and weight.
- All loads being transported by forklifts shall be secured to prevent inadvertent movement.
- All mobile equipment shall have an audible alarm/warning when the equipment is in reverse.
- No personnel shall be permitted to be raised / lowered by a forklift without an approved basket attached to the forks.

c. Aerial Lifts

- All aerial lifts operators shall have a certificate providing proof of training in the operation of the equipment.
- All personnel shall use a full body harness and a lanyard at all times while in an aerial lift. The lanyard should be a suitable length to restrain the worker(s) within the basket.

d. Trailers Used with 690V Generators

- All trailers shall have a tongue jack or maneuvering devices installed to allow the trailer to be raised and lowered on / off a motor vehicle hitch.
- All trailers shall be "road worthy" and conform to country legal requirements.

e. Cable Drums Trailers

- Cable Drum must meet local legislation as a minimum requirement to access public roads
- Cable drums must be clearly marked with SWL, and lockable wheels

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- Cable Drum Trailers marked with an SWL must have a valid, in date certificate and insurance
- The drum must be lockable
- Trailers must have lights and registration plate according to local legislation

11.6. Electrical Safety Requirements

a. Siemens personnel shall only perform work on electrical installations in accordance with SWP INS-30768 - Control of Hazardous Energy (ON), SI 545781-EN Basic Health And Safety Rules, DOC 17291 E W Health and Safety Management Standard, section 6.9.10 Electrical Work, LSP Lockout / Tagout (AM), and LSP 13054 Electrical Safe Work Practices (AM) .

b. All fixed electrical installations and electrically operated plant and tools will be employed and used in accordance with local legislation.

c. Tools will operate at the lowest voltage necessary for the task. All other electrical hand held tools should be run off a 110volt supply.

d. Where appropriate, all electrical equipment will be protected by residual current devices (RCD's) and the equipment and RCD's will be the subject of regular recorded inspections and testing.

e. Reasons behind any safety device tripping, apart from deliberate testing, must be raised to Krima. The tripped safety device must not be reset until the reasons for the trip are known and reported.

f. RCD's, portable electrical equipment, isolated hand held tools, and portable electrical measuring devices must be tested and visually inspected before use. Damaged casings, cables and other faults shall result in the equipment being quarantined, and reported to Krima.

g. Fixed electrical installations will be inspected and tested in accordance with local legislation and records kept readily available for inspection.

11.6.1 Control of Hazardous Energy (CoHE) – Lock Out Tag Out

a. Hazardous Energy refers to energy sources including electrical, mechanical, hydraulic, pneumatic, chemical, thermal or other sources in machines and equipment can be hazardous to workers

b. Work on equipment exposing employees to hazardous energies requires the energy source to be isolated, locked out and zero energy state verified.

c. Only qualified persons designated by site management are to install, commission or troubleshoot on hazardous energy sources. INS-30768 - Control of Hazardous Energy (ON) details how Energy Isolation Procedures (EIPs) will be created, issued, reviewed, revised and provides Onshore specific guidance in meeting the requirements of Procedure (PRO) 18914 Control of Hazardous Energies within Market Unit Onshore. LSP 22195 Lockout / Tagout (AM) applies.

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d. All tasks involving CoHE must have a verified Energy Isolation Procedure specific to the task being undertaken, with accompanying RAMS, diagrams, and Work Instructions available at the work place.

e. Where variation from the EIP is identified, work must stop and the issue shall be escalated to the competent supervisor on-site, who shall follow the escalation process identified in INS 30768.

f. Errors or variations from the the EIP provided for the Product shall also be uploaded onto Krima.

11.7. Working at Heights

a. Working at heights risks must be mitigated anytime a technician has to work above the ground (regardless of height) and the safest option should be used. For example, an aerial lift should be used instead of a portable ladder. The type of and use of fall protection should be considered as part of any risk assessment and implemented consistent with ensuring safe working and local regulations. LSP 20720 Fall Protection (AM) applies.

b. All fall protection equipment shall be part of scheduled inspection program with an inspection interval no greater than twelve (12) months. Inspections shall be documented in accordance with local legislation and available for review as requested by Siemens.

c. Full body harness with a twin leg energy absorber lanyard must be worn in accordance with PRO 15833.

d. A full body harness withharness with the GlideLoc / Lad Saf shall be used when climbing up or down the internal tower ladder.

e. A full body harness shall be worn at all times within the tower, basement, and nacelle to assist with rescue and recovery. PFPE accessories can be removed.

f. Lanyard (1m) and Lanyard with adjustable carbineer (2m) must be worn if its use can prevent a fall.

g. Lanyards should be rigged to prevent a free fall of more than six feet (1.8 meters), nor allow a person to contact any lower level / ground.

h. Unless prohibited by local regulation, mobile crane hooks[11] with lockable latches may be used as fall protection anchor points when maintained in a fixed position during the lifting operation, the crane operator remains in the cab and the crane's capacity as configured for the operation is 2268kg or greater.

[11] **UK/IE** – cranes / hiab's must have a LOLER inspection certificate dated within 6 months to attach an SRL

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i. All personal fall arrest equipment shall be visually inspected by the user prior to each use.

j. All personal fall arrest equipment that is temporarily issued to visitors or employees/contractors FORM 17373 Loaned PPE[12] shall be completed.

11.8. Falling Object Protection

a. Before beginning any task the PTP or JHA/RAMS must assess the possibility of dropped objects and eliminate or mitigate this hazard.

b. One (1) person is allowed on an individual tower ladder section at one time between platforms (except during cabling activities).

c. A sign shall be placed at the front of the turbine door to ensure others do not enter the area below where the possibility of dropped objects may exist.

d. No one is allowed within the tower at the base or on the power unit platform when someone is performing work on the ladder section above. (Exception – cabling activities)

e. No person should intentionally position themselves below the work area of others.

f. All hatches and covers must remain closed when not in use or actively being worked on. In situations when a task requires the hatch to remain open, the PTP must be used to identify whether additional risk controls are required.

g. All personnel shall assess openings, activities, and conditions that create a hazard for dropped items and seek corrective actions to mitigate or eliminate those hazards.

h. All tools, equipment, items, etc. must be secured to a tether while in use and/or climbing to prevent the objects from falling.

i. All unnecessary items; including loose nuts, bolts, unused parts, etc., shall be removed from the wind turbine or shall be placed in a secured location.

[12] **UK/IE** fall arrest equipment and accessories shall only be issued to competent visitors with GWO Working at Height training. **UK/IE / AM** six-monthly inspection shall be performed by a competent person and each piece of fall protection equipment will be marked, and a certificate be provided to indicate when the next inspection is due. EMEA / APAC require an annual, formal inspection

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j. All items stored within the wind turbine including parts, equipment, products, and tooling must be stored within a closed top container when not in use. Examples of closed top containers are lidded totes and closed top bags.

k. No tools, equipment, parts or items shall be stored closer than four (4) feet (1.2 m) from open hatches or other unprotected openings that expose the object to a fall. This includes hatches, air vents, any other unprotected opening.

l. When it is not possible to keep tools, equipment, and parts greater than four (4) feet away from any unprotected opening or edge, the item shall be secured using one or more of the following methods:

- Tool/Equipment Bags, Pouches, and Holsters;
- Tool/Equipment Bungee Tethers;
- Heavy Duty Tool/Equipment Tethers;
- Rings/Quick Wrap/tie wraps;
- Magnetic trays;
- Radio Holsters.

m. Do not tether a tool that exceeds ten (10) lbs. (4.5 kg) to a person; it must be attached to a fixed structure

n. Do not modify/customize the tool lanyard in any way (replacement of tool lanyard components such as carabineer clips, side-release disconnect clips or removal of shock-absorbing components may affect the lanyard's load rating)

o. Do not use tool tethers in situations where machinery entanglement is a concern; most tool tethers will not break away against the weight of a person;

p. Always use a tool lanyard that is rated properly for the tool/object weight.

q. Only load rated bags with top closure are permitted for use.

11.9. Siemens Provided Lifting Accessories / Rigging

a. All SWP lifting accessories / rigging shall be inspected, as a minimum, on an annual basis and receive a certificate of thorough examination by a competent person. Inspections required at shorter intervals shall be determined by local statutory requirements[13].

[13] UKIE and AM require 6 monthly inspection periods

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b. In the event that a lifting accessory / rigging inspection certificate and / or tag is out of date, it will be quarantined. A competent person shall be notified to inspect the accessory and issue a new certificate of thorough examination.

c. Rigging/lifting accessories shall be marked, inspected and used in accordance with INS 26846 Ap3 Rigging, and as required by local regulation.

d. List(s) of lifting equipment and their certificates of thorough examination are required to be located where the lifting operation is being performed, or in the site office.

11.10. Lifting Operations

a. All lifting operations shall be completed in accordance with INS-28691 Appendix 1 - EHS Requirements for Erection and Installation Contractors.

b. Service crane and hoist lifting operations shall comply with INS 28846

c. The maximum wind speed limit for crane operations shall be determined by the crane type and the component to be lifted. The final decision on the acceptable wind speed for each lifting operation lies with the *Person in-Charge* (see Lifting Operation Safety, INS 26846, page 9).

11.11. Service Cranes

The nacelle service crane and hoist is certified, tested and approved according to EN12999 and the machinery directive 98/37/EC. Copies of the test certificates will be held in the nacelle of each turbine. The Service crane operator must ensure that the documentation is in place before operating the crane. If the documentation is not in place, then the service crane cannot be operated.

11.12. Portable Power Tools

a. All employees shall perform a pre-use inspection of their tools and equipment to ensure they are maintained to operate safely.

b. All tools that require calibration shall not be used if the tool is not in current calibration and turned into the stock keeper for quarantine.

c. Ground Fault Circuit Interrupters (GFCI) or local equivalent, for example Residual Current Devices, shall be used on all power cords where GFCI is not built into the power source such as the 690V Generator.

d. All power tools shall be powered down when not in use.

e. No guards or safety features shall be removed or modified on any tool.

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f. Tools should neither be dropped nor thrown from place to place nor from person to person.

g. Tools that must be raised or lowered from one elevation to another shall be placed in an approved lifting bag or firmly attached to a hand-line.

h. Only approved tools shall be used on-Site.

i. In the event a special tool is needed for a specific task, for which no such manufactured tool exists, proper engineering design, specifications, calculations and safety factors must be provided prior to construction of such a tool.

11.13. Ladders and Steps

a. Ladders, Steps Ladders, and Hop Ups should only be used as a last resort.

b. Portable ladders must be secured by anchoring the ladder (tying off) or by having another worker hold the ladder for the duration of the activity.

c. Ladders shall be inspected prior to each use. Damaged ladders shall be tagged as defective and quarantined.

d. Fiberglass ladders shall be used when there is a requirement for work in proximity to electrical equipment.

e. Wooden job built ladders shall not be used on any job site.

f. Ladders shall only be used on a clean, level and solid base.

g. All extension ladders shall be used with a 4:1 ratio from the vertical. For every four (4) feet of working length the base of ladder should be one (1) foot out from the top support.

h. Stepladders shall only be used in the fully open position with the spreader bars locked.

i. Ladders used for access and egress shall extend a minimum of 1 m (3 ft.) above the top of a platform or landing.

j. Always maintain 3 points of contact and face the ladder when climbing up or down. Do not carry tools or material in your hands when climbing.

k. No one shall stand on the top two rungs of any extension ladder or on the top step or cap of a step ladder.

l. Worker may only work from a ladder whilst facing the ladder.

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m. Anyone working from a ladder must be facing the ladder and keep their center of gravity (belt buckle) between the ladder side rails.

11.14. Personal Protective Equipment (PPE)

a. All PPE shall be used in accordance with PRO 13838 Personal Protective Equipment.

b. **Safety Boots** - Steel toe/safety toe work boots that are a minimum of six (6) inch (15cm) high, to cover the ankle with reinforced steel toe caps and appropriate non-slip soles shall be worn at all times while on Site.

c. Head Protection / Head Lamp

- Climbing Helmet – ISO 3873 Industrial Safety Helmet compatable with regional statutory requirements for an industrial climbing helmet, with integral chin straps that prevents inadvertent loss of the helmet is required for all personnel working inside a wind turbine.
- Hard Hat – ISO 3873 Industrial Safety Helmet provided for all employees that work outside a wind turbine. Note – a climbing helmet can be used as a hard hat.
- Head Lamp - A head lamp is required for each person wearing a climbing helmet inside a wind turbine.

d. Hearing Protection

- All employees who are exposed to occupational noise greater than 85 dBA shall be provided hearing protection with a Noise Reduction Rating (NRR) / Single Number Rating (SNR) of a minimum of 34 dBA.

e. Eye Protection

- Eye protection shall conform to the requirements of a risk assessment specific to the task being undertaken.

f. Hand Protection

- Gloves shall be worn when climbing ladders to improve grip on the rungs and also to protect the hands from injury / abrasion.
- Hand protection will need to be changed depending on the task and the type of chemical in use. Refer to the SDS to identify the correct hand protection.
- Suitable hand protection must also be worn where work could lead to:
    i. Burn or scald, irritation, cuts and abrasions, crush injury, lack of grip, skin disorder, frostbite, puncture or absorption of hazardous substances.

g. Respiratory Protection

- Respirators shall be selected based on the potential exposure of the technician using the following criteria:

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i. The specific contaminants known or suspected to be present, concentrations of contaminants known or expected, and skin absorption potential of the contaminants.

- LSP 05.04 Respiratory Projection (AM) applies.

11.15. Clothing Requirements

a. Shirts with at least a 4 inch (10cm) over the shoulder sleeve shall be worn at all times.

b. Full length trousers that cover the entire legs of the employee shall be worn at all times. The trousers shall not have significant holes.

c. Loose fitting clothes or jewelry shall not be worn in the wind turbine, around moving machinery, grinding operations, welding operations, electrical operations, etc.

d. A high visibility vest and/or reflective shirt shall be worn at all times outside of the office building / parking area.

11.16. Motor Vehicles

a. Vehicles shall be parked a minimum of sixty (60) feet (18 meters) from the base of the turbine if the nacelle hoist / nacelle service crane is going to be used or the nacelle doors are opened.

NOTE – Vehicles may enter this area when carrying heavy equipment to be hoisted but must exit perimeter when load is lifted from truck bed.

b. Use of mobile phones to include texting and reading texts and any other communication devices are forbidden when driving any vehicle or mobile equipment on Site.

c. Each vehicle on Site must be equipped with a fire extinguisher, first aid kit, and eye wash. Vehicles equipped with an external fuel tank must have a fire extinguisher relevant for the fire risk.

d. All vehicles shall have their headlights turned on while moving within the project boundaries.

e. All vehicles shall reverse park at all times while within the project boundaries.

f. Personnel travelling in vehicles must be in a seat designed for the purpose and the seat must be equipped with a seat belt.

g. Personnel shall wear seat belts at all times. It is prohibited to ride in the bed of trucks.

h. All motor vehicles shall slow to 15 kmh (10 mph) while driving through/by hardstands.

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i. Always observe the site speed limits and drive in a manner appropriate to the conditions. Avoid excessive braking, accelerating or performing any maneuver likely to cause damage to the road surface, its surroundings or the vehicle.

j. In winter conditions all windows must be clear of snow, ice and condensation before the vehicle is operated.

k. LSP 14549 Fleet Vehicle Management (AM) applies.

11.17. Wind Speed Restrictions for Working in Turbines

a. If the wind turbine has been commissioned, all wind measurements shall be based upon the measurements provided by the turbine measuring system with the hatches closed. The average speed of the wind, measured over the last 10 minutes, shall be used to determine wind speed.

b. If the wind turbine has not been commissioned, a hand held anemometer shall be used with readings taken from the approximate height of the actual work location. In the event that a hand held anemometer is not available the anemometer from the nearest crane shall be used to determine wind speed.

c. For crane operations the crane anemometer shall be used to determine wind speed.

d. Wind Speed restrictions for working in turbines are detailed in the Siemens Basic Health and Safety Rules.

11.18. Permit to Work

a. INS 27706 Permit to Work Onshore Projects outlines the requirements for the permit to work program. The following tasks require a permit to be opened:
- Restricted Work Space
- Hot Work
- Lone Work
- Digging in to the ground or working within an excavation greater than 4 ft. (1.2m) in depth
- Two separate crews working in the same turbine
- Work where the ambient temperate is below -15F / - 23C
- Work where the heat index is above 115F/ 46C

b. The Site Manager shall identify competent personnel during the mobilization phase to manage the permit to work system, and ensure that Permit Issuer(s) are identified and available at site through the Project Execution Period.

c. Permit Issuer(s) and Permit Recievers must receive Permit to Work Awareness Training.

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d. Personnel who have attended the Permit to Work Awareness sessions at site, shall record their attendance and acknowledge their understanding on **Appendix 04, FORM 03 Safety Briefing Acknowledgement**.

11.18.1 Management of Confined Space [AM]

a. Potentially hazardous confined spaces on Siemens Energy, Inc. facilities and job sites must be identified and the hazards evaluated before work begins. Some examples of confined spaces are enclosed generators, hubs, yaw section, etc.

b. Known hazards, such as a toxic atmosphere or mechanical hazards, within a confined space must be identified and controlled before entry may be made into a confined space.

c. LSP 13730 Confined Space Field Procedure (AM) shall be used to assess the compoent and determine whether Confined Space controls are required before entry.

d. A permit must be issued by the Site Manager or his designee before entry can be made. Use Ap 1 Confined Space Permit Form.

11.19. Blood borne Pathogens Protection Guidelines [Review Applicability per project]

a. Prevent contact with the eyes, mouth, mucous membranes and broken skin with blood or other potentially infectious body fluids by using protective barriers such as safety glasses / goggles, face masks, rubber gloves, etc.

b. If possible, provide assistance to injured personnel without exposing yourself to fluids which can be infected with Blood borne pathogens.

c. Do not handle bloody clothing or contact contaminated surfaces unless you are trained and use proper personal protective equipment.

d. Report any potential exposure to infectious materials to the EHS Advisor

e. LSP 16143 Bloodborne Pathogens applies in the Americas.

11.20. Reporting and Investigation of Incidents

a. **Reporting**

- Verbal notification of incident – Personnel are required to notify Siemens Site management of any work-related injury, illness, significant near-miss, significant unsafe condition or practice and any loss or damage to Siemens property immediately.
- Written Krima notification of incident must be uploaded within 24hrs
- An email with a preliminary written report to include the incident classification (lost time, restricted work, medical treatment, first aid, etc.) describing the incident shall be provided to the Client management team as soon as possible, but no later than 24 hours after the incident.

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- All work related incidents such as injures, illnesses, near misses, unsafe acts, unsafe conditions and observations must be reported to the Site EHS Advisor and Site Manager..
- All incidents shall be reported in KRIMA according to PRO 16745 KRIMA EHS Software Application.
- If the incident is defined as “signifincant”, then in addition to entering it into KRIMA the Segement EHS head shall enter it into the Incident Repoting Tool.
- LSP 19560 Accidents / Incidents Reporting and Investigation (AM) apply in the Americas.
- All vehicle incidents involving Siemens/contractors shall be reported using form LSF 13669 Vehicle Accident Form.

b. **Investigation**

- In accordance with PRO 20210 EHS Incident Investigation, each incident shall be risk scored to determine if a detailed TapRoot Investigation is required. All incidents with an actual risk score of 12 or greater or potential of 16 or greater shall have a TapRoot investigation performed.
- All injuries requiring medical treatment or greater shall have the following documents completed, and attached to the Krima Work Flow:

i. LSP 19560 Ap1 Supervisor’s Report of Injury
ii. LSP 19560 Ap2 Employee’s report of injury
iii. LSP 19560 Ap3 Witness statements
iv. LSP 19560 Ap7 Projects / Service Incident Report
v. Work Activity Status FORM from PRO 16475 Ap 12

- Incidents that are not categorized as TapRoot should follow the root cause investigation process and methodology defined by Onshore EHS.
- All TapRoot Investigations require an incident handover meeting where the investigation report is presented by the lead investigator to the project manager, site manager and any additional stakeholders.
- All corrective and preventive actions shall be assigned and tracked to closure using KRIMA.
- A Lesson Learned using FORM 21958 shall be developed and sent to all Onshore project sites Globally.

11.21. Chemical Management

a. PRO 18811 Chemical Management Standard outlines the overall requirements for the handling of chemicals on a construction site.

b. All routine chemicals used on-site have been assessed by an EHS Specialist using PRO 18811 Ap1 ”Form for Request of EHS Evaluation of Chemicals” and those chemicals SDS’s are uploaded to the 3e Online SDS system, Wellnet (Canada) or equivalent system.

c. All non-routine (project specific) chemicals shall be evaluated by a trained chemical evaluator following INS 18811 Request for EHS evaluation of chemical products.

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d. All Siemens contractors shall have their chemicals evaluated and approved by Siemens in accordance with INS 18811 Ap1 Form for EHS Evaluation of Chemical Products by the EHS Manager in Projects, prior to bringing those chemicals on to site. During the project, the EHS Advisor shall monitor chemicals on-site and ensure that where necessary, INS 18811 Ap01 EHS Evaluation of Chemical products is escalated to the Chemical Management Team.

e. The EHSMiP and EHS Advisor shall review the Bill of Materials and ensure that SDS / MSDS sheets are available for all chemicals arriving on the site, and ensure that Chemical Risk Assessments[14] are available for each product.

f. The assessment of the risks and recommended precautions shall be incorporated in the work instruction / RAMS / JHA. Specific substances require additional training, as per the Paint Technicains Roles and Responsibilities.

g. Chemicals identified by Siemens as Prohibited Substances in accordance with PRO 21228 Prohibited and Limited Substances shall not be used and those meeting the definition of Limited Substances will only be used by with approval by Segment EHS Manager.

h. All work involving the transfer of chemicals from one container to another container, such as oils, grease, fuel, paint, etc., shall have a Spill Tray or Plant Nappy.

i. All secondary chemical containers shall be labelled or marked by the user with the product name and primary hazard(s). For chemicals routinely placed in secondary containers pre-printed labels should be created and applied. The Site EHS Advisor shall be consulted before using secondary containers, to ensure the substance is suitable for secordary storage, and to ensure that the correct labeling is applied.

j. All employees who handle chemicals shall attend the training course EHS-8288 Chemical Awareness. Function specific training in safe handling of chemical products shall be implemented as per PRO 18811 to ensure the competences of all relevant employees.

k. Transportation and shipping of chemicals and wastes (referred to as Dangerous Goods-DGs) is only allowed by trained and certified personnel in accordance with national regulatory requirements and Siemens standards.

l. Chemical that are required to imported shall be evaluated by the EHS Segment to ensure import requirements are met.

m. At demobilization, chemical containers that have been opened, or secondary containers, shall be disposed of according to regional statutory requirements.

[14] Chemical Risk Assessment with a chemical risk register for existing products shipped to site is located on the MU Workspace

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n. The client shall inform Siemens regarding the use of chemicals by neighboring farmers, and provide information about their ongoing use around the site if they have the potential to impact the safety and health of those working on the construction project.

o. LSP 21855 Transportation of Dangerous Goods (AM) applies in the Americas.

12. ENVIRONMENTAL REQUIREMENTS

12.1. General Requirements

Environmental Aspects and Impacts evaluated for the the project are detailed in PRO31731 Ap01 Determining Significant Environmental Aspects. Specific controls for the aspects identified are included in Appendix 05.

The relevant data is defined within the organizational unit taking into account both the significant environmental aspects and the operational control needed to mitigate the Environmental Aspects and Impacts identified in **Ap01 Determining Significant Environmental Aspects**. Relevant data will depend on the size and duration of the project, but is not limited to:

- Generation of waste (See 12.2)
- Generation of waste water
- Emissions to air
- Consumption of water
- Consumption of energy divided by energy source; i.e. electricity, natural gas, oil etc.
- Consumption of raw materials
- Production and revenue data needed for KPI calculation
- Number of spills to environment
- Conformity with environmental legal requirements
- Neighbour/Stakeholder complaints
- Environmental incidents and/or accidents (events) as well as near-misses

12.2. Waste Management – General Requirements

The project must identify all types of waste to be generated and include them in INS 14541 Site Waste Management. The quatities of waste disposed of from site are determined by the SESIS reporting requirements, defined as:

- Hazardous wastes for disposal
- Hazardous wastes for recycling/reuse/recovery
- Non-hazardous waste for disposal
- Non-hazardous waste for recycling/reuse/recovery
- Debris and excavated soil for disposal
- Debris and excavated soil for recycling/reuse/recovery

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The EMiP must identify waste disposal facilities for all general waste, oil & coolant products, universal wastes, and hazardous wastes, in Ap03 Site Waste Management Plan. In general terms, that project shall:

a. Ensure all waste or refuse is collected and stored in approved containers at the end of each shift.

b. Recycling of waste is an SWP priority and employees must use recycling systems provided by the client and/or SWP. Recycling requirements will be communicated as part of the site induction.

c. Subcontractors shall notify Siemens in writing of any hazardous waste that shall be generated during performance of their work. The Contractor has the direct responsibility of maintaining proper storage of these wastes while onsite and shall inform Siemens in writing that the wastes have been disposed of in line with local legal requirements.

d. General waste shall be collected in skips, and disposed of by an approved vendor as per INS 14541 Site Waste Management Plan, Appendix 01 to an appropriate facility for recycling or disposal. Skips shall not be overfilled by volume or weight.

e. Containers used for hazardous, universal controlled and other regulated waste collection shall be free from holes, creases, ballooned ends, internal contamination, severe dents and rust that may affect their integrity.

f. Flammable liquids being transferred from one container to another need to be electrically bonded (earthed) and the receiving container must be grounded.

g. Liquid waste containers shall not be filled completely to allow for the expansion of contents. A headspace of approximately 2-inches (5 cm) shall be allowed for each container of liquid.

h. Only new, unused containers shall be used for hazardous and controlled waste collection.

i. Waste containers shall be kept closed except when waste is being added or removed. Containers requiring vent devices are considered closed containers. A container is considered closed if it is tipped over and the contents do not spill out.

j. All markings/labelling of containers is the responsibility of SWP.

k. All containers that hold hazardous, universal and controlled waste (non-regulated) shall have the required markings and labels placed on the upper third of the containers and configured that the labels are clearly visible for inspections. The containers shall be labelled and marked as soon as waste is placed inside the container.

l. Hazardous waste aerosol cans accumulation containers shall be marked with the words “Aerosol Cans Only”.

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Wind Power New Unit and Service Business

m. Containers accumulating used oils shall be marked “Used Oil”.

n. Used oil containers shall be stored in secondary containment that is 110 percent of the capacity of the container.

o. Containers and funnels dedicated to the transfer, collection and storage of used oil shall be marked with the words “Used Oil.” Funnels and other devices used to assist in the transfer of oils will be removed as soon as the transfer is complete and stored to prevent the contamination from residual fluids.

p. Waste segregation areas shall be a identified with an approximately 11-1/2 by 8-inch (29 cm by 20cm) Warning Sign reading “Danger – Hazardous Waste- Unauthorized Personnel Keep Out” and a “No smoking” sign.

q. A 20-B fire extinguisher, or dry powder extinguisher, shall be located within 25 to 75 feet (8 to 23 meters) of the waste segregation area. (A 20B fire extinguisher is designed to extinguish a flammable liquid fire with an area of 20 sq. feet or 1.9 sq. meters.)

r. A hazardous waste spill kit shall be located within 75 feet (23 meters) of the waste segregation area. The contents of the spill kit shall include:
   - ≥50 Sorbent Pads
   - ≥12 Sorbent Socks
   - ≥4 Sorbent Pillows
   - 1 pair of goggles
   - 1 pair of gloves
   - 1 disposable bag

s. A risk assessment / JHA shall be reviewed by employees who handle hazardous, universal, or controlled waste before commencing work.

t. Solids and liquids shall not be mixed into the same waste container.

u. Secondary containment for waste segregation and chemical storage areas shall be designed and constructed so that they can hold the maximum volume of waste from the largest container/ tank as a result of a spill, leak and or other incident plus precipitation from a 25-year, 24-hour rainfall event.

v. Secondary containment shall be properly maintained and free of equipment, tools, liquids, etc.

w. Accumulation of liquids in secondary containment shall be visually inspected and disposed of per the following schedule:
   - Within 24-hours following rain events on weekdays or
   - On the next scheduled workday following weekend/holiday rain events or
   - As soon as safely possible if hazardous conditions are detected

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x. The effectiveness of this plan and the site's emergency response plan shall be evaluated by conducting a spill exercise within 90 days of mobilization of the site. The results of this exercise shall be documented in KRIMA and any deficiency corrected within 30 days.

12.3. Fuel Storage Areas / Tanks

a. Fuel storage areas shall be graded away from buildings or surrounded by an earth dike 12-inch (30cm) high and provided with a closable drain for accumulated rain water or spills of flammable or combustible liquid.

b. Tanks shall be at least 20 feet (6.1m) from the nearest building.

c. Tanks shall be separated from other fuel tanks by a minimum of 3 feet. (1m)

d. Area around the tank shall be free of plants, debris, or any other combustible materials.

e. There shall be at a least one fire extinguisher rated not less than 20 BC located between 25 feet (7.5m) and 75 feet (23m) from the storage area.

f. Fuel storage areas shall be separated at a minimum 25 feet (7.5m) from other operations.

g. Fuel storage areas shall be protected against collision damage from vehicles and other mobile equipment.

h. Secondary containment, such as a bund or drip tray, must be provided to catch any oil leaks from the container or its ancillary pipework and equipment.

i. The secondary containment must be sufficient to contain at least 110% of the maximum contents of an oil tank, mobile bowser or Intermediate Bulk Container (IBC).

j. Where more than one container is stored, the secondary containment should be capable of storing 110% of the largest tank or 25% of the total storage capacity, whichever is the greater.

k. The secondary containment base and walls must be impermeable to water and oil.

l. No drainage valve may be fitted to the secondary containment for draining out rainwater.

m. Fuel storage tanks shall be grounded. (earthed)

n. Dispensing devices and nozzles shall be of the approved type (per national or local requirements such as NFPA, OSHA, EA or SEPA) with self-closing nozzles without a latch open device. Dispensing hose shall be electrically bonded and stored within the secondary containment.

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o. A sign easily visible from all approach directions shall be posted and read: " NO SMOKING OR OPEN FLAMES WITHIN 50 FEET (15M)"

p. Tanks shall be marked to identify the contents and meet all the requirements of the Globally Harmonized System of including appropriate pictogram(s), precautionary statement, and hazard statement.

Note: If local requirement is higher than SWP's, then that has to be followed.

12.4. Vehicle Mounted Fuel Tanks

a. The contents of the fuel (i.e. Diesel) must be labelled on the container.

b. NFPA 704 diamond label (or equivalent per national and /or local requirements) with the appropriate hazard categories

c. Vehicle shall be equipped with a 20B rated fire extinguisher or local equivalent for example dry powder.

d. During tanking process from a vehicle mounted tank to another vehicle or equipment, an equal electric potential must be assured. That is done by connecting an electrical cable between the vehicle mounted fuel tank and the vehicle/equipment that is been refueled.

12.5. Spills

PRO 29711 Water and Soil Protection Procedure summerises the protection of water and soil from pollution derived from our business activities and ensures that legal obligations are met. The following controls detail the minimum requirements at site level in the event of a loss of containment:

a. All spills[15] shall be reported according to the Minimum Communication Flow in the Emergency Response Plan.

b. All spills shall be entered into KRIMA within 24 hours of being notified of the event.

c. A tank system or secondary containment system from which there has been a leak or spill or that is unfit for use shall be removed from service immediately and the following requirements shall be met:
- The flow of waste/liquid into the tank system or secondary containment shall be stopped immediately following all safety requirements.

[15] Specific Regions require trained and competent personal shall be identified for the project, to respond to any loss of containment, and coordinate with external agencies including, but not limited to, the client, Principle Contractor, external spill response providers, and internal stakeholders.

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- A visual inspection of the release shall be immediately conducted and based upon that inspection further migration of the leak/spill to soil, surface water, or ground water shall be prevented.
- The EHS Manager in Projects shall be contacted prior to any cleanup of a flammable liquid (gasoline or solvent) spill. These types of spills (hazardous waste) require special training for cleanup. Spills of hydraulic oil, diesel fuel, or similar materials may be cleaned up by on site personnel. Visible contamination of the soil, surface water or ground water shall be removed and properly disposed of as described above.
- If the release was to a secondary containment system, all released materials shall be removed within 24-hours or in a timely manner to prevent harm to human health and environment.
- For small dry spills, shovel contaminated materials into dry containers, labelled according to their contents and covered. Care shall be taken to minimize dust generation. The container shall be placed into the waste segregation area once spill containment is complete.
- For small liquid spills, absorb the liquid with vermiculite, sand, clean fill, or other non-combustible, absorbent material and place into a container and label according to contents and covered. Container shall be placed into the waste staging area once spill containment is complete and sent for disposal according to local legislation.

12.6. Terrain and Vegetation

The natural terrain at the site area is to be conserved, meaning that traffic is only permitted on the established roads. If the work makes an excursion out into the open terrain necessary, this may only be on foot. Special arrangements and procedures will be agreed with the Client concerning taglines and vehicles working off the established roads.

Where non-routine works require access to areas outside of these, the task shall be risk assessed to take into account the local terrain and immediate environment and submitted for approval by the client / principal contractor.

12.7. Noise and Disturbance of Natural Flora, Fauna and Agriculture

A Siemens objective is to minimize the impact to the local flora and fauna. Operations will be conducted in a manner as a good environmental steward. Work may be temporarily stopped to accommodate wildlife.
A Project is located on private property and we are guests, therefore always show respect for the land and the property owner.

It is the Clients' responsibility to notify Siemens of any endangered or protected species that may need special precautions.

12.8. Dust

Dust must be controlled in order not to present a hazard to health. In most cases, the Client / Principal Contractors / Siemens are responsible for ensuring that the site roads are damped down if necessary.

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If otherwise, the responsibility for damping of the site to prevent dust will be based on contractual agreement

12.9. Historic and Cultural Monuments

Project sites may house historic, cultural or archaeological areas. These areas will be identified by the client and it is imperative that Siemens operations do not disturb these areas. If during the Project potentially additional sites are discovered they need to be reported to the Client and work at the particular area must cease until an investigation is conducted.

12.10. Cooperation with Government Authorities

All enquiries from governmental authorities shall be referred to the Site Manager, unless another person has been named as the point of contact. Government authorities must be accompanied to inspect the site by a designated person who knows the site and meets the necessary training requirements.

Government authorities must at all times receive full cooperation from site personnel to allow the authorities to do their job. If government authorities hand down a restriction or require improvement, their conditions must be met and escalated. Siemens requires immediate notification to the EHS Manager for any agency inspection.

13. EMERGENCY RESPONSE PLAN

Each project site will have a site specific Emergency Response Plan for the construction site. This Plan outlines actions and instructions which must be followed in case of an incident or emergency during Siemens work on site.

All Siemens employees and contractors must know the Emergency Response Plan and where to find it on site.

Additionally each location must establish and maintain a local plan for testing/drills. The “Safety Committee” is responsible for integrating a practical exercise into the project, during or after the first safety induction.

This includes:

Generally:

- Exercise the allocation of First Aid Stations
- Exercise the gathering at the Assembly Point
- Evacuation of the turbine has to be agreed and planned with the customer and exercised during installation.

Site specific (e.g.):

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- Practice the emergency route to the selected hospital
- Snake bites (where relevant)
- Earth quake procedure (where relevant)
- Testing the environmental emergency response plan for a major spill
- External threats

14. PROJECTS TO SERVICE HANDOVER

PRO 19736 Projects to Service Handover defines the guidance points for handover deliverables to ensure all points for the handover meeting are considered. The PM-WP shall introduce the "FORM 16894 PM-SE Handover Protocol"[16] that describes critical deliverables that shall be completed in order to ensure a successful handover.

EHS shall support the Project Management team and ensure that the following information is made available to Service at the handover meeting:

- Lessons Learnt - Environmental Reports & EHS Investigations
- Significant Environmental and Safety Aspects
- Dangerous Material Treatment Reports and Certificates
- Emergency response Plan
- QEHS Contractor Qualification
- EHS Management Review Report
- Internal Audit Results
- Risk Assessments
- Project EHS Plan

15. LIST OF APPLICABLE COUNTRY / STATE SPECIFIC REQUIREMENTS

[16] Service will be granted access to the Project Workspace, Section 12, that contains the majority of the information listed above.

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Exhibit W

Vesta VAME QSE Plan

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VAWT Table of Contents

Chapter	DMS Number	Document Link	Document Format	VAWT	VCWT
	0052-6729	VAWT Manual in PDF	Procedure	Yes	No
	0049-2068	VAWT-Introduction/Table of Contents	Form	Yes	No
0		Safety Program Management	Chapter Title		
0.1	0049-0542	Vestas Americas QSE Plan	Procedure	Yes	No
0.2	0049-2069	VAME QSE Policy Statement	Procedure	Yes	No
0.3	0049-0545	VAWT Drug-Free Workplace	Procedure	Yes	No
0.4	0049-0686	Safety Walks Form	Form	Yes	Yes
0.5	0049-2071	Guest Agreement & Release	Form	Yes	Yes
0.6	0049-0604	Transportation Security Plan	Procedure	Yes	No
0.7	0049-0587	QSE Handover Checklist	Form	Yes	Yes
1		Site Orientation	Chapter Title		
1.1	0047-0898	VAWT Site Orientation	Procedure	Yes	No
1.2	0049-0562	VAWT/VCWT Orientation Checklist	Form	Yes	Yes
1.3	0047-0728	VAWT/VCWT In-Field Orientation Checklist (Use Lean Form)	Form	Yes	Yes
1.4	0049-2056	VAWT-Code of Safe Practices 2016	Procedure	Yes	No
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3		Safety Meetings, Audits and Inspections	Chapter Title		
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4.7	0049-0566	VAWT-Hot Work Plan	Procedure	Yes	Yes
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5.3	0049-0570	New Material Review Form	Form	Yes	Yes
5.4	0049-2050	VAWT-Universal Waste Management	Procedure	Yes	No
5.5	0049-2053	HazMat Handling Storage	Procedure	Yes	Yes
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5.7	0051-7377	Waste Inventory Form	Form	Yes	Yes
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6.3	0049-2065	Heat Index Chart	Form	Yes	Yes
6.4	0049-2067	Cold Stress Equation	Form	Yes	Yes
6.5	0049-2066	VAWT WA State Temp Triggers	Form	Yes	No

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7.4	0049-0556	Emergency Contact Template Color	Form	Yes	Yes
7.5	0049-0557	Emergency Evacuation Drill Evaluation	Form	Yes	Yes
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7.7	0049-0620	Field Rescue Response Protocol	Procedure	Yes	Yes
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8.2	0049-0605	First Aid Procedure	Procedure	Yes	No
8.3	0049-0606	Emergency First Aid Log	Form	Yes	Yes
8.4	0049-0607	The Hepatitis B Vaccine Consent	Form	Yes	Yes
8.5	0049-0550	Witness Statement	Form	Yes	Yes
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8.8	0049-2064	Physical Demand Summary	Form	Yes	Yes
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9.2	0049-0691	PPE Matrix	Matrix	Yes	Yes
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9.5	0049-0694	Equipment Defect Record	Form	Yes	Yes
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9.7	0049-0696	VAWT-Respiratory Protection Plan	Procedure	Yes	No
9.8	0049-2062	Respirator Fit Test Record Form	Form	Yes	Yes
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9.9	0053-9309	Appendix D Acknowledgement	Form	Yes	Yes
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10.5	0052-6020	Ladder Safety	Procedure	Yes	Yes
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11.3	0049-2058	Energized Electrical Work Permit	Form	Yes	Yes
11.4	0049-0599	ESP-CHEP Training Matrix	Matrix	Yes	Yes
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14.6	0049-0579	Crane Safety - Quick Reference Card	Form	Yes	Yes
15		Vehicle Use and Maintenance	Chapter Title		
15.1	0009-0270	Vehicle Use Policy	Procedure	Yes	Yes
15.2	0009-0271	Vehicle Operation Maintenance Guidelines	Procedure	Yes	Yes
15.3	0049-0617	Vehicle Inspection Checklist	Form	Yes	Yes
15.4	0037-2940	Vehicle Policy - Record Release and Driver Agreement Exbt A	Procedure	Yes	Yes
15.5	0037-2941	Vehicle Incident Reporting Process Flow Exbt D	Procedure	Yes	Yes
15.6	0037-2942	VAME Accident Guidelines EXHIBIT G	Procedure	Yes	Yes
15.7	0037-2943	Vestas America PDA Use - Distracted Driving Policy EXBT H	Procedure	Yes	Yes
15.8	0051-2208	VAME Vehicle Incident Report	Form	Yes	Yes
16		Powered Industrial Trucks			
16.1	0049-0614	Powered Industrial Truck Program	Procedure	Yes	No
16.2	0049-0615	Daily Forklift Inspection form (PIT Daily Inspection Form)	Form	Yes	Yes
16.3	0049-0623	PIT Hazard Assess Inventory	Form	Yes	Yes
16.4	0049-0616	PIT Operator Practical Evaluation	Form	Yes	Yes
17		Subcontractor Safety	Chapter Title		
17.1	0049-0608	VAWT Subcontractor Safety Plan	Procedure	Yes	No
17.2	0049-0609	Subcontractor Health and Safety Training Verification	Form	Yes	Yes
17.3	0049-0610	Subcontractor Certificate Start of Work	Form	Yes	Yes
17.4	0049-0611	Subcontractor Site Vehicle Identification	Form	Yes	Yes
17.5	0049-0612	Subcontractor PPE Verification	Form	Yes	Yes
17.6	0052-5690	Construction Daily Sign-in Sheet	Form	Yes	Yes
18		Customer Specific Procedures	Chapter Title		
18.1	0049-2055	Foreign Object Debris FOD Prevention	Procedure	As Required	As Required
18.2	0049-2049	FOD Critical Area Evaluation	Form	As Required	As Required
18.3	0049-2048	FOD Tool Control Log	Form	As Required	As Required
18.4	0051-1137	Short Service Employees	Procedure	As Required	As Required
18.5	0051-8455	Customer HSE Incident Report	Form	As Required	As Required
18.6	0058-4039	BP Zero Harm Analysis	Form	As Required	As Required

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VAME QSE Plan				Document ID: 0049-0542 INS SUS-PLN-GOT (AME US) QSE Plan
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.02.02		Version: 00

Version history

Version No.	Date	Description of Changes
00	2015.01.28	Converted T09 (0025-8101) to T03 document

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1 Purpose

To ensure that VAME maintains an Occupational Safety, Health and Environmental program that creates a safe work environment for VAME employees and others on VAME worksites, meets the needs of the communities in which we do business and is compliant with all applicable governmental regulations.

2 References

Document No.	Title
0049-2068	VAWT QSE Manual Table of Contents
0049-0627	VAWT QSE Manual Table of Contents
29 CFR Parts 1910 and 1926	OSHA General Industry and Construction Standards
TPS-PSU-SAL	Safety Alerts
TPS-PSU-SAL	Managing Safety Alerts
INS-SUS-IEM-IMA-SAL	Distribution and Implementation of Safety Alerts and HSE Alerts
SUS-IEM-IMA	Incident Management
0049-2056	VAWT Code of Safe Practices
0049-0672	VCWT Code of Safe Practices

3 Scope

This procedure applies to VAME employees, contractors and visitor at all locations.

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4 Terms and Abbreviations

Term or Abbreviation	Definition
CFR	Code of Federal Regulations
CPR	Cardiopulmonary resuscitation
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
VAME	Vestas American Wind Technologies and Vestas Canadian Wind Technologies.

5 Responsibilities

5.1 VAME Executive Management:

5.1.1 Encourage employee and subcontractor involvement in the safety process.

5.1.2 Provide appropriate supervision at worksites.

5.1.3 Ensure that all operations including those of subcontractors meet government mandated safety requirements.

5.1.4 Ensure performance and behavior meet the requirements of the VAME Sustainability Program.

5.1.5 Communicate with employees, customers, subcontractors, and vendors regarding their corporate commitment to safety.

5.2 Sustainability Department:

5.2.1 Develop and maintain effective written programs for all recognized hazards that employees may be exposed to. Each program will be reviewed regularly and revised as needed based on regulatory or process changes.

5.2.2 Communicate each program to all personnel affected by the program.

5.2.3 Conduct and document regular audits of all VAME workplaces to identify areas of concern / non-compliance and to continually improve the overall safety program.

5.2.4 Issue a Safety Alert or Bulletin when a serious safety concern is identified. Safety Alerts and Bulletins remain active / open until such time as the hazard is eliminated or the safety issue and its control processes are incorporated into service, safety or training documentation.

5.2.5 Maintain all safety and environmental records in accordance with applicable governmental regulations.

5.2.6 Report safety performance to: Vestas group, VAME management, employees of VAME and authorities as required by governmental regulations.

5.3 Supervisory Personnel:

5.3.1 Ensure all incidents / accidents are reported, properly investigated and that corrective action is taken to prevent a recurrence.

5.3.2 Corrective actions taken must be documented per the Incident Management program.

5.3.3 Ensure workers are adequately qualified to perform assigned work.

5.3.4 Ensure training needs are identified and met.

5.3.5 Take the necessary action to correct any unsafe working conditions brought to their attention by workers.

5.3.6 Correct unsafe acts and behaviors in a proactive and positive manner.

5.3.7 Implement and use appropriate Codes of Safe Practice and associated Safe Work Procedures (service documentation / work instructions).

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5.3.8 Ensure appropriate and well-maintained equipment is available and utilized to perform the work activity.

5.3.9 Be aware of applicable regulatory requirements.

5.3.10 Ensure workers are informed about job hazards and are prepared to deal with any site specific hazards on the worksite.

5.3.11 Ensure all unessential personnel remain outside the turbine during the performance of work on energizes equipment or machinery.

5.3.12 Ensure personal protective equipment (PPE) is readily available at the worksite, correctly used, stored, maintained, inspected and replaced when necessary.

5.3.13 Communicate with employees, customers, subcontractors, and vendors regarding their corporate commitment to safety.

5.3.14 Use safety meetings as one of the primary methods of dealing with safety performance, including the review and discussion of Safe Work Procedures (service documentation / work instructions), corporate expectations, hazardous conditions and corrective measures.

5.4 Employees

5.4.1 Adhere to regulations, guidelines, and safety standards as required by government regulatory agencies, and those communicated by management and supervisors.

5.4.2 Follow all appropriate Codes of Safe Practice, Safe Work Procedures (installation and service documentation / work instructions) contained in this manual and in the installation and service documentation.

5.4.3 Maintain good housekeeping in the work area.

5.4.4 Observe activities of fellow employees and subcontractors to ensure their safety and the safety of those around them, and correct unsafe acts in a proactive, positive manner to prevent an incident from occurring.

5.4.5 Deny turbine access to third part personnel for the expressed purpose of observation or inspection during the performance of work while equipment or machinery is energized.

5.4.6 Respectfully refuse to perform work when unsafe conditions exist or when they are unable to perform the task competently.

5.4.7 Report all: incidents, unsafe acts, unsafe conditions, near misses, injuries, and illnesses immediately to supervision.

5.4.8 Administer first aid and CPR as called upon in an emergency situation.

5.4.9 Participate in, and use, all relevant training offered by VAME.

5.4.10 Inspect and properly maintain the required personal protective equipment (PPE).

5.4.11 All personnel must use approved personal protective equipment (PPE) and clothing where hazards or conditions warrant its use.

5.4.12 Operate all vehicles and mobile equipment in accordance with applicable laws, site rules, manufacturer’s specifications, and company safety policies.

5.5 Subcontractors

5.5.1 Insist on safe performance throughout their operations by ensuring subcontractors and employees are competent to do their work properly.

5.5.2 Have effective health and safety programs that include programs for the identification all hazards employees may be exposed to.

5.5.3 Ensure employees and subcontractors meet all the Vestas safety expectations.

5.5.4 Ensure their safety programs and operations comply with contractual and regulatory requirements.

5.5.5 Provide the time and resources required to enable subcontractors and employees to conduct their activities safely.

5.5.6 Identify and correct hazards, unsafe work conditions and unsafe acts.

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5.5.7 Ensure appropriate and well-maintained equipment is available and utilized to perform the work activity.

5.5.8 Ensure all incidents / accidents are reported and investigated and that corrective action is taken to prevent a recurrence.

5.5.9 Ensure workers are informed about job hazards and are prepared to deal with any site specific hazards on the worksite.

5.5.10 Ensure personal protective equipment (PPE) is readily available at the worksite, correctly used, stored, maintained, inspected and replaced when necessary.

5.6 Visitors

5.6.1 When visitors are present on worksites, they are required to meet the following safety responsibilities:

5.6.2 Follow the instructions of the site supervisor or personal escort.

5.6.3 Wear personal protective equipment (PPE) where required or directed by escort.

5.6.4 Never walk about a worksite unescorted.

6 General Requirements

6.1 Localization:

6.1.1 Worker safety is of vital importance and will not be compromised.

6.1.2 Competent, trained personnel are expected to perform their jobs in a safe and proper manner.

6.1.3 All personnel are required to conduct themselves courteously and in a manner that promotes positive public relations with fellow employees, supervisors, customers, subcontractors, government officials and the public.

6.1.4 For those areas where VAME Safety Manual differs from the Vestas Group requirements, the VAME Safety Manual shall prevail.

6.1.5 In some cases, VAME has implemented a requirement that may exceed a state or provincial requirement – the higher level requirement in the VAME Safety Manual will prevail.

6.1.6 In the event that a state or provincial requirement exceeds a Safety Manual procedure – the higher level requirement will prevail.

6.1.7 All pertinent personnel are required to actively participate in safety inspections, safety meetings, incident / accident reporting and investigative requirements.

6.1.8 Any person using prescription and / or non-prescription over the counter medications, that may cause drowsiness or other side effects, which could influence their ability to work safely, are to notify their supervisor prior to beginning any safety sensitive task or working near others who are performing such tasks.

6.1.9 Prohibited Items and Activities:

6.1.10 Possession, sales, consumption or being under the influence of alcohol and/or illegal drugs;

6.1.11 Riding any hook, hoist or other material handling equipment which is not specifically designed to carry riders;

6.1.12 Fighting, horseplay or practical jokes;

6.1.13 Gambling;

6.1.14 Theft and vandalism;

6.1.15 Cleaning, adjusting or repairing of machinery while in operation;

6.1.16 Operating any tool, piece of equipment or machinery without proper training;

6.1.17 Firearms or hunting equipment;

6.1.18 Removing and not replacing guards on moving belts, drive chains and reciprocated parts;

6.1.19 Damaging, disabling or interfering with safety, firefighting or first aid equipment;

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6.1.20 Arriving for work or remaining at work when ability to perform the job safely is impaired;
6.1.21 Smoking in non-designated areas;
6.1.22 Possession of “strike anywhere” matches;
6.1.23 Unauthorized alteration or removal of locks or tags; or
6.1.24 Use of electronic devices in potentially explosive areas

7 APPENDIX: version history

Version No.	Date	Description of Changes
00	2005.09.26	First edition – Reformatted & new number 11-Apr-2007
01	2009.11.23	Editing and updating
02	2012.01.15	Content and template updates Supervisory and Employee responsibilities

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RESTRICTED

VAWT QSE Policy Statement			Document ID: 0049-2069 INS SUS-PLN-GOT (AME US) Sustainability Policy
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.02.05	Version: 00

Foreword: Safety First

At Vestas America Wind Technologies VAWT, we do not compromise on safety.

Safety is a deeply held value for us, serving as the foundation for all we do at Vestas. The hallmark of all our activities is daily excellence in the protection of our employees, the public and the environment. Fundamental to the attainment of this vision are personnel commitment, mutual trust, open communications, continuous improvement and the involvement of all interested parties. VAWT is committed to being a safe company, preserving the natural environment while conducting our operations in adherence with all applicable laws, regulations and standards.

It is the policy of VAWT that we meet the following principles:

- A safe and healthy work environment will be provided for the protection of our most vital resource—our employees. Employee safety is of the greatest importance to all levels of management and supervision, ranking in importance above production, quality, costs, and service. People are the most critical factor in a safety effort. Personal safety will not be compromised for any reason.
- While the responsibility for safety begins and ends with management, all Vestas employees share that responsibility. All employees, at every level, are fully responsible for their own safety and for the safety of those with whom they work. All injuries are preventable.
- Employees must perform all work tasks in a safe manner, and working safely is a condition of employment. Management will take disciplinary action against an employee who willfully or repeatedly violates workplace safety rules. This action may include verbal or written reprimands and may ultimately result in termination of employment.
- If an incident occurs, immediate reporting of the incident is required by US occupational health, safety and environmental laws. Employees must report all incidents, injuries, and unsafe conditions to their supervisors, and will not be subject to retaliation, penalty, or other disincentive for making such a report.
- Management must develop and communicate clear goals and objectives, and provide the financial resources and authority necessary to correct unsafe conditions and implement changes to improve workplace safety.
- Managers and supervisors will be held accountable for ensuring employees are aware of workplace hazards and are trained to work safely. We must think "safety first" in all our processes and prevent employees from being tempted or feeling obliged to ignore safety requirements. Every hazard can be managed.
- Employee recommendations to improve health and safety conditions will be given full consideration by management.
- Management will be actively involved with employees in establishing and maintaining an effective safety program in accordance with all applicable OSHA and EPA regulations.

Signature VP, Sustainability	Date	Signature GSVP, Vestas Wind Systems	Date

Version history

Version No.	Date	Description of Changes
00	2011.02.11	New document
01	2013.12.02	New GSVP
00	2015.02.05	Converted T09 Document (0025-5754) to T03

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Drug Free Workplace Vestas System Instruction				Document ID: 0049-0545 INS HRM-ELR-HRE (AME US) Drug Free Workplace
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.09.22	Valid until: 2018.09.22	Version: 01

Version history

Version No.	Date	Description of Changes
01	2015.09.22	Updated sections:4, 5, 6, 7, 8 see grey highlited text

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1 Purpose

This program is aligned with Vestas safety value, which states that Vestas employees share a relentless commitment to a zero work-related incident, injury and illness culture. Keeping drugs and alcohol out of the workplace helps maintain a safe, healthy and efficient work environment and protects the company's most important assets — Vestas personnel, property, equipment and operations, as well as the public at large.

2 Responsibility

2.1 Managers

2.1.1 Implementation and adherence to this policy and procedures in regards to testing, security and confidentiality.

2.2 Employees

2.2.1 Compliance with the requirements of maintaining a drug and alcohol free workplace.

3 References

Vestas Employee Guide 2015

4 Scope

All Vestas employees are subject to drug and alcohol testing when there is reasonable cause to suspect violation of company policy or anytime a work-related accident occurs. Employees who are subject to the random testing procedures outlined in this Employment Guide may

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also be chosen randomly for testing. Vestas complies with state and federal laws regarding drug and alcohol testing.

5 Drug and Alcohol-Free Workplace

5.1.1 This program is aligned with Vestas' safety value, which states that Vestas employees share a relentless commitment to a zero work-related incident, injury and illness culture. Keeping drugs and alcohol out of the workplace helps maintain a safe, healthy and efficient work environment and protects the company's most important assets—Vestas personnel, property, equipment and operations, as well as the public at large.

5.1.2 Except as provided herein, all U.S. Vestas employees, and Vestas employees providing services in the U.S. at U.S. locations are subject to this policy.

5.1.3 Vestas employees who work for the SBU or assigned to work at a SBU U.S. location in the U.S. are subject to a random drug test at any time during the course of their employment at Vestas to the maximum extent permitted by law. The PBUs reserve the right to conduct random drug testing to the maximum extent permitted by law following notice to the employees of the intent to implement such a program.

5.1.4 Vestas reserves the right to search and inspect an employee's work area and personal belongings to maintain a safe workplace.

5.2 Expectations

5.2.1 Employees may not use, sell, distribute or possess illegal drugs, including any drug illegal under any law, or controlled substances, during working hours or on Vestas or Company property or while using Vestas equipment or vehicles. Employees may not report to work under the influence of a controlled substance to the extent that the employee does not have a prescription for that substance or if the employee's medical provider concludes it would unsafely impair the employee for performing the functions of the employee's position or caution safety concerns for other personnel.

5.2.2 Employees may not consume alcohol during working hours or report to work under the influence of alcohol. Employees may not possess open containers of alcoholic beverages in company vehicles and equipment, around the worksite or on company property, or while conducting business on behalf of Vestas.

5.2.3 The only exception to this rule is when alcohol is being consumed as part of an approved company social function. In such an event, employees must ensure that they act reasonably and responsibly and at no time become intoxicated or otherwise consume excessive amounts of alcohol.

5.3 Sales/Service Business Unit Only:

5.3.1 Employees working at a project or service site should use caution when consuming alcohol outside of work hours. and employees must, at no time, consume alcohol during work hours or while an employee is performing any work. Vestas will not reimburse any employees working at a project or service site for the cost of alcohol purchased while assigned to or visiting the site, regardless of their job classification or if they are there on a temporary or full-time basis.

5.3.2 Employees must notify their manager immediately or the next working day of any conviction related to violating any state and/or federal statute relating to the use, production, possession, processing, manufacturing, selling, disposition, transportation or importation of any illicit or controlled substances, or alcohol. Employees whose position requires them to drive a vehicle must notify their manager immediately of any restriction, revocation or suspension of their license.

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5.3.3 Employees may appropriately use prescription drugs prescribed by a health care provider or over-the-counter medications, provided they can satisfactorily and safely perform all of the essential functions of their job while using the medication.

5.3.4 Vestas may require an employee to see a health care provider at Vestas expense, to confirm whether the employee can satisfactorily and/or safely perform the essential functions of the job while using the medication. Vestas requires employees to disclose use of prescription drugs to their Manager that may impact their ability to safely perform the essential functions of their position. Managers should inform the HR Business Partner if accommodations for prescription medications continue for an extended period of time lasting more than two (2) business days.

5.3.5 Employees must comply with Vestas drug testing program as a condition of employment. Refusal to take a required drug test or failure of a drug test will result in disciplinary action. Refusal to test includes, but is not limited to, adulteration or substitution of a urine sample.

5.3.6 Employees who work off premises are subject to the same Drug- and Alcohol-Free Workplace policy, as other employees.

6 Drug and Alcohol Testing

All Vestas employees are subject to drug and alcohol testing when there is reasonable cause to suspect violation of this policy or anytime a work-related accident occurs. Employees may also be chosen randomly for testing.

6.1 Reasonable Suspicion

6.1.1 Employees may be required to submit to a drug or alcohol test when there is a reasonable suspicion that they have violated the Drug- and Alcohol-Free Workplace policy, or are under the influence of drugs, including illegal drugs, prescription drugs for which the employee does not have a prescription or prescription drugs that are not being taken in accordance with a health care provider's direction, and/or alcohol while working, on Vestas property or while operating Vestas vehicles, machinery or equipment. "Reasonable suspicion" means suspicion based on specific personal observations that a Vestas manager or supervisor can describe concerning the appearance, behavior, speech or odor of the employee.

6.1.2 Employees who violate any aspect of this policy may be subject disciplinary action, up to and including termination, and referral for prosecution for any violations of the law.

6.1.3 If you believe reasonable suspicion exists, remove the employee from all safety sensitive work areas and immediately contact your HR Business Partner to determine if drug or alcohol testing is appropriate. If HR Business Partner is unavailable, defer to the senior manager or their designee to confirm reasonable suspicion exists, if such personnel is available based upon business needs. If in consultation with the aforementioned parties (if practical) it is determined reasonable suspicion exists, the employee will undergo testing. Vestas management representative will contact Vestas' designated vendor for drug test scheduling and determine which testing site is appropriate for this testing. The manager will be informed of the site location and transport the employee to the specimen collection site. After specimen collection is completed, the employee will be transported to his/her residence at Vestas' expense. In reasonable suspicion cases the employee will be placed on administrative leave pending the results.

6.2 Post-Accident

6.2.1 All employees involved with a work-related accident will be required to submit to a drug or alcohol test. This includes employees who sustain a work-related personal injury requiring medical care beyond first aid, or cause another employee to sustain a work-related personal injury requiring medical care beyond first aid or employees who were operating or helping to operate machinery, equipment or vehicles involved in a work-related accident that results in

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significant property damage. Provided the on-site manager does not have reasonable suspicion, employees required to submit to a drug or alcohol test will be allowed to return to work, pending the results. If reasonable suspicion exists, refer to that section of the Employment Guide.

6.2.2 An employee who is subject to post-accident testing who fails to remain readily available for such testing, including notifying Vestas of his/her location if he/she leaves the scene of the accident prior to submission to such test, may be considered by Vestas to have refused to submit to testing.

6.2.3 If there is suspicion of alcohol involvement, the employee may be required to submit to an alcohol test within two hours of the accident.

6.2.4 An employee has the right to refuse to submit to drug and alcohol testing; however, refusal by an employee to submit to such a test will result in disciplinary action up to and including termination. Refusal to test includes, but is not limited to, adulteration or substitution of a test sample.

6.2.5 When post-accident testing is needed, a Vestas management representative will contact Vestas designated vendor for drug/alcohol test scheduling and determine which site will be appropriate for testing, and transport the employee to the testing site.

6.3 SBU Only: Random Drug Testing

6.3.1 As allowed by applicable law, and as set forth above, all SBU Vestas employees and other Vestas employees performing work in the U.S. for the SBU, are subject to random drug testing at any time during the course of employment. Vestas complies with state drug testing laws where applicable.

6.3.2 Employees have the right to refuse to submit to random testing; however, refusal will result in disciplinary action. Refusal to test includes, but not limited to adulteration or substitution of a test sample.

6.3.3 The PBUs reserve the right to conduct random drug testing to the maximum extent permitted by law following notice to the employees of the intent to implement such a program.

7 Drug Testing Procedures

7.1 Requirements

7.1.1 A health care provider acting as a Medical Review Officer (MRO) will review all positive controlled substance test results before they are reported to Vestas.

7.1.2 If the testing laboratory reports a non-negative result to the MRO, the MRO will contact the affected employee (in person or by telephone) and conduct an interview to determine if there is an alternative medical explanation for the controlled substance found in the employee's results.

7.1.3 Employees will be given an opportunity to discuss the use of medically authorized drugs and any over-the counter drugs with the MRO prior to any positive test result being reported to Vestas.

7.1.4 If the affected employee provides appropriate documentation and the MRO determines that legitimate medical reason for the presence of the controlled substance exists, the controlled substance test result shall be reported as negative to Vestas.

7.1.5 In the event of positive test results, Vestas shall inform the employee of the positive test result and the employee's right to request an additional test of the same specimen at a different certified laboratory at his or her own expense.

7.1.6 The employee must notify Vestas of his/her intention to obtain the additional test within 24 hours after notice of the positive test result. The employee will be suspended without pay pending the result of the additional test.

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7.1.7 In the event of a positive test result on the additional test, the employee will be disciplined, up to and including termination of employment. In the event of a negative test result, Vestas shall pay for the additional testing and any lost wages based on the employee's regular work schedule.

8 Security Inspections

8.1 Prohibited Items

8.1.1 Illegal drugs, alcohol or weapons are prohibited at work.

8.2 Inspections

8.2.1 Vestas may conduct security inspections in order to maintain a work environment that is free of illegal drugs, alcohol, weapons or other improper materials. To this end, the company prohibits the control, possession, transfer, sale or use of such materials on its property or work locations. Unless explicitly permitted by law, employees may not bring weapons to work, including in their car, even if they are otherwise lawfully entitled to have a weapon (i.e., a concealed weapons permit).

8.2.2 Employees should not expect privacy in their workspace, including desks and lockers. Security inspections may be conducted on any package (including purses, bags, briefcases, backpacks, etc.) and person entering and/or leaving the premises. To the extent allowed by applicable law, security inspections may be conducted of vehicles parked on Vestas property or work locations. Here are some of the actions expected of you:

8.2.2.1 Do not bring prohibited items onto the company's premises.

8.2.2.2 Be prepared to submit to random security inspections with or without reasonable suspicion of possession of prohibited items.

8.2.2.3 Employees must accommodate the inspection of desks, lockers and other storage devices by any agent or representative of the company at any time, either with or without prior notice.

8.2.2.4 Understand that Vestas may inspect not only desks and lockers, but also packages and persons entering and/or leaving the premises.

8.2.3 Vestas will confiscate prohibited items and conduct an investigation regarding any items found in an employee's possession. Employees who violate any company policies are subject to disciplinary action and referral for prosecution for violating the law.

9 APPENDIX: version history

Version No.	Date	Description of Changes
00	2010.02.04	New Document
01	2010.02.26	Not Used
02	2010.02.26	Entered into DMS
03	2011.04.28	Addition of random testing, Responsibilities and new format
04	2014.08.12	Updated sections 5.2.3,
00	2015.02.02	Converted T09 Document 0008-7991 to T03

VESTAS PROPRIETARY NOTICE

T03 0052-0329 Ver 01 - Approved - Exported from DMS: 2016-08-29 by RIREG

DMS 0049-0686 R00
Valid from 2015.02.04

Safety Walk Template

Safety Walker Information:

Initials: | Safety Walker: <Your Name> | Date & Time of Safety Walk: <e.g. 1/23/2012> <e.g. 9:45 AM> | Conducted in own area? Select...

Safety Walk Location:

State: | City: | Wind Farm/Facility: | Location: Select...

General Comments:

Category A - Personal Protective Equipment:
Use of PPE for eyes, face, ears, head, hands and arms, feet and legs, respiratory system, etc.
Please note observations around personal protective equipment here.

Category B - Safe Behavior
Risk awareness, attitude towards safety, taking risks/chances, unnecessary speed and lack of planning before start up, etc.
Please note observations around safety behavior here.

Category C - Reactions of People
Adjusting personal protective equipment, changing position, rearranging job, stopping job, changing tools, etc.
Please note observations around reactions of people here.

Category D - Tools and Equipment
Right tool for the job, used correctly, in safe condition, maintenance is up to date, user instructions are used, etc.
Please note tool and equipment observations here.

Category E - Procedures
Adequate procedures, procedures in place, procedures being followed, updated and implemented, etc.
Please note observations around procedures here.

Category F - Ergonomics & Physical Conditions
Noise, type & number of motions, load handling, work area design, tools & grips, vibration, temperature, dust, lighting, etc.
Please note ergonomic and physical conditions observations here.

Category G - Housekeeping & 5S
Obstruction of passageways, organization of workplace, general housekeeping, etc.
Please note housekeeping and 5s observations here.

Category H - Environmental Management
Chemical storage, waste storage, flammable liquid storage, MSDSs are available, spill kits, recycling, etc.
Please note environmental management observations here.

Category I - Psychological Work Environment
Atmosphere, stress, harassment, etc.
Please note psychological work environment observations here.

Category J - Management Support & Communication
Safety first, management involvement, general communication to the organization, incident follow-up, etc.

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Please note management support and communication observations here.

Category K - Basic Safety

Overview of emergency exit, meeting place in case of emergency, fire extinguisher, first aid kit, contact numbers, etc.

Please note basic safety observations here.

File Attachment | File Attachment | File Attachment | File Attachment

Submit Safety Walk

T03 0052-0020 Ver 00 - Approved - Exported from DMS: 2016-06-03 by RIREG

RESTRICTED

Guest Agreement & Release of Liability				Document ID: 0049-2071 INS SUS-SAF-OPC (AME US/CAN) Release of Liability
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.03.06	Valid until: 2018.03.16	Version: 00

I, (Print Full Name)_____

☐ Am a site guest of:_____ ☐ Am a site visitor.

In case of emergency, please call:

(Name)_____ Phone: (_____) _____-_____

In consideration of being permitted to use the facilities and equipment at this Vestas site, I do hereby waive, release, and forever discharge Vestas and all of its employees and representatives from any and all responsibilities or liability for injuries or damages resulting from my participation or my use of equipment at the aforementioned facility. I do hereby release all of those mentioned and any others acting on their behalf from any responsibility or liability for any injury or damage to myself in any way arising out of or connected with my use of this facility.

Please initial here: _____

I understand and am aware of the presence of industrial equipment and that exposure to the equipment can be a potentially hazardous activity. I also understand that some activities may involve a risk of injury and even death and that I am voluntarily participating in these activities and utilizing equipment and machinery with the knowledge of the dangers involved. I hereby agree to expressly assume and accept any and all risks of injury or death.

Please initial here: _____

I do hereby further declare myself to be physically sound and suffering from no condition, impairment, disease, infirmity, or other illness that would impede or preclude my activities at this facility.

Please initial here: _____

I acknowledge that I have either had a physician's approval for my activities or that I have decided to participate without the approval of a physician and do hereby assume all responsibility for my participation and activities and utilization of equipment and machinery in my activities.

Please initial here: _____

_____ _____

Signature Date

PROJECT MANAGER / SITE SUPERVISOR USE ONLY

Visit/Tour was pre-arranged and approved

☐ By Phone ☐ Written Request (attach) ☐ Other: _____

Site Mgmt. Rep. Name: _____

Site Escort Name(s): _____

Number of Guest(s)/Visitor(s) _____ (Attach Guests/Visitors Site Safety Rules if available)

Visit Start Time: _____ End Time: _____ VISITOR PPE: ☐ Issued ☐ Returned

☐ Copy to employer if other than Vestas Americas.

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T03 0049-2071 Ver 00 - Approved - Exported from DMS: 2016-06-03 by RIREG

Transportation Security Plan Vestas System Instruction				Document ID: 0049-0604 INS SUS-IEM-EMR (AME US/CAN) .Transportation Security
Owner(s): BPO Del.SUS	Author(s): RIREG	Valid from: 2015.10.26	Valid until: 2018.10.26	Version: 01

Version history

Version No.	Date	Description of Changes
01	2015.10.26	Corrected document DMS number, added applicable to Canada

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1 Purpose

Vestas is committed to the safety and security of our employees, the customers we serve and the general public. We all are aware of the reasons that we must remain vigilant to prevent or inhibit the use of our equipment, terminals, or the products we transport by terrorists. We urge all employees to help us implement this plan and to continuously improve our security efforts. Regulations of the United States Department of Transportation require that any employee of this company (including independent contractors) who is a designated "hazmat employee" be trained and familiar with our company's security plan.

2 Scope:

Vestas Americas – All locations

3 Definitions:

Word	Definition
Hazmat Employee	Any person who performs a task or function covered by the regulations of the United States Department of Transportation.

4 References:

Title 49 of the Code of Federal Regulations (United States)

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5 General Requirements:

5.1 Personnel Security:

Vestas will implement the following provisions with regard to the employment of the contractors which transport Vestas goods and services. Additionally, the company may (at its discretion) implement some or all of these provisions relevant to the employment of non-driver employees who perform functions regulated by the U.S. Department of Transportation's "Hazardous Materials Regulations" within Title 49 of the Code of Federal Regulations.

5.1.1 Perform detailed background checks on all applicants for any driver or leased operator position.

5.1.2 To the extent possible, check for criminal convictions.

5.1.3 Contact previous employers and references.

5.1.4 Investigate gaps in employment.

5.1.5 To the extent possible, have at least 10 years consecutive employment/education records.

5.1.6 Maintain employee information in a confidential and secure manner, and in compliance with all relevant Federal and state regulations and statutes regarding confidentiality and individual privacy.

5.1.7 Verify that drivers are US citizens or that non-citizens have documentation appropriate to their immigration status.

5.1.8 Ensure drivers have current CDL with appropriate endorsements and another form of identification (i.e. company issued credential; current medical certificate).

5.1.9 Collect company identification card and any security materials when a driver/employee leaves the company. Update websites and lists. Cancel passwords to prohibit computer access by former employees.

5.2 Unauthorized Access:

5.2.1 Vestas management will designate who is in charge of security for the company and at each facility.

5.2.2 Vestas management will conduct security awareness training for all employees, including how to report suspicious incidents or events.

5.2.3 Vestas Site Managers will require all visitors and outside vendors to a terminal to sign in and be identified by a visitor's badge. Designated parking areas for visitor vehicles should be established.

5.2.4 Designated Vestas personnel will perform daily yard checks and equipment reconciliations.

5.2.5 Designated Vestas personnel will remove keys from vehicles not in use and have secure key storage.

5.2.6 All employees should control access to computers, especially those with product or routing information in keeping with Vestas confidentiality rules.

5.2.7 Vestas may develop specific actions for each security level alert that might be set by the Department of Homeland Security, (e.g. no preloading during condition Red)

5.2.8 Vestas may consider use of seals (for manways, product loading and unloading lines, etc.) for certain products or routes.

5.2.9 Vestas will distribute information related to changes in the nation's threat level.

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5.2.10 Vestas Management will inspect facility grounds, maintenance areas, and buildings to identify points of possible unauthorized entry to the property. This will be an important consideration, particularly at facilities having more than one point for access and egress.

5.2.11 Periodically, Vestas will test emergency response communications equipment and procedures.

5.3 En Route Security:

5.3.1 Contractors working on behalf of Vestas should not accept business from an unknown party before verifying company legitimacy.

5.3.2 Contractors working on behalf of Vestas should lock vehicles and facility doors at all times and take keys anytime driver is not with vehicle. Ensure windows are closed.

5.3.3 Contractors working on behalf of Vestas should perform "walk around" inspection of vehicle after every stop, including deliveries and breaks. Be sure to look under the trailer and in hose tubes where a device could be attached.

5.3.4 To the extent possible, reduce preloading. Contractors working on behalf of Vestas should designate an area for pre-loaded trailers. Put glad-hand locks or kingpin locks on spotted loaded trailers. Regularly check that area.

5.3.5 Contractors working on behalf of Vestas should develop "parking instructions" for any locations away from Vestas facilities. Look for lighted and fenced areas, visibility, and security.

5.3.6 Contractors working on behalf of Vestas should include security considerations en route selection and times for pick-up and delivery. When possible, avoid bridges, tunnels and dense population areas.

5.3.7 Contractors working on behalf of Vestas should minimize driver "down-time" while en route.

5.3.8 Schedule and dispatch with as few required stops as possible.

5.3.9 Contractors working on behalf of Vestas will establish procedures to communicate emergency messages to all facilities and to drivers on the road. Options may include satellite communications systems, cell phones, two-way radios, or scheduled call-in times. Management will include communications procedures for drivers to report an unexpected occurrence with equipment, load, or route.

5.3.10 Contractors working on behalf of Vestas (and other knowledgeable employees) should not discuss any details about their load or pick-up points and destinations with unauthorized personnel, such as over the CB radio or at truck stops.

5.3.11 Contractors working on behalf of Vestas should not pick up hitchhikers or allow any unauthorized personnel in the truck cab.

5.3.12 Contractors working on behalf of Vestas should not stop to help disabled vehicles or motorists. Call local authorities and notify them of anyone needing assistance. Be suspicious of motorists trying to get the driver to pull over for an "alleged" traffic accident. Be especially suspicious of vehicles with three or more people in them.

5.3.13 Contractors working on behalf of Vestas should develop procedure for detecting "late loads." Investigate any late load more than an hour late for a delivery.

5.3.14 Contractors working on behalf of Vestas should not change delivery destination unless authorized by dispatch.

5.3.15 Contractors working on behalf of Vestas should develop a procedure for drivers when being asked to pull over by law enforcement or an unmarked vehicle.

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5.3.16 Contractors working on behalf of Vestas may arrange with shippers to schedule teams for long trips with high hazard materials.

5.3.17 Contractors working on behalf of Vestas should consult with shippers to ensure security of consignee delivery areas. Request well-lit and marked delivery area and that customer personnel be available to answer safety or security questions.

5.3.18 All Vestas employees are to report any suspicious events to their supervisors and possibly to local law enforcement based on their observations.

6 APPENDIX: version history

Version No.	Date	Description of Changes
00	2008.08.28	New Document
01	2010.01.01	Content and template update
02	2014.09.24	Review and template update
00	2015.03.23	Converted T09 Document (0008-8011) to T03

VESTAS PROPRIETARY NOTICE

T03 0052-0020 Ver 01 - Approved - Exported from DMS: 2016-08-29 by RIREG

QSE Handover Checklist

Document ID: 0049-0587
INS SUS-SAF-OPC (AME US/CAN)

Owner(s):	Author(s):	Valid from:	Valid until:	Version: 00
BPO.Del.SUS	RIREG	2015.07.30	2018.07.30	

Wind Farm Information			
Name:		Office Location:	
Client/Owner:		Wind Farm Location:	
Client/Owner Representative:		Contact Number:	

Vestas Information			
Services Site Manager:		Contact Number:	
Construction Site Manager:			
QSE Representative:			

Handover (to be completed by Construction Site Manager)						
This Handover is:	Partial ☐	Complete ☐	Date:		Number of Wind Turbines:	
Other structures, equipment, materials under the Services scope of work:						
RESERVED						

Handover Checklist

The following information was complete and accurate at the completion of construction of this wind farm. The items listed have been included in this checklist to ensure management of change (construction activities to operation activities) risks is properly communicated. Information in this checklist is the responsibility of both the Construction and Operations department for obtaining, organizing, and delivery.

In the event information is required from the client of the wind farm, the construction Site Manager shall obtain this information from their point of contact at the client.

In the event of "PARTIAL" or "N/A" applies a brief explanation must be provided.

Complete Delivery	Partial Delivery	N/A	Delivery Item/Action and description.
☐	☐	☐	**Legal posting requirements: (Posters/Banners/Notices):** Depending on the location (USA, Canada, Department of Energy, Department of Defense) the required legal postings shall be posted during both the construction and operations activities. These postings shall be delivered in the handover. Typically these postings indicate basic safety and health requirements, point of contact for inquiries, and is (must be) posted at a common location for all employees. On this project, the poster can be found . Explanation:
☐	☐	☐	**Legal References/Documentation:** Documentation relating to any authorities having jurisdiction involving inspections, notice of violations, non-conformity violations, etc must be either closed prior to handover, or partial delivery must indicate action plan. Explanation:
☐	☐	☐	**Owner's Health, Safety, Environmental Plan:** If applicable, this plan may include information from the wind farm Owner/Developers with the following information: • Specific requirements set forth in the permitting and development phase of the project. o May include agreements for QSE matters with land owners, local schools, emergency response services, hospitals, flash flood zones, sensitive areas due to flora and fauna, archeological finds, shared project spaces (mining, agriculture, forestry, etc). • Specific requirements set forth by the client/owner of the wind farm (not specific to the wind turbine). o This may include meeting requirements for QSE activities, safety committees, reporting requirements, recreation agreements such as a designated site shut down

T03 0049-0587 Ver 00 - Approved - Exported from DMS: 2016-06-03 by RIREG

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QSE Handover Checklist				Document ID: 0049-0587 INS SUS-SAF-OPC (AME US/CAN)
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.07.30	Valid until: 2018.07.30	Version: 00

			due to hunting activities, recreational vehicle use, or specific company policies that supersede the non-wind turbine safety manuals. • Specific requirements on environmentally sensitive areas. o These areas could have been identified in the permitting phase, or identified during the construction of the project. Explanation:
☐	☐	☐	**Job Site Inspections.** Any audits completed during the construction activities along with their corrective actions shall be issued to the operations group for traceability on the audit findings. In the event audit findings are open at the end of construction, an agreement between construction and operations is allowable for the transfer of the action items. Audit findings are not automatically closed when the site transfers responsibility. Explanation:
☐	☐	☐	**Emergency Response Plan:** The emergency action plan used during the construction activities shall be delivered to the operations group prior to the transfer of responsibility. It should include: • Potential Emergency situations and actions (wild fire, tower rescue, cave-in, etc) • Emergency response teams, equipment, training, drills • Outside resource capabilities, equipment, training, • Maps, evacuation routes **Emergency Response Plan Activation:** During the construction phase of the project, if the emergency response plan was activated, the incident report (scrubbed of employee identification items) relating to the activation of the emergency response plan shall be issued along with a summary of lessons learned from the emergency services response. This should include communications, training, drills, participation in emergency services meetings, activation, etc. Explanation:
☐	☐	☐	**Fire, Medical, or Emergency Drill Reports:** All drills completed during the construction project shall have a drill evaluation completed. These evaluations shall be delivered during the handover checklist. Modifications to the EAP shall be documented in the EAP document. Explanation:
☐	☐	☐	**Accident/Incident Reporting:** All incidents (Health, Safety, or Environmental) must be properly recorded and reported. Records pertaining to the criteria below must be discussed and made available (via intranet or physical copies) to services group during the handover checklist: • Fatality • Lost Time Injuries • Recordable injuries • Fire/Electrical Arc Flash • Unexpected Release: Energization of electrical system (wind farm or wind turbine); wind turbine blade failure, dropped tools/equipment. • Multiple contractor injuries/near miss Explanation:
☐	☐	☐	**Incident Database (Credit360) Case Closure:** All open incidents during the construction phase close out by the case handler. Normally this is the responsibility of the Construction Manager. Explanation:
☐	☐	☐	**Return To Work:** Vestas has a return to work program. In the event an employee is injured during construction activities, the operations group shall make all attempts possible to supply continued restricted duty work for the injured person, and shall take over the responsibility of rehabilitation of the employee to full status under direction from medical care provider. Documentation of any cases involving employees requiring this program shall be discussed at a manager level along with the Vestas workers compensation manager prior to the transfer or responsibility. Explanation:

T03 0049-0587 Ver 00 - Approved - Exported from DMS: 2016-06-08 by RIREG

QSE Handover Checklist				Document ID: 0049-0587 INS SUS-SAF-OPC (AME US/CAN)
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.07.30	Valid until: 2018.07.30	Version: 00

☐	☐	☐	**Required Meetings:** The meeting requirements set forth in the construction phase shall be offered to the operations group. Meetings shall be mandatory according to the Vestas Management System and the client requirements. Typical meetings are: • **Plan of the day (Management):** The management team and contractor supervisors shall organize and conduct plan of the day meetings at the beginning of each shift. The agenda shall include a review of the work to be conducted, emphasizing the hazards and controls associated with that scope of work, and any lessons learned or relevant safety issues associated with the previous day's activities. • **Job Safety Analysis (Management + Crew Leaders).** The wind farm will conduct job safety analysis meetings based upon information issued during Plan of the Day Meeting and their work scope. They will be completed prior to each shift start of work. Daily information must consist of: weather, wind, previous day incident review, new risks for the day, new contractors, work permits, etc. **Weekly Safety Meeting (Hosted by Management for all employees).** Documented weekly safety meetings will take place on (day of week) and at (time of day). Attendance must be taken, and if required delivered to the Client/Owner. Explanation:
☐	☐	☐	**Safe Operating Procedures & Special Hazards:** Depending on the design, layout, and construction methods, there could be Site Specific Safe Operating Procedures (SOP) and Other hazards that must be communicated to the operations group. Copies of relevant SOPs and other hazards that are documented shall be provided by the construction Site Manager to the Operations Site Manager. Hazards unique to the work area (e.g. turbine site, prototype turbines, Dept. of Energy Interconnects, overhead power lines, etc) shall be reviewed with the operations group prior to the transfer of responsibility. Explanation:
☐	☐	☐	**Jobsite Control:** The construction manager shall communicate the features or processes used during the construction project to manage and control access to the site. The agreed process shall be communicated to all employees upon arrival to the location. Vendors and visitors accessing the project must follow the same process. Appropriate signage shall be deployed (in vehicle tags, and road instruction signs) instructing workers, vendors, and visitors accessing the project to "check in" when they arrive. Records shall be maintained that document this process. In the event the project falls under North American Electric Reliability Corporation's (NERC) or Federal Energy Regulatory Commission (FERC), employee/visitor/vendor control requirements shall be followed during both construction and operations. In the event construction has completed the review of their jobsite controls to the NERC and FERC requirement, those policies/programs/processes shall be adopted by the operations group. Vehicles shall have color badges indicating their business on the wind farm. Explanation:
☐	☐	☐	**Energization – Lockout/Tagout Procedures:** Upon completion of the construction project the client is required to have a lockout tagout procedure for the energization and operation of the wind farm. The construction department will be required to follow those procedures for the commissioning and energization of the wind farm. Those procedures must be delivered to the operations group as a part of the handover checklist. The operations group may work with the client to change the procedure as long as it does not violate the Vestas Lockout Tagout policy. Any changes must be discussed, agreed, and confirmed by the "as built" drawings submitted by the electrical contractors building the wind farm. Explanation:

T03 0049-0587 Ver 00 - Approved - Exported from DMS: 2016-06-05 by RIREG

QSE Handover Checklist				Document ID: 0049-0587 INS SUS-SAF-OPC (AME US/CAN)
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.07.30	Valid until: 2018.07.30	Version: 00

☐	☐	☐	**Fall Protection:** The construction department shall deliver the information for the arrest/restraint systems used in the turbines on the wind farm. This at a minimum will be in the wind turbine user's manual and emergency response plan. Specific to this project, the vertical lifeline in the wind turbine is in size, and nacelle roof access fall protection equipment requires the following: • - Lanyard(s) • - Positioning Device • - Rescue System • - Harness Explanation:
☐	☐	☐	**Chemical Safety:** Upon completion of construction activities, any leftover chemicals that can be used by the services organization shall be agreed prior to the departure of the construction group. All chemicals must be properly stored during all phases of the project. Any chemicals that have expired or have been mishandled will be the responsibility of the services organization for disposal. All Safety Data Sheets and chemical inventories must be delivered in the handover checklist before the responsibility of such chemicals is transferred. Chemicals found on the Vestas Chemical Blacklist may not be used unless authorized on a restricted basis from the Chemical Blacklist. Explanation:
☐	☐	☐	**Transfer of Equipment:** In the event the construction department is leaving Vestas owned, rented, or leased equipment such as forklifts, excavators, aerial lifts, snow plows, generators, etc, the construction department shall deliver the last inspection record of said equipment along with the rental agreements, and other safety related information on the equipment (user manual, training documentation, inspection requirements, etc). Explanation:
☐	☐	☐	**Transfer of tools:** In the event the construction department is leaving Vestas owned tooling for the operations group, they shall provide: • Inspection records • Medical Oversight records (AED) • Purchase records • Recertification dates • Calibration dates/records Note: Vestas does not allow for the transfer of personal protective equipment used in: fall protection, electrical safety, personal hygiene, respiratory protection, safety footwear, or arc flash clothing (excluding 40cal/cm2 suit). Explanation:
☐	☐	☐	**High Winds and Severe Weather.** The construction group will have the best information for weather prediction and trending in the area of the wind farm. The construction group shall deliver the best method for weather prediction either through web based service or computer service (Such as DTN). The construction group shall also brief the operations group of the weather patterns typical of the area, and if the construction project activated the emergency response plan due to weather and what type. Explanation:
☐	☐	☐	**Traffic Safety:** The set limits for safe vehicle operation on the wind farm during construction shall also apply to the operations group. Parameters shall be set to Limit vehicle operation to prepared roadways and driveways. If off-road driving is required, the procedure to request approval shall be indicated by the construction group and maintained for the operations group. Explanation:
☐	☐	☐	**Fire Protection/First Aid/CPR/AED**. After the completion of the construction phase, any equipment related to Fire protection/First Aid/CPR/AED remaining on the wind farm shall be inspected by the operations Site Manager. The equipment shall be accompanied with appropriate records. Each project must have an AED locate on the property. The AED is located on this project. Explanation:

T03 0049-0587 Ver 00 - Approved - Exported from DMS: 2016-06-08 by RIREG

QSE Handover Checklist				Document ID: 0049-0587 INS SUS-SAF-OPC (AME US/CAN)
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.07.30	Valid until: 2018.07.30	Version: 00

☐	☐	☐	**Environmental Controls:** Upon completion of the construction and prior to the transfer of responsibility to services the following items must be determined in reasonable condition. Specific areas are: • Housekeeping/trash. Trash and debris shall be collected and disposed of in accordance with environmental requirements, client requirements and Vestas environmental management system. • Recycling. The construction department shall make its best attempt at recycling all recyclable materials prior to the transfer of responsibility to the services organization. • Parking / Vegetation Disturbance. Vehicles, equipment and materials shall not be stored, parked or operated on vegetated areas unless that activity is specifically addressed and authorized in the scope of work. Materials to be left after the completion of construction must be agreed to prior to the departure of the construction group. • Spill Control. The client shall apply the requirements of their Spill Prevention Control and Countermeasures plan when quantity surpasses the SPCC requirements (or equivalent for Canadian projects). The construction group of Vestas shall deliver the requirements of the SPCC plan required for Vestas to follow at the handover checklist completion. Services organization shall evaluate the additional products intended to be brought to the site during the operations stage and notify the client to update their SPCC plan appropriately. o If the construction group is leaving any materials for chemical storage, spill prevention, or spill containment, the care, use and storage of those materials shall be identified to the services department prior to the transfer of responsibility. • Sensitive / Protected Areas: Any sensitive or protected areas must be clearly communicated to the Service Manager. Areas include: organic crops, protected wildlife habitat, swamps, marshes, creeks, rivers, ect. • Endangered Species. Any species found on the wind farm during the construction project shall be communicated to the services organization in Vestas so mitigation practices can take place. Threatened or endangered species on this project are (Photos must be posted in common location): o o o Explanation:

Signatures:			
Vestas Construction Site Manager		Date:	
Vestas Services Site Manager			
Vestas QSE Representative			
RESERVED			

APPENDIX: version history

Version No.	Date	Description of Changes
00	2015.07.30	Converted T09 (0046-7406) to T03, modified header

T03 0049-0587 Ver 00 - Approved - Exported from DMS: 2016-06-05 by RIREG

VAWT Safety Orientation Vestas System Instruction				Document ID:0047-0898 INS SUS-SAF-OPC (AME US) Site Orientation
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2016.05.03	Valid until: 2019.05.03	Version: 02

Version history

Version No.	Date	Description of Changes
02	2016.05.03	Added requirement for In-Field Orientations DMS 0047-0728

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1 Purpose

The purpose of this procedure is to ensure that all personnel have the necessary instruction and training required to ensure their safety while working at Vestas.

2 Responsibility

2.1 Senior Management

2.1.1 Allocate resources for implementing the orientation program

2.2 Site\Construction Managers\ Authorized Supervisors

2.2.1 Responsible for the implementation of this program;

2.2.2 Complete the Safety Orientation Checklist (DMS 0049-0562) for new employees, Visitors and Subcontractors;

2.2.3 Complete the In-Field Orientation Checklist (DMS 0047-0728) for all Subcontractors working in the turbine.

2.2.4 Ensure employees are receiving their Safety Orientation at the worksite within the first day of employment; and

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2.2.5 Ensure visitors and subcontractors are receiving their Safety Orientation prior to conducting work activities on Vestas Sites.

2.3 Quality Safety and Environmental (QSE) Department

2.3.1 Ensure that employees are receiving the required Safety Orientation.

2.4 Employee, Subcontractor and Visitors

2.4.1 Participate in the Safety Orientation at Vestas and advise the site management of any questions or comments they have regarding safety and on-the-job training during their first week.

3 Scope

3.1 This procedure applies to:

3.1.1 Newly hired employees;

3.1.2 Site employees returning from an extended absence (more than one year);

3.1.3 Non Site Vestas employees (Resource Technicians/Corporate Employees) visiting Service Sites (annually at each site visited);

3.1.4 Transferred employees (site to site);

3.1.5 Subcontractors; and

3.1.6 Visitors

4 References

Applicable legislation relating to the responsibility of employers to provide employees with a safety orientation:

OSHA [Occupational Safety and Health Administration]	https://www.osha.gov/

5 Terms and Abbreviations

Term or Abbreviation	Definition
QSE	Quality Safety and Environmental
PPE	Personal Protective Equipment

6 Process

6.1 New Hire Orientation

New employees, transferees, subcontractors, and visitors to Vestas will be given an orientation session by their respective Site\Construction Manager\Authorized Supervisor prior to conducting work activities onsite. Topics covered will include and may not necessarily be limited to [See section 10]:

6.1.1 Review of Vestas Health and Safety Manual highlighting specific areas;

6.1.2 Review of Vestas safety policies, Codes of Practice, and procedures;

6.1.3 Safety responsibilities;

6.1.4 Working alone program;

6.1.5 Job expectations and employee conduct on and off the job;

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6.1.6 Responsibility and care of personal protective equipment (PPE) and clothing;

6.1.7 Specific job hazards;

6.1.8 Job responsibilities/subcontractor's responsibilities;

6.1.9 Company enforcement policy;

6.1.10 Workers right to refuse unsafe work and conditions of imminent danger;

6.1.11 Requirement to report all hazards, incidents and accidents;

6.1.12 Any significant/site specific regulatory requirements;

6.1.13 Emergency procedures;

6.1.14 Location of all emergency response equipment;

6.1.15 Muster area locations;

6.1.16 Complete a worksite walk-through with further commentary by the Site\Construction Manager\Authorized Supervisor or Designee; and

6.1.17 The Safety Orientation Checklist to be completed by the Site\Construction Manager\Authorized Supervisor or Designee.

6.2 Site employees returning from extended leave of absence

6.2.1 Site employees returning from extended absence (more than one year) will be required to take Vestas Safety Orientation [See section 10].

6.3 Transferred employees (Site to Site)

6.3.1 All employees transferred to new site will be given a Safety Orientation [See Section 10] and procedures which applies to their new job.

6.4 Non-Site Vestas Employees/Visitors

6.4.1 All employees visiting a Vestas site such as Resource Technicians and/or Corporate employees/Visitors will be given a Site Orientation based on the requirements for "Vestas Employees/Visitors" [See Section 10]. Non Site Employees/Visitors will receive an orientation no more than annually per each site visited.

6.5 Subcontractors

6.5.1 All Subcontractors employed to a Vestas site will receive a Site Orientation and an In-Field Orientation prior to starting activities onsite. Subcontractors should receive an orientation based on the requirements for "Subcontractor Orientation" [See Section 10]. Subcontractors will receive an orientation no more than annually per each site visited.

7 Orientation Records

Completed Orientation Documentation (Sign documentation, Emergency Contacts, Training Records) shall be retained onsite will be stored onsite for 1 year.

8 Training

All Employees that will designate to conduct orientations will be trained on this process.

9 Evaluation

This procedure will be reviewed annually through the QSE corporate annual review.

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10 Orientation Contents Requirements

Orientation Requirement	DMS Number	Employee	Visitor	Subcontractor
Safety Orientation Checklist	0049-0562	X	X	X
Site Map	Site Specific	X	X	X
Code of Safe Practices	0049-2056			X
Code of Safe Practices Acknowledgement	0049-0561			X
Visitor Code of Safe Practices	0049-0563		X	
Visitor Code of Safe Practices Acknowledgement	0049-0564		X	
Emergency Response Plan	Site Specific 0049-2057	X	X	X
Tower climbing Practical Test	0049-2061	X Confirm complete	If applicable Confirm completed	X Confirm complete
Confined Space Hazard Assessment	0049-0585	X	X	X
Personal Fall Arrest System Inspection	0049-0572	X	X	X
Hazard ID and Control	0049-0565	X	X	X
Emergency Contact Form	0049-0704 0049-0556	X	X	X
Level 0 & 1 LOTO	ECC Training Material	X	X	X
Site Specific HAZCOM	0049-2063	X	X	X
Environmental Requirements/ Response/Recycling	Site Specific	X	X	X
Endangered/Passerine Species	Site Specific	X	X	X
Confidentiality Agreement (Non- Vestas Only) *	0008-9778	If applicable	If applicable	If applicable
Guest Release of Liability (Non-Vestas Only) *	0049-2071	If applicable	If applicable	If applicable
Review of JSA for affected area (Activity Specific)	0049-0549	X	X	X
Site Orientation PPT	Sites are encouraged to create a PPT that covers site specific logistical items, Hazard ID and Control, Environmental, Endangered/Passerine Species and any other items that the site sees fit.			

11 APPENDIX: version history

Version No.	Date	Description of Changes
00	2014.10.09	New Document
01	2015.04.06	Revised Header VPP designator added Site Orientaion, DMS #'s

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Safety Orientation Checklist

Please Print

NAME: _____

COMPLETE HOME ADDRESS: _____ HOME PHONE: _____

OTHER #: _____

EMERGENCY CONTACT NAME & PHONE #: _____

SITE/LOCATION: _____

PROJECT/SITE MANAGER: _____

☐ Vestas Employee ☐ Subcontractor ☐ Visitor ☐ OTHER: _____

DATE OF THIS SITE ASSIGNMENT: _____

CHECK EACH ITEM AS IT IS EXPLAINED TO YOU:

I. PROJECT/SITE LOGISTICS

☐ Schedule: Shift, Start/End & Break Times ☐ Driving onsite ☐ Phones &/or Radios ☐ Work Uniform/Footwear

☐ Sanitary Facilities - Restrooms & Water ☐ Site Access/Parking ☐ Harassment Policy ☐ Emergency Response Plan/Supplies

☐ Eating Areas - Food Storage/Recycling ☐ Weather ☐ Smoking/Chew Policy ☐ Customer Specific Requirements

II. INITIAL TRAINING ON THE HEALTH AND SAFETY PROGRAM, INCLUDING:

☐ Reporting safety concerns and the right to ask any question, or report any safety hazard, either directly OR ANONYMOUSLY without any fear of reprisal.

☐ Disciplinary procedures that may be used to ensure compliance with safe work practices.

☐ The location of site safety postings and federal, state and local required postings.

☐ Access to the Vestas Safety Committee. Site Safety Rep: _____

☐ Pre-Task Planning Forms (Pre-Lift, JSAs, PTP, WI etc.)

☐ Reporting Occupational Incidents - Injuries, Illnesses, Vehicle or Equipment Damage, Near Miss events and Hazardous Conditions.

☐ Site Emergency Contact Phone Numbers. To summon Emergency Medical Response, Call: _____

☐ Safety Meetings - Scheduled Day of the Week _____

☐ Code of Safe Practices ☐ Fall Arrest System Inspection ☐ Climb Test (if applicable)

☐ PPE Issue & Training ☐ Safety Bulletin/Alert Review

III. HAZARD COMMUNICATION

☐ The potential occupational hazards in the work area and **safe work practices and/or personal protective equipment** required for my job title/assigned tasks can include, but are not limited too (Please check those that apply):

- ☐ Bloodborne Pathogens - **Universal Precautions**
- ☐ Cranes & Forklifts - **Trained Operators**
- ☐ Office Area Hazards - **Ergonomics**
- ☐ Electrical Hazards - **LOTO, GFCI & Grounding**
- ☐ Confined Space - **Permits & Attendants**
- ☐ Poisoning/Spills - **Haz Com Procedures**
- ☐ Fall From Heights - **Fall Protection Training/PPE**
- ☐ Excavations - **Barricades & Bridges**
- ☐ Weather - **Emergency Response Plan**
- ☐ Vehicle Accident - **Defensive Driver**
- ☐ Slip/Trip/Fall - **Housekeeping**
- ☐ Other [Please name] _____
- ☐ Other [Please name] _____

☐ The hazards of any chemicals to which I may be exposed, and my right to review the information contained on the Safety Data Sheets.

☐ The labeling and hazard warnings for containers of hazardous chemicals.

☐ The location and availability Safety Data Sheets (SDSs), the site Chemical Inventory List & the VWS Black List.

☐ (Initials Please) I have had the opportunity to review the safety data sheets for the substances I will exposed to during work activities/scope of work.

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Safety Orientation Checklist

IV. TRAINING CERTIFICATIONS REQUIRED *((M)=mandatory, (O)=optional, ATTACH proof of Current/Valid Training below - Record Expiration Dates)*

Training shall match scope of work being performed:

☐	Confined Space(M)	☐	First Aid/CPR(M):	☐	Suspended Platform(O):
☐	Hi Angle Rescue(M):	☐	Bloodborne Pathogens(M):	☐	LOTO (Level 1 min).(M)
☐	Fire Safety (M):	☐	Respirator (M):	☐	Other:
☐	JHSC Certified Member (Canada Specific) :	☐	Propane Handler (Canada Specific):		

IV. IN-FIELD ORIENTATION

Subcontractors and Vestas Employees that will be participating in any onsite activities over and above a one-time escorted site visit for observation purposes only, shall receive a full In-Field Orientation [DMS 0043-6719]. Completed In-Field Orientation forms shall be completed in conjunction to this form. and filed with the Site Safety Orientation Documentation onsite.

I fully understand the above items and agree to comply with safe work practices in my work area at all times.
I understand that my actions can affect the health and safety of others.
I understand that disciplinary action, up to and including termination, may result from failure to follow procedure.
I also understand that every individual is ultimately responsible for his/her own safety.

EMPLOYEE SIGNATURE: _____ DATE: _____

I, (Site/Project Manager) _____
hereby certify that this employee has been trained on the items checked on this form.

SITE/PROJECT SIGNATURE: _____ DATE: _____

**When complete, file documentation in Site Safety Records*

Attach copy of Driver's License, Training Records, and In-Field Orientation (If applicable)

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Owner: BPO.DEL.SUS Valid from: 2015.06.11 Valid until: 2018.06.11	**In-Field Orientation**	Document ID 0047-0728 R01 INS-SUS-SAF-OPC (AME US/CAN) In-Field Orientation

Date of Orientation:

Orientation for:

Name: Initials: Employer:

Orientation Administered by:

Name: Initials: Employer:

Country: State/Province: City:

Criterion

The In-Field Orientation is to be completed for visiting technicians during their first turbine visit. The orientation must be administered by a senior local technician with expert knowledge of local hazards and protocol. Recommended discussion points are provided below the checklist.

Down Tower	✓	Notes:
1. Turbine Location/Site Map	☐	
2. Parking/Turbine Approach	☐	
3. Controller Operation	☐	
4. Dropped Item Awareness	☐	
5. Lad Saf/Slider Operation	☐	
6. 100% Tie Off Awareness	☐	
7. Climb Assist Operation	☐	
8. Service Lift Operation	☐	

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Up Tower

1. Pinch Point Awareness	☐	
2. Rotating Hazard Awareness	☐	
3. E-Stop/Switchgear trip Awareness	☐	
4. Crane Signal Review	☐	
5. Service Crane Awareness	☐	
6. Rescue Kit Location	☐	
7. Rotor Lock Procedure	☐	
8. Hub Entry Procedure	☐	
9. Arc Flash Labels	☐	

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VAWT Code of Safe Practices				Document ID: 0049-2056 INS SUS-SAF-OPC (AME US) Code of Safe Practices
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.10.28	Valid until: 2018.10.28	Version: 01

Version history

Version No.	Date	Description of Changes
01	2015.10.28	Modified Sections: 7.2, 9.1, 10.1, 12.1, 12.2, 18.2, 21.1, 24.1

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1 Purpose

The Code of Safe Practices is provided as a quick reference of standard guidelines policies utilized within VAME.

2 Basis

All of these practices are founded on established Global and VAME QSE procedures and business practices. The specific requirements for these practices will be contained in the VAME-QSE Manual.

3 Responsibilities

3.1 Site/Construction Manager or designee

3.1.1 Implementation and compliance with all provisions of the Code of Safe Practices.

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3.2 Personnel

3.2.1 All personnel must follow this Code of Safe Practices, render every possible aid to safe operations, and should report all unsafe conditions or practices to the manager responsible. Failure to comply with the Code of Safe Practices may result in disciplinary action up to and including termination.

4 Terms and Abbreviations

Term or Abbreviation	Definition
VAME	Vestas - American Wind Technology, Inc. and Vestas Canadian Wind Technology, Inc., collectively
PPE	Personal Protective Equipment
SDS	Safety Data Sheet
JSA	Job Safety Analysis

5 References

Document No.	Title
0000-0502	Vestas Corporate OH&S Manual Code of Safe Practices
0049-0545	VAWT-Drug-Free Workplace Policy
0049-2070	VAWT-PPE Plan
0049-0578	Lifting Guidelines for Turbine Service Hoist and Material Handling
0049-0565	Hazard Identification & Control
0047-0898	VAWT Site Orientation
0049-0580	VAWT Control of Hazardous Energy
0049-0995	VAWT Electrical Safety
0049-0605	VAWT First Aid
0049-0608	VAWT Subcontractor Safety Plan
0049-0614	VAWT Lift Truck Safety
0009-0270	Vehicle Use Policy
0049-0620	Field Rescue Response Protocol

6 Scope

This document applies to all VAME employees, contractors and visitors within the US and Canada.

7 Safe Practices

7.1 Acknowledgement

After reading the list of practices you must sign and date the acknowledgement form (DMS #0049-0561). If you DO NOT understand the practice, list the topic and practice number on the acknowledgement page, and discuss item(s) with the Site/Construction Manager or designee.

By selecting "Done" on the E-learning module, you certify you have completed the assignment and will abide by these practices. If you DO NOT understand the practice, list the topic and practice number and discuss the item(s) with the Site/Construction Manager or designee.

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7.2 General

7.2.1 Safety must be the FIRST concern. Priorities change, concern over safety never should.

7.2.2 Stay alert, identify and react to potential danger/hazards before they develop.

7.2.3 Report all unsafe conditions or hazards to your supervisor or anonymously if prefer, to the Safety Department (VAME-SafetyDepartment@vestas.com).

7.2.4 All injuries, illnesses, chemical exposures, vehicle incidents, environmental/spills, good catch or near miss events, must be reported to your supervisor as soon as possible.

7.2.5 At least two competent persons must be present when performing work in a turbine.

7.2.5.1 Employees are only permitted to work alone in exceptional cases and only at the bottom of the tower, i.e. read and record meters. Only competent and educated personnel are allowed to carry out lone working. Communication between the lone worker and a contact/base person must be established. An emergency plan must be agreed on between the lone worker and the contact/base person.

7.2.6 A qualified person must be in the nacelle or on the roof to support the climber entering the hub.

7.2.7 Communication devices which work inside the tower (such as radios or cell phones), are required to be carried by anyone climbing in the turbine.

7.2.8 All work must be carried out in accordance with the latest revision of the VAWT QSE Manual, related technical manuals and work instructions.

7.2.9 All equipment must be operated in accordance with Vestas operating manuals and manufacturer's specifications.

7.2.10 All personnel are expected to practice good housekeeping and LEAN methodology to ensure tools, equipment and generated waste are properly contained and removed after work is complete.

7.2.11 Keep all egresses clear of stored material.

7.2.12 Keep roads, paths and pedestrian areas free of stored materials.

7.2.13 Emergency Response and Hazard Communication plan signs and regulations must be followed and all personnel are required to familiarize themselves with these rules before work is commenced.

7.2.14 All personnel must know who their safety representative is.

7.2.15 If an operating wind turbine must be inspected from the ground, never stand under the rotor plane.

7.2.16 Work must only be carried out by trained and instructed personnel.

7.2.17 Machinery or equipment must only be operated by trained and qualified personnel.

7.2.18 Do not attempt to repair or adjust any machine or attempt to lubricate any moving parts while in operation unless the equipment is designed or fitted with safeguards to protect the person performing the work.

7.2.19 All personnel shall be given frequent incident/hazard prevention instruction and reminders. Daily and/or weekly safety meetings for all site personnel and subcontractors will be held on a regular basis. Attendance is mandatory.

7.2.20 Vestas maintains a violence/harassment free workplace. No threatening or aggressive behavior toward other site personnel, contractors or visitors will be tolerated.

7.2.21 Horseplay, fighting or other unsafe acts that could potentially injure or adversely affect the safety of others are prohibited.

7.2.22 Only self-retracting knives are to be utilized.

7.2.23 Tool tethers/lanyards shall be used when working.

7.2.24 When climbing, remove all objects from non-closing (Snaps or Velco) pockets and place them in a closable, personal climb bag or tool bag.

7.2.25 All Personnel are required to wear proper clothing as dictated by PPE Matrix. DMS# 0049-0691

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8 Fitness for Duty

8.1 Requirements

8.1.1 Work requirements may require personnel to climb vertically in excess of 250' and access restricted or confined work areas. Failure to do so or have the ability to do so may result in termination.

8.1.2 Never work aloft if you are afraid, nervous or subject to fainting or dizziness.

8.1.3 When working with tools, near machinery or with chemicals, personnel must tie back or otherwise confine hair that may pose a hazard.

8.1.4 Anyone known to be under the influence of intoxicating substances shall not be allowed on site while in that condition. Intoxication (or the use of intoxicating substances while on the job) may result in disciplinary action up to and including termination.

8.1.5 No person shall knowingly be permitted to work while his/her ability or alertness is so impaired by fatigue, illness, or other causes that it exposes him/her or others to injury.

8.1.6 Employees shall notify the immediate manager, if using prescription medication/or over-the-counter medication that may cause drowsiness or other side effects which could influence the ability to work safely, prior to beginning any work.

9 Personal Protective Equipment

9.1 Requirements

9.1.1 All personnel must wear personal protective equipment that meets or exceeds requirements to protect from all potential hazards. Required PPE includes but is not limited to:

9.1.1.1 Safety footwear approved to meet local regulations and requirements;

9.1.1.2 Full body harness with fall arrester;

9.1.1.3 Minimum Type 1 hardhat with chinstrap for all work including climbing, crane, or construction work. May substitute Type 2 for Type 1;

9.1.1.4 Safety glasses with side shield that meet ANSI Z87 requirements;

9.1.1.5 Task suitable gloves;

9.1.2 Respirators. Employees must maintain respirator qualifications and be capable of wearing a respirator as appropriate to job scope; and

9.1.3 Suitable reflective work wear or vest shall be used in poor weather conditions, at night and on all construction sites.;

10 Material Handling

10.1 Lifting

10.1.1 When lifting or moving components or equipment look for the Vestas lifting stickers to help identify the type of lift required; Solo, Partner or Equipment.



Solo Lift – weighs < 50#s that can be kept close to the body



Partner Lift – weighs >50#s but ≤100#s that can be kept close to the body



Equipment Lift – weighs >100#s that can't be kept close to the body

10.1.2 Heavy objects (>50#), always seek assistance from competent personnel and utilize appropriate lifting techniques, tools and/or equipment where necessary. If the appropriate tools and/or equipment aren't readily available, the job must be stopped.

10.1.3 All lift bags must have closeable tops.Drawstring or roll top?

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11 Ergonomics

11.1 Body Mechanics

11.1.1 Personnel shall be mindful of their body position when performing tasks in the potentially hazardous work environment of the nacelle, hub, tower and roof.

11.1.2 Personnel shall properly warm up prior to starting strenuous activities.

12 Entering and Leaving a Wind Turbine

12.1 Entering

12.1.1 Switch off any remote control (Service Key) or take appropriate measures to isolate the turbine. Special precautions must be taken if the work requires the remote control to be switched on.

12.1.2 Before climbing the ladder system or using the service lift, stop the turbine according to the wind turbine-specific manual or work instruction.

12.1.3 Close all hatches after passing through them.

12.1.4 Note the location of the emergency stop buttons in the wind turbine.

12.1.5 Do not stay in the nacelle while the wind turbine is in operation, unless there is a special task to be performed.

12.2 Leaving

12.2.1 When leaving the wind turbine, the access door to the turbine must be locked to prevent unauthorized persons from accessing the turbine.

12.2.2 Before descent:

12.2.2.1 Close and lock the nacelle skylight and service hatch.

12.2.2.2 Make sure that all tools are accounted for and properly secured.

12.2.2.3 Ensure the red emergency stop buttons are off.

12.2.2.4 Remove all flammable materials, oil and greased soiled rags.

13 Pre-Job Planning

13.1 Prior to Work

13.1.1 A JSA is required for each task and shall be well planned, documented and supervised to ensure quality and eliminate risk and prevent injury.

13.1.2 A Pre-Task Plan will be developed and utilized whenever an established Work Instruction does not exist or when deviating from Work Instruction.

13.1.3 All personnel shall be aware of hazards present and promptly report deficiencies to their work team and supervisor or manager.

13.1.4 Be alert to conditions and work processes in surrounding areas so that you can foresee and avoid danger. Be aware of other personnel and equipment.

13.1.5 Always have an escape route and an established rescue plan.

14 Safety Signs

14.1 Manuals, Work Instructions and in Wind Turbines

14.1.1 The following are examples of safety and alert signs used in wind turbines, manuals and work instructions.

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Ear protection required.



Safety footwear required.



Only one person on the ladder.



Safety helmet required.



Full body harness required.



Fire extinguisher.



Electric hazard.



Rescue equipment.



Danger! Overhead crane.



Rotor lock required.



Eye protection required.



Anchorage points – for fall arrest equipment.

15 Hazardous Materials

15.1 Chemicals

15.1.1 Prior to handling or working with any chemical substances, review SDS for special storage, compatibility, and PPE instructions and follow the precautions.

15.1.2 Properly label and store chemicals.

15.1.3 Properly dispose of all chemicals.

15.2 Compressed Gasses

15.2.1 Compressed Air/Gas tanks must be separated between empty and full containers in an upright and secured position out of the way of moving traffic. Accumulators are the only exception to the storage restrictions, they are to be stored laid on their side.

15.2.2 Remove regulators, close valves tight and cap after use and during storage.

15.2.3 When tanks must be moved, they must be capped and properly secured to the transport vehicle vertically or horizontally on a temporary basis.

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16 Control of Hazardous Energy

16.1 Requirements

16.1.1 All persons performing work on Vestas wind turbines must be fully protected from unexpected energization, startup or the uncontrolled release of energy, which could cause injury to those persons and/or damage to equipment.

16.1.2 Any person who operates or attempts to operate a valve, switch or other energy isolating device to which a lock or “do not operate” tag is attached will be subject to disciplinary action up to and including immediate termination, and may be subject to criminal prosecution.

16.1.3 Anyone working on the equipment must work under his or her personal lock and tag. Under no condition is anyone ever authorized to apply or remove another person’s lock and tag.

16.1.4 All lockout points must consist of positive energy isolation devices such as disconnect switches, circuit breakers, block valves, and blocking pins.

17 Electrical Safety Program

17.1 Requirements

17.1.1 Responsibility for complying with the requirements of the Electrical Safety Program ultimately rests with each individual. To eliminate hazardous conditions and practices in the workplace, specific responsibilities are designated to certain positions under the Electrical Safety Program.

17.1.2 Electrical Work is defined as the maintenance, service, modification, or troubleshooting of electrical systems or components.

17.1.3 Personnel must be qualified to perform electrical work or supervised by someone who is qualified to perform electrical work.

17.1.4 Personnel must remove all metal jewelry prior to performing electrical work in a turbine.

18 Walking and Working Surfaces

18.1 Platforms and Scaffolding

18.1.1 Cover all floor or platform openings with adequate barriers or covers when performing work where objects or personnel could fall through an opening.

18.1.2 Nothing may be thrown or dropped from a turbine, tower, ladder, scaffold or other elevated platform.

18.1.3 Only properly erected scaffolding equipped with guardrails, toeboards, and secured planks that has been properly inspected by a competent person shall be utilized.

18.1.4 Any damaged scaffolding components or other supporting structures must be tagged out and reported promptly to a supervisor or manager and repaired or replaced prior to use.

18.1.5 Scaffold training must be completed prior to personnel working on scaffolding and include proper use, load capacity as well as identification of hazards such as fall, electrical, falling objects, fall protection.

18.1.6 Retraining on platforms and scaffolding shall take place:

18.1.6.1 Where changes at the worksite present a hazard about which an employee has not been previously trained; or

18.1.6.2 Where changes in the types of scaffolds, fall protection, falling object protection, or other equipment present a hazard about which an employee has not been previously trained; or

18.1.6.3 Where inadequacies in an affected employee's work involving scaffolds indicate that the employee has not retained the requisite proficiency.

18.1.7 Only approved ASME personnel lift platforms may be utilized.

18.1.8 Personnel platforms must be inspected before use in accordance with manufacturers’ specifications, and shall be designed to support the task working load capacity.

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18.1.9 Personnel must be trained in the use, operation and emergency descent of a personnel lift platform prior to work.

18.2 Ladders

18.2.1 Only one person at a time is allowed on the turbine ladder.

18.2.2 Any person climbing any section of the tower ladder must utilize the installed personal fall arrest system.

18.2.3 Personnel working at heights must maintain 100% tie off 100% of the time when not connected to a fall arrest system.

18.2.4 Only ladders appropriate for the job shall be utilized. Never attempt to splice two (2) ladders together.

18.2.5 All ladders shall be inspected prior to use. Any defective ladders must be removed from service immediately.

18.2.6 Do not ascend higher than the third rung from the top of a straight or extension ladder or above the second step from the top of a stepladder.

18.2.7 All ladders shall be properly set up, used in the manner designed for and tie off when necessary.

18.2.8 Personnel shall maintain three (3) points of contact while ascending, descending or stationary and utilize a support person at the bottom of the ladder whenever stability of the ladder is in question.

18.2.9 Personnel performing tasks while on the tower ladder shall utilize work position lanyards, in addition to the fall arrest lanyards.

19 Emergency Rescue Equipment

19.1 Controlled Descent Devices

19.1.1 Tower Rescue/Escape System (controlled descent device) shall have a rope length greater than the tower height.

19.1.2 All personnel except escorted visitors entering a turbine must have successfully completed approved controlled descent training.

19.1.3 At least one HSE approved, inspected, controlled descent device must be present at the base of the tower or higher any time personnel are working on de-energized equipment.

19.1.4 Additional Tower Rescue/Escape System shall be required when there are more than four workers up the tower.

19.1.5 New hire testing and visitors climbing a turbine are required to be escorted by two competent people with approved VAME controlled descent and rescue training.

19.1.6 When performing energized work the controlled descent equipment must be at or above the level of work.

20 Fire Protection and Prevention

20.1 Requirements

20.1.1 Prior to beginning any work, assess your work environment, noting the possibility of a fire occurring, the proximity of firefighting equipment, controlled descent equipment and a safe escape route in the event of a fire.

20.1.2 The proper size and type of firefighting equipment shall be conspicuously located and easily accessible to permit the evacuation of workers.

20.1.3 Fire extinguishers are to be inspected and maintained monthly by a competent person and annually by a certified inspector.

20.1.4 Fire extinguishers are required to be up tower when working.

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20.1.5 Smoking is prohibited on site except in designated areas. Smoking is forbidden in any turbine.

20.1.6 A Hot Work Permit will be utilized when performing operations involving: open flames, heat producing or spark generating equipment.

21 Vehicle Use

21.1 Vestas Vehicles

21.1.1 Smoking is forbidden in VESTAS owned, leased or rented vehicle.

21.1.2 All vehicles and trailers in use shall be thoroughly checked at the beginning of the shift.

21.1.3 At a minimum each vehicle must have a documented quarterly inspection.

21.1.4 The driver is responsible for the safety of all passengers and for the stability of all materials in and on the vehicle.

21.1.5 Observer/spotter shall be used when backing up or when visibility is limited for any reason.

21.1.6 Whenever a vehicle is parked, it should be backed into the parking space with the parking brake set.

21.1.7 At the turbine if possible, park so that the vehicle windshield is facing directly into the wind.

21.1.8 Off road parking or driving is prohibited.

21.1.9 Drivers are required to obey all traffic laws. Seat belts must be worn by all occupants of a vehicle.

22 Construction Activities

22.1 Safety Hazards and Preventive Actions

22.1.1 Suitable reflective work wear or vest shall be used on all construction sites.

22.1.2 High visibility traffic control measures must be used when working on or close to the site roads especially when using cranes and excavators, digging trenches, or blocking part of the road for rotor assembly.

22.1.3 The responsible manager for the site must check local weather forecasts every morning and inform the crew.

22.1.4 All personnel are required to watch out for severe incoming weather such as high winds, thunder and lightning and immediately inform the Site/Construction Manager.

23 Cranes

23.1 Mobile

23.1.1 Current certifications for all on-site operators shall be on hand at all times.

23.1.2 Crane operators are responsible for all equipment inspections, rigging, moving, lifting and personnel involved in operations.

23.1.3 Loads shall never pass over personnel and no persons shall pass or work under suspended loads. Any exception to this practice must be identified on a JSA and discussed in the pre-lift brief.

23.1.4 During crane operations only one trained signal person utilizing approved signals is allowed to direct the crane operator at any one time.

23.1.5 Any person involved in the crane operation shall call for an all stop upon identifying a hazardous condition that will harm personnel or equipment.

23.1.6 Use a spotter when moving the load, backing up, or whenever additional visibility is warranted.

23.1.7 Riding on a suspended load is strictly forbidden, failure to follow this policy is grounds for disciplinary action up to and including termination.

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23.1.8 Ground personnel must not come in contact with the crane if overhead utility power lines are near the crane.

24 Rigging

24.1 Inspection and Use

24.1.1 Before issuing and annually, qualified rigging inspectors shall inspect equipment for wear, defects and current certification tags.

24.1.2 Only certified rigging meeting applicable standards shall be utilizes when lifting any equipment, components or personnel. Refer to Turbine Lifting Guidelines DMS #0049-0578.

24.1.3 All rigging hooks must have safety latches (double acting/positive locking).

24.1.4 Work under a suspended load is strictly forbidden.

24.1.5 Tag lines must be utilized wherever they do not pose a hazard for personnel or the load being lifted.

24.1.6 When a hazard is identified, an appropriate mitigation plan must be implemented and documented on the JSA outlining the safest course of action.

24.1.7 Exception: in winds less than 5 m/s on a 10min average, a tag line is recommended but optional when the load is away from the wind and not over the stairs or other structure in the drop zone. If during the course of the job, wind speeds rise above 5 m/s, the exception no longer applies and a tag line must be used.

24.1.8 When not in use Tag lines shall be:

- Collected into the nacelle; or
- Left on the ground; or
- Candy caned Spiral wrapped around the tower (if yawing is not required)

Note: If a tag line is to be dropped to the ground due to the inability to collect it into the nacelle or safely return it to the ground it may be dropped inside the drop zone provided all personnel and equipment are clear of the area and wind speeds are less than 10m/sec. Dropping of the tag line must be documented on the JSA.

25 Excavations

25.1 Trenches

25.1.1 Place high visibility barricades and warning signs around excavation site. Use warning lights, flagmen, or watchman if necessary.

25.1.2 Slope or shore all sides to prevent cave-ins. Inspect carefully after rain and/or flooding, or other hazard-increasing occurrence. Sides must be shored if vertically deeper than five (5) feet, (four (4) feet in WA)

25.1.3 Ensure that there is no one below when excavating near tops of cuts, banks, and cliffs.

25.1.4 Use hand railed bridges as walkways across excavations.

25.1.5 Before backfilling any excavation, ensure there is no one in it.

25.1.6 Perform Air Quality checks prior to entering any trench.

26 Visitors

26.1 Vestas

26.1.1 Site/Construction Manager or designee must be informed of the visitor names, company name and purpose of visit before visitors arrive on site.

26.1.2 Visitors shall only be allowed access to the wind turbine site after receiving permission from the responsible manager for the site.

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26.1.3 Visitors must be instructed in Vestas Visitor Code of Safe Practices DMS# 0049-0563 and complete the Visitor COSP Acknowledgement DMS# 0049-0564.

26.1.4 Visitors must be escorted at all times and wear required PPE in order to access the site.

26.1.5 Visitors climbing a turbine must have two competent persons present.

26.1.6 Visitors are not allowed to enter restricted areas unless authorized.

26.1.7 Visitors and third party personnel shall be denied access for the expressed purpose of observation or inspection during the performance of work while equipment or machinery is energized.

27 Forms

Document No.	Title
0049-0561	Code of Safe Practices Acknowledgement

28 History of this Document

Version no.	Date	Description of changes
00	04-02-2010	First edition.
01	01-03-2010	No revision
02	01-03-2010	Formatting changes
03	09-07-2010	Change in PPE requirements
04	01-10-2010	Annual review
05	16-09-2011	Revision to align policy and practices
06	23-11-2011	Modified Sections: 18.2, 25, 26
07	22 10 2012	Modified Sections:3,7,8,9,10,12,13,17,18,20,21,24,26
08	10 11 2012	Added Section 27
09	10 10 2013	Sections: 7,9, 22, 24, 26, 27
10	31 10-2014	Sections: 7, 9, 13, 18, 19, 20
00	2015.04.27	Converted T09 Document 0008-7923 to T03

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VESTAS PROPRIETARY NOTICE

RESTRICTED

Acknowledgement of Intent to Follow Code of Safe Practices				Document ID: 0049-0561 INS SUS-SAF-OPC (AME US/CAN) Acknowledgement COSP
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.02.18		Version: 00

VAME expects all employees, subcontractors and visitors on site to know and follow the VAWT Code of Safe Practices (DMS 0049-2056) or VCWT Code of Safe Practices (DMS 0049-0672).

Additionally, other safety rules (e.g.: site or job specific) may be brought to your attention, and should be followed as well.

There are many other safety regulations, such as standards issued by the Occupational Safety and Health officials that may also apply.

This Code of Safe Practices is comprised of basic rules. It is your responsibility to abide by them and ensure a safe work place for yourself and others. Failure to comply with the Code of Safe Practices may result in disciplinary action up to and including termination.

Directions:

As you review the Code of Safe Practices, list each Item Number that you do not understand or wish to have further clarified on each line.

Example:

7.1.1 ☐

Once you have read through the Code, present this list to the trainer.
As they have been explained to you and you understand them, write your initials in the adjoining box:

_____ ☐ _____ ☐ _____ ☐

_____ ☐ _____ ☐ _____ ☐

I, (Print Full Name) _____, have received and reviewed a complete copy of the VAME Code of Safe Practices.

I understand and agree to abide by these and any supplementary safety rules.

_____ _____

Employee Signature Date (MM/DD/YR)

Name/Address of Employer if other than VAME:

Name: _____

Address: _____ City: _____ ST: _____

Phone: _____ FAX: _____

The Code of Safe Practices is readily available for review in the VAME HSE Manual posted on SharePoint.

Attach this SIGNED Acknowledgement sheet to the Orientation Form and file with the Site Safety Records.
Copy to: Employee File (if Applicable)
Copy to: Employer (if other than VAME)
Copy to: Signee Above

T03 0052-0529 Ver 00 - Approved - Exported from DMS: 2016-06-04 by RIREG

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Visitors Code of Safe Practices Vestas System Instruction				Document ID: 0049-0563 INS SUS-SAF-OPC (AME US) Visitor Code Safe Practices
Owner(s): BPO.DEL.SUS	Author(s): RIREG	Valid from: 2015.02.19		Version: 00

Version history

Version No.	Date	Description of Changes
00	2015.02.19	Converted T09 Document 0023-0872 to T03, Updated section 8

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1 Purpose

The Code of Safe Practices is provided as a quick reference of standard policies utilized with in VAWT.

2 Basis

All policies are founded on established Global and VAWT QSE Instructions.

3 Responsibilities

3.1 Managers

3.1.1 Implementation and compliance with the provisions of the Code of Safe Practices.

3.2 Visitors

3.2.1 All personnel must follow this Code of Safe Practices, render every possible aid to safe operations, and report all unsafe conditions or practices to the site/construction manager.

T03 0049-0563 Ver 00 - Approved - Exported from DMS: 2016-04-05 by RIREG

T03 0052-6729 Ver 01 - Approved - Exported from DMS: 2016-06-15 by RIREG

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4 Terms and Abbreviations

Term or abbreviation	Definition
VAWT	Vestas-American Wind Technology
PPE	Personal Protective Equipment
QSE	Quality, Safety and Environmental

5 References

Document No.	Title
0000-0502	Vestas Corporate OH&S Manual Code of Safe Practices
	VAWT QSE Manual

6 Scope

This document applies to all visitors to a VAWT wind turbine site within the US.

7 Safe Practices

7.1 Acknowledgement

7.1.1 After reading the list of practices, you must sign and date the visitor acknowledgement form (DMS 0049-0564). If you DO NOT understand the practice, list the topic and practice number on the acknowledgement page, and discuss item(s) with the Site/Construction Manager or designee.

8 Site Rules

8.1 Visitors:

8.1.1 Safety must be the FIRST concern. Priorities change, safety never should.

8.1.2 Must be inducted into the site safety rules and hazards;

8.1.3 Must comply with all Vestas and site safety rules;

8.1.4 Are required to stay alert and react to potential danger;

8.1.5 Must be escorted at all times by a Vestas representative;

8.1.6 Shall prevent hazards before they develop where ever possible;

8.1.7 Are only allowed access to the wind turbine site after receiving permission from the responsible manager;

8.1.8 Upon arrival, visitors must report to the site's responsible manager;

8.1.9 Are not allowed entry into restricted areas (e.g. areas where crane work or excavation) unless authorized;

8.1.10 Must report any injury or illness to their escort or responsible manager;

8.1.11 Are required to be familiarized with and adhere to Emergency Response and Hazard Communication Plans, signs and regulations;

8.1.12 Must wear the appropriate Personal Protective Equipment (PPE) required for the hazards exposed too;

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8.1.13 Climbing a wind turbine must be accompanied by at least two competent persons with rescue equipment;

8.1.14 Entering a lockout boundary must receive Level 1 LOTO training and place their lock as directed;

8.1.15 Known to be under the influence of intoxicating substances shall not be allowed on site;

8.1.16 Must adhere to Vestas Anti-Harassment policy/Anti- Discrimination policy: No threatening or aggressive behavior toward other site personnel or visitors will be tolerated;

8.1.17 Shall not engage in horseplay, fighting, or other unsafe acts that could potentially injure or adversely affect the safety of others;

8.1.18 Must operate equipment in accordance with Vestas operating manuals and manufacturer's specifications;

8.1.19 Are expected to practice good housekeeping and LEAN methodology to ensure all tools, equipment, and generated waste are properly contained and removed after work is complete.;

8.1.20 Are required to keep all egresses clear of stored material;

8.1.21 Must keep roads, paths and pedestrian areas free of stored materials;

8.1.22 Must be trained and instructed in the work to be accomplished;

8.1.23 Must be trained and qualified to operate machinery or equipment;

8.1.24 Shall wear suitable reflective work wear or vest when poor weather conditions are present, at night and on all construction sites;

8.1.25 May not throw or drop anything from a turbine, tower, ladder, scaffold, or other elevated platform;

8.1.26 Must obey posted speed limit on all graded dirt site roads; (15 mph Non-posted); Slower speeds are advised where visibility is impaired;

8.1.27 Off road parking or driving is prohibited;

8.1.28 Smoking is prohibited on site except in designated areas; Smoking is forbidden in any turbine or VESTAS owned, leased or rented vehicle;

9 Safety Signs

9.1 Manuals, Work Instructions and in Wind Turbines

9.1.1 The following safety and alert signs are used in wind turbines, manuals and work instructions.

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Ear protection required.



Safety footwear required.



Only one person on the ladder.



Safety helmet required.



Full body harness required.



Fire extinguisher.



Electric hazard.



Rescue equipment.



Danger! Overhead crane.



Rotor lock required.



Eye protection required.



Anchorage points – for fall arrest equipment.

10 APPENDIX: version history

Version No.	Date	Description of Changes
00	2011.08.31	New Document
01	2014.09.23	Changed to L5 format

T03 0049-0563 Ver 00 - Approved - Exported from DMS: 2016-04-05 by RIREG

T03 0052-6729 Ver 01 - Approved - Exported from DMS: 2016-06-15 by RIREG

VESTAS PROPRIETARY NOTICE

Visitor Acknowledgement of Intent to Follow Code of Safe Practices				Document ID: 0049-0564 INS SUS-IEM-IMA (AME US) Visitor Acknowledgement COSP
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.10.07	Valid until: 2018.10.07	Version: 01

VAWT expects all employees, subcontractors and visitors on site to know and follow the safety rules described in the Visitor Code of Safe Practices (DMS 0049-0563).

Additionally, other safety rules (e.g.: site or job specific) may be brought to your attention, and should be followed as well.

There are many other safety regulations, such as standards issued by the Occupational Safety and Health officials that may also apply.

This Code of Safe Practices is comprised of basic rules. It is your responsibility to abide by them and ensure a safe work place for yourself and others.

Directions:

As you review the Code of Safe Practices, list each Item Number that you do not understand or wish to have further clarified on each line.

Example:

8.1.1 ☐

Once you have read through the Code, present this list to the trainer.
As they have been explained to you and you understand them, write your initials in the adjoining box:

_____ ☐ _____ ☐ _____ ☐

_____ ☐ _____ ☐ _____ ☐

I, (Print Full Name) _____, have received and reviewed a complete copy of the VAME Code of Safe Practices.

I understand and agree to abide by these and any supplementary safety rules.

_____ _____

Employee Signature Date (MM/DD/YR)

Name/Address of Employer if other than VAME:

Name: _____

Address: _____ City: _____ ST: _____

Phone: _____ FAX: _____

The Code of Safe Practices is readily available for review in the VAME HSE Manual posted on SharePoint.

Attach this SIGNED Acknowledgement sheet to the Orientation Form and file with the Site Safety Records.
Copy to: Employee File (if Applicable)
Copy to: Employer (if other than VAME)
Copy to: Signee Above

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VESTAS PROPRIETARY NOTICE

VAWT/VCWT Safety Training Requirements				Document ID: 0029-4864 INS SUS-SAF-OPC (AME US/CAN) Training Requirements
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2016.04.13	Valid until: 2019.04.13	Version: 02

Version history

Version No.	Date	Description of Changes
02	2016.04.13	Revised Sections:9.1.3, 9.2.3 Se grey highlighted text

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1 Purpose

Training is an important aspect of the QSE Health & Safety Program at Vestas. This document outlines training requirements for various Vestas employees or Visitor to ensure they have the requisite knowledge and training to safety visit and access Vestas-managed facilities.

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2 Responsibilities

2.1 Senior Management

2.1.1 Ensure effective program development and implementation.

2.1.2 Provide Site/Construction Management with adequate resources and support to carry out program responsibilities and obligations.

2.1.3 Require adherence to all policies, procedures, practices and rules related to safety training.

2.1.4 Oversee and evaluate Site/Construction Manager/Authorized Supervisor performance.

2.2 Site/Construction Manager/Authorized Supervisor

2.2.1 Ensure all personnel, Contractors and their subcontractors adhere to all policies, procedures and rules related to completion of required safety training.

2.2.2 Deny access to the Vestas facility under his supervision to any individual that has not completed required safety training.

2.2.3 Ensure all personal under Vestas supervision have the proper training and are current in that training prior to using or working on equipment.

2.2.4 Document all safety related training in the e-learning LMS.

2.2.5 Identify site personnel required to climb turbines as part of their job duties.

2.3 Personnel

2.3.1 Participate in on-line and classroom training.

2.3.2 Stay current on all required certifications.

2.3.3 Complete required initial and monthly e-learning within the time frame set forth in the assignment.

2.4 QSE

2.4.1 Identify and oversee all safety-related training programs.

2.4.2 Lead an annual review of safety related training to ensure it meets the regulations.

2.4.3 Make arrangements with the TTC to have employees complete the training by either in-house or outsourcing the training.

2.4.4 Ensure that safety-training requirements are communicated.

2.5 Subcontractors

2.5.1 Ensure all of their personnel and any subcontractors meet the minimum training requirements outlined in the Subcontractor training matrix (DMS 0049-0665)

2.5.2 Ensure that their training is adequate and current for their assigned duties at the worksite.

3 Technical Training Center (TTC)

3.1.1 Ensure that a documentation system is in place to record all safety-related training taken by employees.

3.1.2 Maintain scheduled safety and equipment-related training at the TTC or on-site.

3.1.3 Assign initial and refresher training.

3.1.4 Work with QSE to develop and update training curriculum to meet requirements of the QSE manual, federal, state and local regulations.

4 References

Document No.		
VAWT	VCWT	Title
0008-9806	0049-0675	Emergency Preparedness
0049-2068	0049-0627	VAME QSE Manual Table of Contents
0042-3182		Incident Management

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T03 0032-6309 Ver 02 - Approved - Exported from DMS: 2016-06-16 by RIREG

0049-0608	0049-0663	Subcontractor Safety Plan
0049-2056	0049-0672	Code of Safe Practices
0027-6859	0049-0648	Hazard Communication Program
0049-2070	0049-0702	Personal Protective Equipment Plan
0049-0696	0049-0700	Respiratory Protection Plan
0049-0695	?	Hearing Conservation Program
0049-0571	0049-0674	Fall Protection Program
0009-0270		Vehicle Use policy and Procedure
0049-0580	0049-0677	Control of Hazardous Energy Program
0049-0584	0049-0626	Confined Space Policy and Program
0049-0995	0049-0678	VAME Electrical Safety Manual
0049-0605	0049-0645	First Aid / CPR Procedures – Medical Emergencies
0049-0544	0049-0665	Vestas Safety Training Matrix
0049-2071		Guest Agreement Release of Liability
0049-0563	0049-0636	Visitor Code of Safe Practices
0049-0564	0049-0638	Visitor COSP Acknowledgement

5 Forms

Document No.	Title
0049-2073	Training Request

6 Scope

This procedure applies to all Vestas employees, subcontractors and visitors accessing a VAME-managed facility.

7 Terms and Abbreviations

Term or Abbreviation	Definition
EE	Employee
LMS	Learning Management System
QSE	Quality Safety and Environmental
TBC	Task Based Certification
TTC	Technical Training Center

8 General Requirements

8.1 Training Needs Analysis

A training needs analysis will be conducted by the TTC in conjunction with QSE Department. The factors in the analysis include the following:

8.1.1 Introduction of new equipment or machinery;

8.1.2 Occupations, jobs and tasks;

8.1.3 Local regulatory requirements updates;

8.1.4 Analysis of the hazards associated with tasks;

8.1.5 Analysis of incidents and incident trends analysis;

8.1.6 Training records, including new hires, transferred or promoted employees requiring training.

9 Employee Classifications

9.1 Technicians (US or Canadian)

9.1.1 Vestas personnel maintaining Level 100-400 TBC qualification who are granted unescorted, unsupervised access to Vestas-managed facilities in either the US or Canada.

9.1.2 Climb turbines as part of their condition of employment.

9.1.3 Fill the role of a first responder in WTG rescue situations.

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9.2 Resource Technicians (US or Canadian)

9.2.1 Vestas personnel maintaining Level 100-400 TBC qualification who are granted unescorted, unsupervised access to Vestas managed facilities in either the US or Canada.

9.2.2 Climb turbines as part of their condition of employment.

9.2.3 Fill the role of a first responder in WTG rescue situations.

9.3 Site Non-Technician Climbers (SNTC) (US or Canadian)

9.3.1 Vestas personnel who are granted unescorted, unsupervised access to Vestas managed facilities in either the US or Canada.

9.3.2 Personnel designated by the Site/Construction Manager/Authorized Supervisor as those who climb turbines for non-maintenance activities (delivery of parts or inspections). Positions may include but is not limited to:

9.3.2.1 Site/Construction Manager/Authorized Supervisor;

9.3.2.2 Inventory Coordinators;

9.3.2.3 Planners;

9.3.2.4 QSE Coordinators; or

9.3.2.5 Office Coordinators.

9.3.3 Personnel who make frequent site visits to multiple sites:

9.3.3.1 QSE personnel;

9.3.3.2 Technical Support; or

9.3.3.3 Service Optimization.

9.4 Site Non Technician Non-Climbers (SNTNC) (US or Canadian)

9.4.1 Personnel designated by the Site/Construction Manager/Authorized Supervisor as those who do not regularly climb turbines. Positions may include but is not limited to:

9.4.1.1 Inventory Coordinators

9.4.1.2 Planners

9.4.1.3 Office Coordinators

9.5 Non-Site EE Climbers (US or Canadian)

9.5.1 Vestas non-TBC qualified personnel who require escorted access to Vestas managed facilities in either the US or Canada.

9.5.2 Personnel who climb turbines at least once a quarter with technicians for specialized maintenance activities, testing, investigations, training or inspections that may be exposed hazards. Positions may include but is not limited to:

9.5.2.1 Engineers

9.5.2.2 Executive Management

9.5.2.3 Instructors;

9.6 Escorted Visitors Climber

9.6.1 Vestas or non-Vestas personnel requesting to climb requiring escorted, supervised access to Vestas managed facilities in either the US or Canada.

9.6.2 Require a minimum of two controlled descent qualified escorts in order to climb.

9.7 Warehouse/Tools Facility EE

9.7.1 Vestas personnel performing material handling, storage and/or maintenance activities at a Vestas managed facility.

10 Training Requirements

10.1 Minimum Requirements

10.1.1 All personnel outlined in the classifications above are required to complete the safety training per the Safety Training Matrix for that classification.

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10.1.2 All Classifications are required to complete at a minimum Vestas Safety Orientation training annually; that training includes:

10.1.2.1 Code of Safe Practices;

10.1.2.2 Electrical Safety and Lockout Tagout (Level 0 & 1);

10.1.2.3 Fall Protection;

10.1.2.4 PPE Overview;

10.1.2.5 Fire Extinguisher Training; and

10.1.2.6 Hazard Communication.

10.1.3 Site personnel will receive the Vestas Orientation training during the monthly required assignments.

10.1.4 Non-Site personnel will receive the Vestas Orientation training upon request and will be valid for one year.

10.1.5 All personnel are required to complete a site specific orientation annually for each site assigned to or visited:

10.1.5.1 Site Specific Hazard Communication;

10.1.5.2 Site ERP; and

10.1.5.3 Any site specific rules imposed by the customer or local regulations.

10.2 Technician Requirements

10.2.1 All technicians are required to receive a combination classroom, practical, e-learning and on the job training at the TTC and on site.

10.2.2 Complete required monthly safety assignments via e-learning by the last day of the month.

10.2.3 Training is assigned to all active technicians on specified months annually.

10.3 Non-technician Requirements

10.3.1 Site Non-Technicians (Climbers and Non-Climbers)

10.3.1.1 Complete the Vestas Orientation training annually and applicable monthly e-learning assignments.

10.3.2 Non-Site EE Climber and Visitors

10.3.2.1 Non-Site Climbers' must have completed Safe Access and Rescue within the last two years and Tractel Derope Refresher training within the last year in order to climb unescorted.

10.3.3 Visitors

10.3.3.1 Complete the:

10.3.3.1.1 Guest Agreement Release of Liability;

10.3.3.1.2 Visitor Code of Safe Practices and Acknowledgement, and site specific Hazard Communication.

10.3.4 Contractors

10.3.4.1 Complete required training described in the Vestas Safety Training Matrix (Subcontractor Tab) and any task specific training requirements.

11 Site Personnel Designation

11.1 Climber/Non Climber

11.1.1 Each Site/Construction Manager/Authorized Supervisor shall identify those positions at site that are not required to enter or climb a turbine as part of the job duties.

12 Site Visit Process

12.1 Technician

12.1.1 Safety training must be current as mandated in the Vestas Safety Training Matrix.

12.1.2 Complete site specific orientation training for each site assigned to perform work.

12.2 Non-Site EE

12.2.1 Must complete and submit a Safety Training Request (DMS 0049-2073) to the TTC and at least two weeks prior to the visit.

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12.2.2 TTC or QSE will create or activate the EE in PureSafety LMS and assign the Vestas Orientation and the Site Orientation (if available) with a due date of two weeks.

12.2.3 EE's are required to complete the Vestas Orientation and the respective sites Site Specific Orientation annually.

12.3 Visitor

12.3.1 Attain permission from Site/Construction Manager/Authorized Supervisor to visit the site at least two weeks prior to the visit.

13 Contract Personnel Process

13.1 Contract Technicians

13.1.1 Must be able to produce training records showing completion of assignments outlined in the Vestas Safety Training Matrix (Contractor Section)

13.1.2 Complete the Vestas Orientation and the respective sites Site Specific Orientation annually.

14 APPENDIX: version history

Version No.	Date	Description of Changes
00	2011.06.09	New document
01	2012.08.10	Removed Appendix A and B, minor grammatical changes, embedded applicable DMS numbers in document.
00	2012.04.16	New Document
01	2015.04.09	Changed document format, updated references

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Owner: BPO.DEL.SUS
Valid from: 2015.02.02
Version:00

Vestas Safety Training Matrix

Document ID: 0049-0544
INS SUS-TRA-TED (AME US/CAN)
Training Matrix

Training Title	Start Date	Tech	SNTC	SNTNC	Office Serv	Warehouse
Confined Space Permit Required v2, Vestas-PS4 eLesson	#########	X				
Confined Space Hazards v2, Vestas-PS4 eLesson	#########	X				
Clean Up Small Chemical Spills	#########					X
Bloodborne Pathogens v4, Vestas-PS4 eLesson	#########	X	X	X	X	X
Applying Electrical Standards	#########					X
Electrical Safety and Lockout/Tagout v2, Vestas-PS4 eLesson	#########	X	X	X	X	X
Ergonomics for Heavy Equipment	#########					X
Hearing Conservation v2, Vestas-PS4 eLesson	#########	X	X	X	X	
Fall Protection v2, Vestas-PS4 eLesson	#########	X	X		X	X
Heat Stress v2, Vestas-PS4 eLesson	#########	X	X	X		X
Hand, Wrist and Finger Safety v2, Vestas-PS4 eLesson	#########					X
Distracted Driver, Vestas-PS4 eLesson	#########	X	X	X	X	X
Hazard Communication v2, Vestas-PS4 eLesson (WHMIS for VCWT)	#########	X	X	X	X	X
Extreme Driving Conditions, Vestas-PS4 eLesson	#########	X	X	X		X
Respiratory Protection v2, Vestas-PS4 eLesson	#########	X				
Preventing Back Injury	#########				X	X
Vehicle Use Policy	#########	X	X	X	X	X
Driver Agreement	#########	X	X	X	X	X
Industrial Ergonomics	#########				X	X
PPE Overview	#########	X	X	X	X	X
Cold Stress, Vestas-PS4 eLesson	#########	X	X	X		
Access to Medical and Exposure Records, Vestas-PS4 eLesson (US Only)	#########	X	X	X	X	X
Fire Extinguisher Training Vestas PS4 elearning	#########	X	X	X	X	X
Egress and Emergency Action Plans v2, Vestas-PS4 eLesson	#########	X	X	X	X	X
Walking/Working Surfaces	#########					X
VAWT/VCWT Code of Safe Practices	#########	X	X	X	X	X
Site Non-Tech Climber (SNTC)						
Site Non-Tech Non-Climber (SNTNC)						

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QSE Training Request

Employee Name:

Date:

Date of Visit:

Vestas Initials

Vestas Initials

State:

City:

Windfarm:

Click 'Insert Item' and fill out location for sites you are planning to visit.

Reason for Visit:

Will you be climbing?

Selec

Have you successfully completed safe access & rescue within the last two years?

Select

Will you require climb equipment for your visit?

Select

Do you have current First Aid/CPR training?

Selec

If there is anything that might hinder your ability to ascend or descend the wind turbine, including medical conditions or medication use, report your concerns to the site manager prior to ascending the turbine.

Submit Request

Vestas

☐ Click here to agree with below terms and conditions

By clicking the above checkbox you agree to complete the assigned PureSafety training within two weeks prior to visiting the above mentioned site. Training will be provided for your review within two business days via PureSafety at vestas.puresafety.com. The training assigned will be dependent upon the training already completed by you as reflected on file within PureSafety. Failure to complete the required training within the specified two week timeframe prior to visiting the site will result in denial of site and/or turbine access upon arrival. If you have questions or concerns, please contact Kristine Bitz at kbitz@vestas.com or Richard Regnier at rireg@vestas.com.

DMS 0049-2073
2015.01.23

T03 0049-2073 Ver 00 - Approved - Exported from DMS: 2016-06-08 by RIREG

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VESTAS PROPRIETARY NOTICE

Safety Meetings Vestas System Instruction				Document ID: 0049-0547 INS SUS-IEM-IMA (AME US) Safety Meetings
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2016.04.28	Valid until: 2019.04.28	Version: 02

Version history

Version No.	Date	Description of Changes
01	2016.04.28	Revised Document DMS number to 0049-0547

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1 Purpose

VAME requires regularly scheduled safety meetings at all facilities. Vestas ISO and OSHAS certifications require use of a global QSE Management System of which QSE (Safety) Committees are a critical element.

2 Responsibility

2.1 Management

2.1.1 Ensure safety meetings are scheduled, held and documented.

2.1.2 Ensure all personnel on site at the time of the meeting – attend and participate in the safety meeting.

2.1.3 Document safety meeting using the Safety Meeting Minutes Form (DMS 0049-0548) and upload a copy on the Safety Meeting Minutes Hub page.

2.1.4 The responsible manager is responsible for the preparation and distribution of minutes from the meetings. All employees and subcontractors will be provided with the information to perform their required tasks. The relevant documents and information will be distributed to all employees, subcontractors and other cooperation partners.

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2.2 Employees

2.2.1 Adhere to documentation and information provided to perform their required tasks

2.3 QSE Representatives(s)

2.3.1 Assist in providing relevant materials to be utilized during safety meetings.

3 References

Document No.	Title
OSHA	29 CFR 1904
OSHA	29 CFR 1952
OSHA	OSHA Tech Manual Directive Number: TED 01-00-015
NOAA	National Oceanic and Atmospheric Administration
US DOL	US Department of Labor
0049-0691	PPE Matrix

4 Scope

VAME – All Locations

5 Terms and Abbreviations

Term or Abbreviation	Definition
OSHA	Occupational Safety and Health Administration
QSE	Quality Safety and Environmental

6 Forms

Document No.	Title
0049-0548	Safety Meeting Minutes Form

7 General Requirements

7.1 Localization

7.1.1 For those areas where this Safety Manual differs from the Vestas Group requirements, this manual shall prevail.

7.1.2 In some cases, VAME has implemented a requirement that may exceed a state or provincial requirement – the higher level requirement in the Safety Manual will prevail.

7.1.3 In the event that a state or provincial requirement exceeds a Safety Manual procedure the higher level requirement will prevail.

8 General Safety Meetings

8.1 Regularly Scheduled Meetings at Office Facilities

8.1.1 The responsible manager must conduct regular safety meetings with the department's employee safety representative.

8.1.2 The Committee should be made up of volunteers and their roles are to be defined by the committee themselves. At a minimum the committee should have a Chairperson who presides over meetings, runs meetings, reviews key messages from Area Managers and

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the corporate QSE (Safety) meetings. For larger committees a Record keeper may be needed to document meeting minutes, upload the minutes and act as the Chairperson in their absence.

8.1.3 Meet monthly (minimum requirement) If meetings are held more frequently that is above the minimum and encouraged.

8.1.4 Document the meeting on the Safety Meeting Minutes form.

8.2 Safety Meetings at Wind Turbine Sites

8.2.1 The responsible manager must conduct regular safety meetings with employee safety representatives and representatives from relevant subcontractors and other cooperation partners at the site. (This meeting may be held in conjunction with the employee safety meeting).

8.2.2 Meet weekly (minimum requirement) If meetings are held more frequently that is above the minimum and encouraged.

8.2.3 Document the meeting on the Safety Meeting Minutes form.

8.2.4 Conduct a post incident safety meeting as immediately after each incident or near miss as is practical (in no case later than the beginning of the next business day).

8.3 Record Keeping

8.3.1 All facilities must maintain records of all safety meetings held by uploading a copy of the minutes to Site Safety Meeting Minutes Hub page.
http://teamsitesame.vestas.net/sites/safetysustainabilitymeetingminutes-vame/default.aspx

8.3.2 File name must include the site name and the date or week number of meeting.

8.4 Safety Meeting Agenda

8.4.1 Safety meeting shall include but are not limited to the following agenda items:

8.4.2 Follow-up on problems and solutions since the last safety meeting;

8.4.3 Results from inspections;

8.4.4 Incidents of lack of compliance with laws and regulations;

8.4.5 Safety Alerts and/or Bulletins;

8.4.6 Summary of incident reports (e.g. reported industrial injuries and near misses) and investigation reports; and

8.4.7 Activities not covered by the actual OH&S plan and risk assessment.

9 APPENDIX: version history

Version No.	Date	Description of Changes
01	2010.01.01	Content and Template
02	2011.09.01	Revised to included office facilities, minutes form and doc storage
03	2014.08.14	Revised Template
00	2005.09.21	Convert T09 (0008-6845) to T03 Document updated sections; 2,3,6 grey highlighted text

T03 0052-6329 Ver 02 - Approved - Exported from DMS: 2016-08-28 by RIREG

VESTAS PROPRIETARY NOTICE

Safety Meeting Minutes

Document ID: 0049-0548
INS SUS-SAF-OPC (AME-US)
Safety Meeting Minutes

Owner(s):	Author(s):RIREG	Valid from:	Valid until:	Version: 01
BPO.Del.SUS		2015.05.20	2018.05.20	

Meeting Date			**Time**		
Chairperson			**Record Keeper**		
Attendees • "X" if in attendance					

Upcoming Events

Date	Event	Applies To

Meeting Agenda

Item	Topic	Discussion Detail	Who	Time
1	Roll Call			
2	Near Miss, Recordable Injuries from Team Site	Lessons learned, potential to happen again		
3	Safety Bulletins	Applicability to site platform, actions to be completed		
4	Safety Message	A safety topic for safety at work or home, Extreme Safety		
5	Issues or concerns	Site, Area, Corporate safety issues and concerns & discussion		
6	Action item Status			
7				

Action Items

No.	Date Entered	Action	Owner	Commit Date	Actual Complete
1.					
2.					
3.					
4.					

Meeting Notes

1. Insert Notes Here

Completed Action Items

No.	Date Entered	Action	Owner	Commit Date	Actual Complete
1					
2					
3					
4					

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Site Self Audit Checklist

Site: **Date:**

Inspector:

Notes: Complete ALL applicable checklist items, All "NO" answers will require corrective action.

Category	Item #	Description	Yes	No
Housekeeping,	1,1	Is the workplace maintained free of hazards that could result in slip, trip or fall incidents.		
	1.2	Are aisles, walkways and doorways clear of obstructions?		
	1.3	Are shelves and platforms above ground properly secured and labeled with capacity limits?		
ERP		Ensure safe evacuation instructions for all affected personnel and emergency equipment is accessible and ready for use.		
	2.1	Is the annual revised Emergency Response Procedure posted in the workplace?		
	2.2	Have all fire extinguishers received a monthly and annual inspection?		
	2.3	Are fire extinguishers: easy to access, unobstructed and placed within 50 feet of each other?		
	2.4	Are First Response Kits (First Out Kit, ERE Kit, Spec Pack, AED): easy to access and unobstructed?		
	2.5	Are First Aid Kits: up to date with no expired materials?		
	2.6	Are AED consumables (batteries and pads) within expiration dates?		
Chemical Invt. Mgt.		Ensure all chemical substance used at Vestas worksites have Safety Data Sheet (SDS), properly stored and labeled.		
	3.1	Is a Chemical Inventory List available and kept current for the site?		
	3.2	Is there an SDS for each of the chemicals on the Chemical Inventory List? Is the SDS current for each chemical?		
	3.3	Are all chemical substance containers properly labeled?		
	3.4	Is there a new chemical review form as a part of the SDS book? Is there evidence of new chemicals reviewed if/when introduced to the site?		
	3.5	Are eyewash stations inspected for function on a monthly basis and rinse bottles verified for expiry?		
	3.6	Are all secondary containment pallets or trays free of liquids?		
Mach. and Equip.		Ensure that machinery and equipment in the workplace is properly guarded, used properly and maintained in good repair.		
	4.1	Are machine guards in place on all operating equipment?		
	4.2	Are forklift inspection logs properly completed and up to date?		
	4.3	Forklift training records are available for each identified operator and there is evidence of a regular evaluation of the identified operator's competencies?		
	4.4	Is access to forklift operation controlled?		
	4.5	Is the forklift operation manual located on the lift?		
	4.6	Are truck inspections conducted and is there evidence of completion on site?		
	4.7	Are rigging inspections up to date with no expired materials?		
	4.8	Have all portable ladder received a documented inspection within the last year?		
Electrical		Ensure that the electrical equipment and other energy sources in your workplace are safe, inspected and maintained regularly.		
	5.1	Are circuit breaker panels accessible and free of obstructions? (Minimum 36" directly in front; warehouse, shop & O&M building)		
	5.2	Are corded devices (vacuums, drills, grinders, etc.) properly inspected and tagged in accordance with assured grounding program?		
	5.3	Are extension cords free of taped splices and unprotected wires?		
	5.4	Are contact voltage testers within calibration cycle?		
	5.5	Are electrically insulated tools free of nicks, gouges, scrapes?		
ESP/CHE		Ensure the Electrical Safety Plan (ESP) and the Control of Hazardous Energy (COHE) program requirements are being met.		
	6.1	Does arc flash clothing show signs of inspections? (No holes, tears, free of grease or oils, Visors free from deep scratches and extreme warpage)		
	6.2	Are all visitor locks present and or accounted for?		
	6.3	Are personal LOTO sets (blue locks, hasp & tags) issued to each employee, properly marked with Technician picture and Contact information?		
	6.4	Is COHE program level 0 & 1 training being conducted for guests and visitors?		
	6.5	Are LOTO Instructions correctly filled out and returned for review?		
	6.6	Are Personal Work Practice audits being performed for each technician annually?		
Environmental Mgt.		Ensure that procedures are followed in your workplace in accordance with ISO 14001.		
	7.1	Are fluids being stored in or on secondary containment?		
	7.2	Are any chemicals stored outside unsheltered or can be exposed to rainwater?		
	7.3	Is there an adequate inventory of spill response supplies and is it available at or near the containment area?		
	7.4	Are all containers in satisfactory condition and is the secondary containment system functioning properly?		
PPE		Ensure equipment is: available, inspected, used properly, maintained in good repair and trained on.		
	8.1	Are documents available for each technician verifying personal fall protection equipment is inspected regularly (quarterly) for damage and wear?		
	8.2	Have all technicians issued respirators received an annual medical clearance and fit test?		
	8.3	Are all electrical gloves on site within test date? Are electrical gloves properly stored?		

NOTES (*"NO" answers will require Corrective Action)* :

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Site Self Audit Checklist

Concern or Issue	Corrective Action	Assign to (int.)	Due Date

T03 0049-0546 Ver 00 - Approved - Exported from DMS: 2016-06-03 by RIREG

VESTAS PROPRIETARY NOTICE

Hazard Identification & Control Plan				Document ID: 0049-0565 INS SUS-SAF-IEM-IMA (AME US) Return To Work
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.02.19		Version: 00

Version history

Version No.	Date	Description of Changes
00	2015.02.19	Converted T09 (0008-7993) to T03 document

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1 Purpose

The purpose of the Hazard Identification and Control Plan is to provide direction in identifying, controlling and correcting hazards.

2 Responsibilities

2.1 Senior Management

2.1.1 Ensure development and implementation of the plan;

2.1.2 Provide site management with adequate resources and support to carry out their responsibilities;

2.1.3 Require site management adherence to hazard identification and control procedures; and

2.1.4 Recognize site management and personnel for performance improvement.

2.2 Site/Construction/Authorized Supervisor

2.2.1 Adhere to Hazard Identification and Control Plan procedures;

2.2.2 Ensure a Job Safety Analysis is available and reviewed prior to and upon completion of performing a task;

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2.2.3 Ensure required instruction and training have been provided to personnel, contractors, visitors and others;

2.2.4 Require personnel, contractors, visitors and others to carry out their responsibility to identify and report hazards;

2.2.5 Ensure personnel and others are protected from hazards presenting imminent-danger and that the hazards are corrected as soon as possible;

2.2.6 Respond promptly to hazard reports, safety concerns and suggestions;

2.2.7 Ensure hazard reports are properly documented and submitted to the QSE Department utilizing the Incident Management System;

2.2.8 Ensure required preventive or corrective actions have been taken and monitor effectiveness; and

2.2.9 Ensure the duration of personnel exposure to identified hazards does not extend beyond safe limits.

2.3 QSE Department

2.3.1 Develop and monitor implementation of this plan;

2.3.2 Provide efficient and effective hazard identification and control instruction and training;

2.3.3 Conduct regular worksite inspections and program audits; and

2.3.4 Review hazard reports and evaluate preventive or corrective actions taken utilizing the Incident Management System.

2.4 Personnel

2.4.1 Adhere to Hazard Identification and Control Plan requirements;

2.4.2 Review safety precautions in work instructions prior to performing tasks;

2.4.3 Report inadequate safe work instructions and/or JSAs to site management;

2.4.4 Report any of the following as soon as possible to a supervisor:

2.4.4.1 Injuries or illnesses;

2.4.4.2 Unsafe conditions and behaviors;

2.4.4.3 Near miss (non-injury) incidents; and

2.4.4.4 Environmental incidents.

2.4.5 Conduct safety inspections and program audits as required by Site/Construction/Authorized Supervisors;

2.4.6 Warn co-workers of unsafe conditions or behaviors;

2.4.7 Refuse to perform hazardous tasks if:

2.4.7.1 Adequate protective equipment and other resources have not been provided, or

2.4.7.2 Adequate instruction and/or training on the task have not been provided

3 References

Document No.	Title
SUS-IEM-IMA	Incident Management System (Credit 360)
0027-6859	Hazard Communication Plan
0000-8000	VAME QSE Manual Table of Contents
0008-7907	Extreme Weather Conditions
0008-7923	Code of Safe Practices
0008-6837	PPE Plan
0028-1600	Fall Protection Program

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4 Scope

This plan applies to Vestas personnel, contractors, visitors and others performing work on Vestas premises.

5 Terms and Abbreviations

Term or Abbreviation	Definition
DMS	Document Management System
JSA	Job Safety Analysis
PPE	Personal Protective Equipment
PTP	Pre-task Plan
QSE	Quality Safety & Environmental
SPRA	Standard Procedure Risk Assessment
Personnel	Vestas employees and contractors working for Vestas

6 Forms

Document No.	Title
0049-0549	Job Safety Analysis (JSA)
0049-0685	Pre-Task Plan (PTP)
0004-6278	Standard Procedure Risk Assessment
0049-0546	Site QSE Inspection Checklist
0049-0686	Safety Walk Form

7 Identifying and Reporting Hazards

7.1 Observations

7.1.1 Site/Construction/Authorized Supervisors shall:

7.1.1.1 Frequently observe personnel performing work tasks to reinforce safe work practices; and

7.1.1.2 Frequently observe worksite conditions and take protective or corrective action when deficiencies are noted.

7.1.2 Personnel shall:

7.1.2.1 Continually observe behaviors and worksite conditions while performing work activities and take immediate corrective action if unsafe conditions or behaviors are observed. This includes alerting others of hazards;

7.1.2.2 Document hazard observations utilizing the Incident Management System; and

7.1.2.3 Document conversations of potentially hazardous: tasks, systems or activities utilizing the Safe Work Observation (SPIDER) program.

7.2 Inspections

7.2.1 Site/Construction/Authorized Supervisors shall conduct Safety Walks in accordance with the NCSA Safety Walk Business Process (DMS# 0008-9812).

7.2.2 Site safety inspections are required monthly utilizing the Site QSE Inspection Checklist.

7.2.3 Defective equipment or unsafe conditions found during worksite inspections shall be removed from service, replaced, repaired, or remedied promptly.

7.2.4 Inspection reports shall be signed, dated and kept on file for a minimum of one year.

7.3 Reporting Hazards

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7.3.1 Vestas personnel and contractors shall report workplace hazards to their immediate supervisor or other person in charge as soon as possible.

7.3.2 Unsafe conditions shall be reported as a “Hazard Observation” utilizing the QSE Department using the Incident Management System (Credit 360).

8 Controlling Hazards and Exposure

8.1 Controlling Hazards

8.1.1 Site/Construction/Authorized Supervisors shall take protective or corrective action to eliminate or reduce hazards to an acceptable level of risk according to the following priority:

8.1.1.1 Elimination: Attempt to remove the hazard itself through design specifications and standards for: tools, equipment, machinery, and facilities;

8.1.1.2 Substitution: Eliminate/reduce hazards by substituting or replacing existing equipment and materials with less hazardous equipment and materials;

8.1.1.3 Engineering controls: Designing in safety including: ventilation systems, machine guarding, noise abatement, or modification of existing tools, equipment, machinery, or facilities, etc.; and

8.1.1.4 Warnings: Increase awareness of potential and/or existing hazards (e.g., lights, signage, barriers, and beepers, etc.)

8.2 Controlling Exposure

8.2.1 To reduce exposure to hazards, Site/Construction/Authorized Supervisors shall use administrative controls such as modified work schedules, procedures, or work practices (e.g., job rotation, safe work instructions, restricted access, or required use of PPE.)

8.2.2 Personnel shall review and follow task-specific work instructions for all hazardous tasks.

8.2.3 A Job Safety Analysis (JSA) shall be completed and referenced for all tasks when performing any work especially when a task-specific work instruction is available, but the procedures do not adequately identify the hazards and safety precautions

8.2.4 A Pre-Task Plan (PTP) shall be completed and referenced when an adequate task-specific work instruction is not available

8.2.5 Site management shall review and approve each PTP for use as a temporary work instruction until an adequate approved task-specific work instruction is available.

8.2.6 For complex processes, site management may choose to escalate corrective actions through the appropriate department: conduct a Risk Assessment using the SPRA form.

8.3 Scheduling

8.3.1 Site/Construction/Authorized Supervisors shall ensure work schedules do not extend the duration of personnel exposure to hazards beyond safe limits.

9 Training Requirements

9.1 General Instruction

9.1.1 Personnel will receive hazard identification and control training as follows:

9.1.1.1 Initially during basic safety training at the Technical Training Center, or on-site during site-specific safety orientation; and

9.1.1.2 Periodically through on-site instruction or web-based training.

10 APPENDIX: version history

Rev. no.:	Date:	Description of changes
02	2002-10-15	Unknown – revision history was not maintained in original safety manual
03	2007-05-30	Completely rewritten and formatted
04	2010-01-01	Template and content updates

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Public
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2016-01-06

Standardised procedure risk assessment (SPRA)

Vestas Wind Systems A/S · Hedeager 42 · 8200 Aarhus N · Denmark · www.vestas.com

Original Instruction: T09 0004-4159 VER 12

T09 0004-4159 Ver 12 - Approved - Exported from DMS: 2016-06-03 by RIREG

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Directions for updates of this SPRA document

Procedure for updating of the SPRA document
Email any comments, questions, or proposals for changes to **GIROH, FLEPE, and JAHUA** who are the only ones to edit the SPRA document.
The ID# in edited/added rows must be included in the 'History of document' sheet.
The draft document will be DMS reviewed and approved approximately bimonthly, and at the same time a new draft version for future edits will be created.

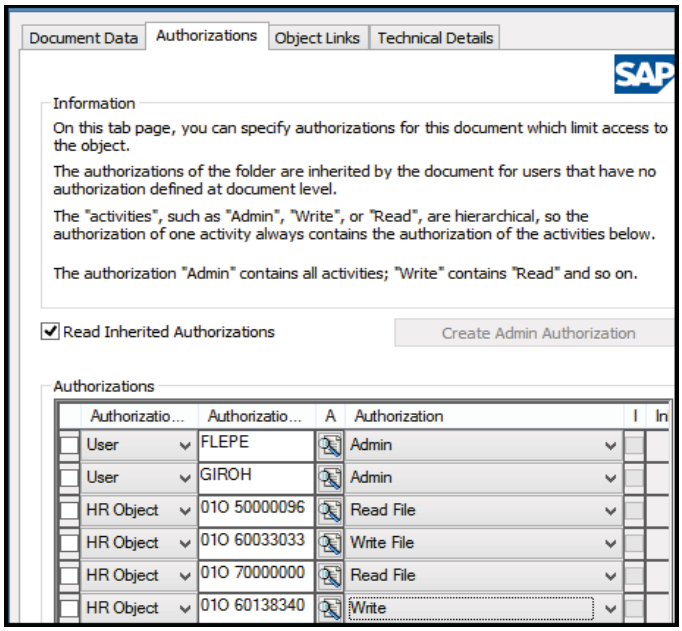
Do not change the SPRA ID No. on any of the rows in this SPRA document.
If a hazard (row) must be **deleted**, then leave the ID next to the empty row and identify it as <Deleted V##>, including the version # of the revision in which it was deleted, and include the ID# in the 'History of document' sheet.
If a hazard (row) must be **revised**, be sure to include the ID# in the 'History of document' sheet and describe what was changed.
If a hazard (row) must be **added**, please add it at the bottom of the appropriate section, provide the appropriate ID#, and include this information in the 'History of document' sheet.

Remember, when you make changes to this document, that the SPRA ID numbers tie the specific hazards back to the danger/hazard statement codes used in previously published procedures.

The SPRA is in an approved version, which everybody can use/read.
The SPRA is also in a draft version for current editing. Authorisations: See DMS 'Authorisations' tab.

DMS roles
User: FLEPE
Language reviewer: GIROH
QSE reviewer: JAHUA
Approver: LAOD

Authorisations created in order to protect the document:
01O 50000096 = Vestas All
01O 60033033 = QSE Engineering Center
01O 60138340 = SME
01O 70000000 = MHI Vestas Offshore



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Standardised procedure risk assessment (SPRA)

1. This tool is designed to be the primary source to identify risks to all field personnel who do work on Vestas wind turbines. The procedure may call out a second PRA as necessary.
2. This tool should also be the source for the danger/hazard statements placed in the procedures.
3. To select the relevant 'Standardised procedure risk assessment' topic, click the 'Risk assessment topic' below and get access to a number of examples and their SPRA ID number to reference in the procedure.

Section no.	Risk assessment topic	Area covered
0	PRA Definitions	• Descriptions and definitions of PRA columns, and 'Likelihood' and 'Severity' ratings.
1	Working at Height	• Hazard of falling from one level to another including working on mobile platforms, working on ladders, scaffolds, nacelle roof, hub, etc.
2	Working with Chemicals	• Working with chemicals on site.
3	Working on Electrical Systems	• Working with electrical systems like transformers, switchgear, HV-cables, UPS, batteries, static electricity, etc.
4	Working on Pressurised Systems	• Working with hydraulic systems and cooling systems in the wind turbine.
5	Working on Mechanical Systems	• Working with gearbox, brake system, pitch, yaw, generator, coupling, fans, rotor, springs, motors, or rotating parts.
6	Working with Portable ElectricalTools	• Working with electrical power tools or battery-operated, cordless electrical tools.
7	Working with Heat (Hot Work)	• Grinding by means of hot air gun, cutting, drilling, or welding.
8	Working with Hand Tools	• Working with hand tools, e.g. knives, screwdrivers, hammers, torque bars, etc.
9	Working with Pneumatic/Hydraulic Tools	• Working with torque wrench or impact wrench.
10	Prevention of Explosive Atmosphere (ATEX)	• Working with or near solvents, inflammable chemicals, or in explosive dust atmospheres.
11	Painting on Site	• Painting of tower sections on site in connection with transport damage. • Repair of blade damage, spray painting, etc.
12	Fibreglass Work on Site	• Repair of nacelle cover including cutting or drilling in hardened materials.
13	Epoxy Work on Site	• Repair of blade damage including cutting, drilling, or grinding in hardened materials.
14	Manual Item Handling	• Manual carrying, pushing, and pulling of items.
15	Working with Hot Surfaces	• Working close to heater, generator, gearbox oil, slip ring, brake, etc.
16	Working Posture	• Body posture, accessibility of work.
17	Transportation and Storage of Parts on Site	• Transport of individual wind turbine parts on site.
18	Using the Service Crane	• Using winches and internal cranes inside the wind turbine.
19	Crane and Lifting Operations	• Using external cranes and other lifting equipment.
20	Loading and Unloading of Components	• Working with trucks and fork lifts.
21	Use of Service Lift	• Maintenance and use of service lift inside the wind turbine.
22	Weather Conditions	• Weather conditions like thunderstorms and lightning, turbulence, wind pressure, rain, snow, icing, temperatures, etc.
23	Working Environment	• Slippery area, noise, lighting, ventilation, etc.
24	Working in Enclosed Spaces	• Working inside blades, tower basement, or other enclosed spaces.
25	Permanent Magnets & Electromagnets	• Working with permanent magnets and electromagnets.
26	Routine Work	• This RA is created to include all risks that have been identified as routine and standard work.

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PRA column explanations

S: Severity	1. Minor injury, no absence. 2. Reversible injury with absence less than 14 days. 3. Absence more than 14 days due to reversible injury or disease. 4. Absence due to irreversible injury or disease. 5. Loss of life.	L: Likelihood	1. Unlikely, not likely to occur. 2. Unlikely, but may occur. 3. Likely, could occur occasionally. 4. More likely, could occur often. 5. Frequently, could occur regularly.
S x L = R	The risk (R) is calculated by multiplying the severity (S) and the likelihood (L)	R: Risk:	1–4 : Low risk. (Green) 5–10: Medium risk. (Yellow) 11-25: High risk. (Red)
Action required:	No or minor risk Attention needed Correction needed	Conditions under assessment	Description of the conditions under assessment, e.g. working near hot parts.
Description of hazard	Description of the identified hazard. The description should cover: a) What could go wrong? (The suspended load could fall). b) Due to what reason? (Due to lifting equipment or accessory failure?). c) The harm that could be the result? (Resulting in severe injury or death?) d) The exposure of the technicians (of technicians working below). E.g. risk of slipping and/or falling from nacelle roof resulting in death of technician.	Severity	Severity of injury caused by the hazard: 1. Injury resulting in first aid*, or no treatment at all. No need for formal medical treatment by registered medical professionals before returning to work. No lost-time injury. Illness causing non-disability. 2. Injury resulting in medical treatment by a physician or registered professional, or restricted work*. 3. Injury resulting in lost-time injury*. Illness causing partial disability. 4. Serious injury according to definition*, or injury preventing staff from returning to work at Vestas. Illness causing permanent disability or reduction in normal life expectancy. 5. Fatal injury. Illness resulting in significant reduction in normal life expectancy. Ensure that the severity rating aligns with the stated hazard.
Likelihood	Likelihood of being exposed to the hazard: 1. Very unlikely. Unusual sequence/coincidence. Can occur but is hard to imagine. Historically evident that it is impossible to completely eliminate this risk. 2. Unlikely. Can occur but similar events are not common. 3. Possible similar events have occurred. 4. Likely. Could happen any time. 5. Very likely. Almost certain. Happens as a regular occurrence.	Result	Result of risk evaluation. Severity X Likelihood = Result
Action required	Description of what kind of action is required due to the result of the risk evaluation. NOTE: Will be filled in automatically.		Red risk indicates that additional measures must be employed to either eliminate or reduce the risk associated with this task.
			Yellow risk indicates that additional measures to reduce risk are warranted.
			Green risk indicates that no additional actions to reduce risk are necessary.
Action to reduce risk	Describe the risk-reducing action.	Residual hazard	Any hazard remaining after risk reduction is implemented, or risk remaining after protective measures are taken. The residual hazard assumes that all instructions and rules will be obeyed correctly. Most often, the residual hazard is similar to or identical with the original hazard. Do not specify how much (minimised or reduced).
Type of hazard		How to avoid	
Result	Result of the risk evaluation after the risk-reducing action is implemented.	Reference	References to other documents e.g. a DMS document or a supplier manual.
			*) Denotes a word or phrase that is defined in 0041-0451 'Incident definitions'.

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Section 1: Working at height

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction: Type of hazard	Statements to be transferred to the work instruction: How to avoid	Reference
1.01	Working at height down-tower. (On nacelle roof prior to installation, locations over 2 m above ground level but close enough to ground for fast rescue).	Risk of falling resulting in severe injuries.	4	2	8	Attention needed	• Do not work at height exceeding 2 m from the ground without wearing appropriate PPE attached to approved anchor points. • Use a ladder or man basket, as needed. • Ensure that no persons are present in areas where overhead work is being performed. • Use required PPE: Wear PPE according to PPE sheet '8'.	Risk of a fall from height with properly worn personal fall arrest equipment causing suspension trauma resulting in injuries.	4	1	4	Risk of falling to the ground	• Wear PPE according to PPE sheet '8'. • Ensure no persons are present in areas where overhead work is being performed.	
1.02	Working at height in the tower. (From tower ladder, service lift or other locations allowing for fast rescue).	Risk of falling from height resulting in severe injury or death.	5	2	10	Attention needed	• Use required PPE attached to approved anchor points, slides, or cables. • Follow the rules for working at height according to local regulations. • Ensure that no persons are present in areas where overhead work is being performed. • Use required PPE: Wear PPE according to PPE sheet '8'. • Ensure that all platform hatches are closed, when not in use.	Risk of a fall from height with properly worn personal fall arrest equipment causing suspension trauma resulting in injuries.	5	1	5	Risk of falling to the ground	• Wear PPE according to PPE sheet '8'. • Ensure no persons are present in areas where overhead work is being performed.	
1.03	Working at height inside the nacelle. (With open service hatch).	Risk of falling from height resulting in severe injury or death.	5	2	10	Attention needed	• Use required PPE attached to approved anchor points. • Follow the rules for working at height according to local regulations. • Ensure that no persons are present in areas where overhead work is being performed. • Use required PPE: Wear PPE according to PPE sheet '8'.	Risk of a fall from height with properly worn personal fall arrest equipment causing suspension trauma resulting in death.	5	1	5	Risk of falling to the ground	• Wear PPE according to PPE sheet '8'. • Ensure no persons are present in areas where overhead work is being performed.	
1.04	Working at height on the nacelle roof.	Risk of falling from the nacelle/hub roof resulting in severe injury or death.	5	2	10	Attention needed	• Do not work during extreme weather conditions. • Use required PPE attached to approved anchor points. • Verify that the appropriate LOTO procedures are complete before working on the nacelle roof. • Follow the rules for working at height according to local regulations. • Close and secure all roof access points to prevent falling into the skylight. • Ensure, by setting up a perimeter and providing signage, that no persons are present in areas where overhead work is being performed. • Use required PPE: Wear PPE according to PPE sheet '8'.	Risk of a fall from height with properly worn personal fall arrest equipment causing suspension trauma resulting in death.	5	1	5	Risk of falling to the ground	• Wear PPE according to PPE sheet '8'. • Ensure no persons are present in areas where overhead work is being performed.	
1.05	Repair and maintenance work from mobile platform or man basket.	Risk of falling from the platform, due to leaning over or failure of equipment, resulting in severe injury or death.	5	2	10	Attention needed	• It is only allowed to use man baskets and lifts made for personnel use. • The mobile platform must be stable on the ground. • Technicians working from a mobile platform or man baskets must be secured by personal fall arrest equipment. • Follow the mobile platform supplier's instructions. • Platforms must have full-edge protection. • Ensure that guard rails and toe boards are in place. • Inspect the personal fall arrest equipment prior to use to ensure its good condition. • Use required PPE: Wear PPE according to PPE sheet '8'. • The turbine must be locked to avoid all movement if the mobile platform or man basket will be in the turbine's area of movement. • A guiding rope must be used to maintain the position of the man basket.	Risk of a fall from height with properly worn personal fall arrest equipment causing suspension trauma resulting in death.	5	1	5	Risk of falling to the ground	• Wear PPE according to PPE sheet '8'. • Follow the mobile platform supplier's instructions.	
1.06	Repair and maintenance work from overhead.	Risk of falling objects (hand tools, parts, etc.) resulting in injury or death of technicians working below.	5	3	15	Correction needed	• Do not carry loose parts or tools in hands or in open pockets. • Small equipment must be carried in a closed tool bag designed for the purpose, carried on the back or attached to the personal full-body harness. • Tools and parts must be secured with ropes when working in elevated areas. • Tools and parts must be secured by both parties when handed from one person to another. • Ensure that no persons are present in areas where overhead work is being performed.	Risk of falling objects (hand tools, parts, etc.) resulting in injury or death of technicians working below.	5	1	5	Risk of falling objects (hand tools, parts, etc.)	• Do not carry loose parts or tools in hands or in open pockets. • Ensure that no persons are present in areas where overhead work is being performed.	
1.07	Approaching the hub on the turbine exterior.	Risk of falling from the hub or nose cone resulting in severe injury or death.	5	2	10	Attention needed	• Use required PPE: Wear PPE according to PPE sheet '8'. • Always wear personal fall arrest equipment with two lanyards. At least one of the lanyards must be attached to an approved anchor point before approaching the hub on the outside of the hub or nose cone. • If there are no approved anchor points, an appropriate, approved, retractable lanyard may be used. • Rotor and pitch lock must be applied at all times when approaching the hub.	Risk of falling from height with properly worn personal fall arrest equipment causing suspension trauma resulting in death.	5	1	5	Risk of falling to the ground	• Wear PPE according to PPE sheet '8', attached to approved anchor points.	

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1.08	Working inside the hub with one blade pointing downwards.	Risk of falling into the blades resulting in severe injuries or death.	5	2	10	Attention needed	• Only remove the manhole covers in blade bearings when the technicians have secured personal fall arrest equipment to an approved anchor point. • If only one manhole cover is provided in the hub, it must be installed on the downward blade prior to removal of personal fall arrest equipment. • Use the blade manhole cover to secure the opening that is pointing down.	Risk of falling into blades with properly worn personal fall arrest equipment causing suspension trauma resulting in severe injuries.	5	1	5	Open manhole covers	• Wear PPE according to PPE sheet '8', attached to approved anchor points. • Always install manhole cover on the blade pointing downwards.	
1.09	Working inside the hub with the nose cone open.	Risk of falling out of the nose cone resulting in severe injury or death.	5	2	10	Attention needed	• Only open the nose cone when the technicians present are wearing personal fall arrest equipment attached to an approved anchor point.	Risk of a fall from height with properly worn personal fall arrest equipment causing suspension trauma resulting in death.	5	1	5	Risk of falling to the ground	• Wear PPE according to PPE sheet '8', attached to approved anchor points.	
1.10	Removing and installing nacelle roof panels.	Risk of roof panel collapse causing technician to fall resulting in severe injuries or death.	5	2	10	Attention needed	• Use required PPE: Wear PPE according to PPE sheet '8'. • Complete the installation of the rear roof panel before accessing the roof.	Risk of a fall from height with properly worn personal fall arrest equipment causing suspension trauma resulting in death.	5	1	5	Risk of roof panel collapse	• Wear PPE according to PPE sheet '8', attached to approved anchor points.	
1.11	Using scaffolding.	Risk of falling from height, due to improper scaffolding assembly or use, resulting in death.	5	3	15	Correction needed	• Use approved scaffolding with railing that fulfils local requirements. • Scaffolding must be installed by trained personnel.	There is still a small risk of mismounting the scaffold is still a risk even as the scaffold is mounted by a personnel.	5	1	5	Risk of falling to the ground	• Use approved scaffolding with railing that fulfils local requirements and is installed by trained personnel.	
	Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 1.75	Recovering from a fall from heights.	Risk of a fall from heights with properly worn personal fall arrest equipment resulting in suspension trauma, resulting in severe injury or death.	5	3	15	Correction needed	• Minimum 2 persons must have GWO basic safety training. • Always notify first responders, rescue personnel, and ambulance staff of the possibility of suspension trauma.	Risk of suspension trauma.	5	1	5	Risk of falling from height	• Minimum 2 persons must have GWO basic safety training	
RW 1.76	Working from a portable ladder.	Risk of falling from ladder resulting in significant injuries.	3	3	9	Attention needed	• Evaluate if the job is suitable for being performed from a portable ladder. • Do not move or shift a ladder while a person or equipment is on the ladder. • Do not use the top step/rung of a ladder as a step/rung, unless it was designed for that purpose. • Do not exceed the maximum load rating of a ladder. • Inspect the ladder prior to use to ensure that it is in good condition. • Use a ladder only on a stable and level surface, unless it has been secured (top or bottom) to prevent displacement. • Ladders must be free of any slippery material on rungs, steps, or shoes. • Always maintain a 3-point contact (two hands and one foot, or two feet and one hand) on the ladder when climbing. • Keep body near the middle of the step and always face the ladder while climbing. • Be sure that all locks on an extension ladder are properly engaged.	Risk of falling from height	3	2	6	Risk of falling from height	• Evaluate if the job is suitable for being performed from a portable ladder.	
RW 1.77	Climbing the ladder inside the tower.	Risk of falling from heights resulting in severe injury or death.	5	3	15	Correction needed	• Always wear personal fall arrest equipment. • If there is a permanently installed ladder fall protection device, it must be utilised.	Risk of suspension trauma	5	1	5	Risk of falling from height	• Always wear personal fall arrest equipment.	

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Section 2: Working with Chemicals

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
2.01	Hazardous chemical ???.	<<Copy the H-statement or R-phrase from the 3E Online SDS database>>	3	2	6	Attention needed	• Read and comply with PPE sheet ?? and relevant SDS. 2.01 is not recommended to be used. Use instead 2.02 fro chemical hazards	There is always a risk of unintentional exposure to the hazardous substances and mixtures due incorrect use of PPE.	3	1	3	Risk of exposure to hazardous substances and mixtures	• Read and comply with PPE sheet ?? and relevant SDS.	
2.02	Hazardous chemical ???.	<<Copy the H-Statement or R-Phrase from the 3E Online SDS database>>	3	2	6	Attention needed	• Read and comply with PPE sheet ?? and relevant SDS.	There is always a risk of unintentional exposure to the hazardous substances and mixtures due incorrect use of PPE.	3	1	3	Risk of exposure to hazardous substances and mixtures	• Read and comply with PPE sheet ?? and relevant SDS.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														

NB: Please follow the below-mentioned instructions for risk assessment of chemicals:
1) If you have a new chemical to introduce, follow the process in the VPP under "Business Support Processes - Sustainability Management - Management of Chemicals and Dangerous Goods - Release chemical for purchase" (SUS-CHM-CRP).
2) For instructions and examples on how to insert chemical warnings in Service Work Instructions, see 0001-6937 'Use of Chemicals in Service Work Instructions – a Guideline'.
3) In the Service Work Instruction (SWI), insert a hazard statement whose title is the name of the chemical. If a PPE sheet can be referenced, use SPRA ID No. 2.02 and identify the proper PPE sheet. Otherwise, use SPRA ID No. 2.01.

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Section 3: Working on Electrical Systems

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
3.01	Working with HV/LV equipment.	Risk of exposure to electric shock from contact with live circuits and/or risk of arcing, flashover, fire, and explosion from loose connections, resulting in severe injuries or	5	3	15	Correction needed	• Follow the appropriate LOTO procedures. • Only qualified persons are allowed to work with HV/LV cables or equipment. • Use required PPE according to PPE sheets 5 and 6. • De-energise/isolate the working place before starting to work. • Use HV/LV electricity measuring tools to measure zero voltage before beginning work. • Use certified and correct equipment.	Risk of exposure to electric shock resulting in injuries.	5	1	5	Risk of exposure to live circuits or short circuits	• Follow the appropriate LOTO procedures. • Only qualified persons are allowed to work with HV/LV cables or equipment. • Use required PPE according to PPE sheets 5 and 6.	
3.02	Live electrical work, e.g.: • Fault finding. • Live testing of components, electrical equipment, and apparatus. • Live testing to ensure correct connections (including polarity). • Meter level diagnostics.	Risk of exposure to electric shock from contact with live circuits and or risk of arcing, flashover, fire, and explosion from loose connections resulting in severe injuries or death.	5	3	15	Correction needed	• Use required PPE according to PPE sheet 5 and 6 including: - Long cotton sleeves - Electrical work gloves - Safety goggles / face shield - Electrically insulated safety shoe • Only trained and qualified technicians are allowed to do this work. • Electrical Work Permit / Approval needs to be obtained before starting to work. • Establish safety barriers to keep unprotected personnel out of the arc flash control zone and shock hazard control zones. • Always use non-conducting rubber mat for standing while working. • Electrical safety observer / Second qualified person must be present for all live works. • After completing the work, replace any physical barriers which were removed in order to do the work and remove all tools, equipment, and scrap. • Inform those involved and those nearby, who could have been impacted, that the work has been completed and conditions are safe after completing the work.	Risk of exposure to electric shock resulting in injuries.	3	1	3	Risk of exposure to live circuits or short circuits	• Use required PPE according to PPE sheet 5 and 6. • Only trained and qualified technicians are allowed to do this work. • Electrical Work Permit / Approval needs to be obtained before starting to work. • Electrical safety observer / Second qualified person must be present for all live works.	
3.03	Using an external generator.	Risk of exposure to electric shock from contact with live circuits and/or risk of arcing, flashover, fire, and explosion from loose connections resulting in severe injuries or death.	5	3	15	Correction needed	• Do not connect the generator before switching off the appropriate breaker including removing the UPS power cable and all other sources of power. • Follow the appropriate LOTO procedures. • Follow the manufacturer's instructions for safe wiring connection and operation. • Use required PPE according to PPE sheets 5 and 6. • Use HV/LV electricity measuring tools to measure zero voltage before connecting the generator. • Use certified and correct equipment. • Protect power cords from wet, muddy conditions. • Use HV/LV electricity measuring tools to validate and verify LOTO boundaries after the installation of an external generator. • Ensure that the generator is properly earthed to clean, rust-free, and paint-free surface and in accordance with local codes.	Risk of exposure to electric shock resulting in injuries.	5	1	5	**SPRA 3.03** Risk of exposure to live circuits or short circuits	• Be aware that the use of an external generator will change the LOTO boundaries, which means that already established lockouts could be violated. • Do not connect the generator before switching off the appropriate breaker including removing the UPS power cable and all other sources of power. • Follow the appropriate LOTO procedures. • Follow the manufacturer's instructions for safe wiring connection and operation. • Use required PPE according to PPE sheets 5 and 6.	
3.04	Connecting to the grid when performing scheduled service.	Risk of exposure to electric shock, arcing, flashover, fire, and explosion resulting in severe injuries and death.	5	3	15	Correction needed	• All personnel remaining in the tower must use the required PPE sheet 8. • Evacuate the nacelle. • Only the switchgear operator and authorised subcontractors or representatives from the responsible power company may stay in the tower during grid connection. • Personnel remaining in tower must move to the yaw deck or lower level and be dressed in fall protection equipment ready to descend. • Personnel remaining on yaw deck must have the descent equipment attached for immediate use for the nacelle descent.	Risk of exposure to trauma due to arc flash resulting in injuries.	5	1	5	Risk of exposure to live circuits or short circuits	All personnel remaining in the tower must use the required PPE sheet 8.	

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3.05	Entering the transformer room.	Risk of exposure to electric shock, arcing, flashover, fire, and explosion resulting in severe injuries and death.	5	3	15	Correction needed	• Do not enter the transformer room before the high-voltage supply to the transformer has been disconnected, earthed, and secured against closing. • Follow the appropriate LOTO procedures. • Use required PPE according to PPE sheets 5 and 6 when disconnecting, earthing, and securing against closing. • Use HV/LV electricity measuring tools to measure zero voltage before entering the transformer room.	Risk of exposure to electric shock, arcing, flashover, fire, and explosion resulting in severe injuries and death.	5	1	5	Risk of exposure to electric shock, arcing, flashover, fire, and explosion	• Do not enter the transformer room before the high-voltage supply to the transformer has been disconnected, earthed, and secured against closing. • Follow the appropriate LOTO procedures. • Use required PPE according to PPE sheets 5 and 6	
3.06	Operating the HV switchgear under normal conditions, NOT when connecting to the grid the first time or after a disconnection due to failure!	Risk of exposure to electric shock, arcing, flashover, fire, and explosion resulting in severe injuries and death.	5	3	15	Correction needed	• All personnel must use the required PPE. Make sure that the conditions for operating the switchgear are fulfilled: • Follow the manufacturer's operating instructions for the relevant switchgear. • Check that the gas insulation level on the pressure indicator is in the green area before operating the HV switchgear. • Make sure that all temporary earthing is removed, and that the transformer room is locked. Bring all personnel to a safe position before operating the switchgear: • Evacuate the nacelle. • Personnel in the tower must move to the yaw deck or a lower level, must wear safety harness and be ready to descend. • Only the switchgear operator and authorised subcontractors or representatives from the responsible power company must stay in the bottom of the tower during the grid connection. • Operate the switchgear remotely, if possible.	Risk of exposure to electric shock resulting in death of technicians.	5	1	5	Risk of exposure to electric shock, arcing, flashover, fire, and explosion	All personnel must use the required PPE.	
3.07	Service work on the switchgear circuit breaker.	Risk of exposure to electric shock, arcing, flashover, fire, and explosion resulting in severe injuries and death.	5	3	15	Correction needed	• Follow the appropriate LOTO procedures. • Use required PPE according to PPE sheets 5 and 6. • Do not work on live circuits. • Ensure that the turbine grid power supply is opened, earthed, and secured against closing at the substation. • Ensure that the switchgear circuit breakers are open, earthed, and secured against closing. • Verify that the high-voltage power supply from the substation is de-energised before starting the work.	Risk of exposure to electric shock, arcing, flashover, fire, and explosion	5	1	5	Risk of exposure to electric shock, arcing, flashover, fire, and explosion	• Follow the appropriate LOTO procedures. • Use required PPE according to PPE sheets 5 and 6.	
3.08	Service work on circuits that have backup UPS power.	Risk of exposure to electric shock, if backup power from the UPS is not disconnected during servicing, resulting in severe injuries.	4	3	12	Correction needed	• Follow the appropriate LOTO procedures. • Use required PPE according to PPE sheets 5 and 6. • Only qualified personnel are allowed to perform the work. • Turn off the UPS. • Use HV/LV electricity measuring tools to measure zero voltage before beginning work. • Use certified and correct equipment, cables, and tools.	Risk of exposure to electric shock, if backup power from the UPS is not disconnected during servicing	4	1	4	Risk of exposure to electric shock	• Follow the appropriate LOTO procedures. • Use required PPE according to PPE sheets 5 and 6.	
3.09	Working with UPS batteries.	Risk of chemical burns resulting from contact with spilled battery acid.	3	3	9	Attention needed	• Follow the appropriate LOTO procedures. • Use required PPE according to PPE sheets 5 and 6 including protective face shield, gloves, and clothing. • Read the SDS for the battery chemicals prior to beginning work. • Keep the batteries in an upright position. • Electrolytics must be cleaned up according to the SDS immediately, if spilled.	Risk of chemical burns resulting from contact with spilled battery acid.	3	1	3	Risk of exposure to chemicals	Follow the appropriate LOTO procedures. Use required PPE according to PPE sheets 5 and 6.	
3.10	Static electricity.	Risk of exposure to electric shock resulting in severe injuries.	4	2	8	Attention needed	• Use earthing and connection to discharge the static electricity. • Use HV/LV electricity measuring tools to measure zero voltage before beginning work. • Use certified and correct tools and equipment. • Use required PPE according to PPE sheet 7.	Risk of exposure to electric shock	4	1	4	Risk of exposure to electric shock	• Use required PPE according to PPE sheet 7.	
3.11	Testing the turbine.	Risk of electrical test failure resulting in electric shock, arcing, flashover, fire, and explosion resulting in severe injuries and	5	3	15	Correction needed	• Ensure that no persons are present in the indicated area during the test.	Risk of electrical test failure resulting in electric shock, arcing, flashover, fire, and explosion	5	1	5	Risk of electrical test failure resulting in electric shock, arcing, flashover, fire, and explosion	• Ensure that no persons are present in the indicated area during the test.	
3.12	Noisy environment.	Risk of exposure to noise level above 80 dB(A) resulting in hearing damage.	3	5	15	Correction needed	• Wear appropriate hearing protection when working near equipment with high noise levels (prolonged exposure to 80 dB(A) or more). • Ensure that everyone in the work area is appropriately protected.	Risk of exposure to noise level above 80 dB(A)	3	1	3	Risk of loud noise	• Wear appropriate hearing protection	

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3.13	Working on slip rings.	Risk of exposure to metallic dust created by the slip ring resulting in lung injuries.	3	3	9	Attention needed	• Wear appropriate PPE according to PPE sheet 'S' to prevent inhalation and eye injuries. • Ensure that everyone in the work area is appropriately protected. • Ensure that slip rings are completely dry from any liquid cleaners before energising.	Risk of exposure to metallic dust.	3	1	3	Exposure to metallic dust.	• Wear appropriate PPE according to PPE sheet 'S'.	
3.14	Working with HV/LV equipment that requires time to discharge after shut-down.	Risk of exposure to electric shock from contact with live circuits and or risk of arcing, flashover, fire, and explosion resulting in severe injuries or death.	5	3	15	Correction needed	• Follow the appropriate LOTO procedures. • Only qualified persons are allowed to work with HV/LV equipment. • De-energise/isolate the working place before starting to work. • Use HV/LV electricity measuring tools to measure zero voltage before beginning work. • Use certified and correct equipment. • Use required PPE according to PPE sheets 5 and 6. • Wait for 5 minutes before removing covers.	Risk of exposure to electric shock from contact with live circuits and or risk of arcing, flashover, fire, and explosion.	5	1	5	Risk of exposure to live circuits or short circuits	• Follow the appropriate LOTO procedures. • Use required PPE according to PPE sheets 5 and 6.	
3.15	Working on the LCTU.	Risk of exposure to electric shock from static discharge while working on the LCTU.	5	3	15	Correction needed	• Use appropriate PPE according to PPE sheet 7 • Ensure that the discharge cable is connected prior to working on the LCTU. • Ensure that the LCTU is completely operational prior to removal of the discharge cable. • If LCTU repairs cannot be completed, or if the LCTU is removed for other reasons, a jumper cable must be installed inside the blade before the discharge cable is removed. DO the same for the car.	Risk of exposure to electric shock from static discharge while working on the LCTU.	5	1	5	Risk of exposure to electric shock	• Use appropriate PPE according to PPE sheet 7	
3.16	Testing the Vestas Overspeed Guards.	Risk of catastrophic turbine failure or flying parts inside the nacelle resulting in serious injuries or death.	5	2	10	Attention needed	• Ensure that all protective covers are bolted in place prior to starting the test. • Use VOG testing tool unless the turbine has a safety system where the test is done by reducing rpm usint the control system. • Depending on the test methods take the necessary precautions. Do not stay in the Nacelle when the turbine is running.	Risk of being struck by flying parts	5	1	5	Risk of being struck by flying parts	• Ensure that all protective covers are bolted in place prior to starting the test.	
3.17	Accessing the HV transformer room.	Risk of exposure to electric shock from contact with live circuits and/or risk of arcing, flashover, fire, and explosion resulting in severe injuries or death.	5	3	15	Correction needed	• Never work in the transformer room while the transformer is energised. • Switch off the high-voltage switchgear. • Connect the switchgear to earth. • Lockout-tagout the switchgear against unintended re-closing. • If external generator is utilised, lockout-tagout to prevent back-feed. • Establish temporary earthing of the HV transformer in the nacelle.	Risk of exposure to electric shock	5	1	5	Risk of exposure to electric shock from contact with live circuits.	• Never work in the transformer room while the transformer is energised.	
3.18	Working in or near the HV transformer room.	Risk of exposure to electric shock from contact with live circuits and/or risk of arcing, flashover, fire, and explosion resulting in severe injuries or death.	5	3	15	Correction needed	• The transformer must not be energised • If working above the transformers, place a piece of plastic on top of the transformer to protect the windings. • Be careful not to drop bolts, washers, or other parts into the windings. • Carefully check that no foreign objects are left in the transformer room once work is completed. • Ensure transformers are completely dry after cleaning prior to energising.	Risk of exposure to electric shock	5	1	5	Risk of exposure to electric shock from contact with live circuits	• The transformer must not be energised	
3.19	Service work on systems requiring isolation of switchgear circuit breakers.	Risk of exposure to electric shock, arcing, flashover, fire, and explosion resulting in severe injuries and death.	5	3	15	Correction needed	• Do not work on live circuits. • Follow the appropriate LOTO procedures. • Only qualified personnel are allowed to perform the work. • Ensure that the switchgear circuit breakers are open, earthed, and secured against closing. • Use HV/LV electricity measuring tools to measure zero voltage before beginning work. • Use certified and correct equipment. • Use required PPE according to PPE sheets 5 and 6.	Risk of exposure to electric shock, arcing, flashover, fire, and explosion	5	1	5	Risk of exposure to electric shock, arcing, flashover, fire, and explosion	• Do not work on live circuits.	
3.20	Working in a location where there is the potential of exposure to incident energy (arc flash).	Risk of exposure to arcing, flashover, fire, and explosion resulting in severe injuries or	5	2	10	Attention needed	• Use required PPE according to PPE sheet 5. • Establish safety barriers to keep personnel at a safe distance from potential incident energy (arc flash). • When it is useful, de-energise/isolate the source of incident energy.	Risk of exposure to arcing, flashover, fire, and explosion resulting in severe injuries.	5	1	5	Risk of exposure to arcing, flashover, fire, and explosion resulting in severe	• Use required PPE according to PPE sheet 5.	
3.21	Working on circuit breakers with a motor- or manually-charged activation spring.	Risk of unexpected re-energisation resulting in crushed fingers and exposure to electric shock, arcing, flashover, fire, and explosion resulting in severe injuries or	5	3	15	Correction needed	• Follow the appropriate LOTO procedures. • Use required PPE according to PPE sheets 5 and 6. • Only qualified persons are allowed to work with HV/LV cables or equipment. • De-energise/isolate the working place before starting to work. • Discharge the circuit breaker activation spring before starting to work. • Use HV/LV electricity measuring tools to measure zero voltage before beginning work. • Use certified and correct equipment.	Risk of exposure to arcing, flashover, fire, and explosion resulting in severe injuries.	5	1	5	Risk of exposure to arcing, flashover, fire, and explosion resulting in severe injuries.	• Follow the appropriate LOTO procedures. • Use required PPE according to PPE sheets 5 and 6.	

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3.22	Operating the HV switchgear when connecting to the grid the first time or after a disconnection due to failure	Risk of exposure to electric shock, arcing, flashover, fire, and explosion resulting in severe injuries and death.	5	3	15	Correction needed	• All personnel must use the required PPE sheet 5 and 6. • Make sure that the conditions for operating the switchgear are fulfilled. • Follow the manufacturer's operating instructions for the relevant switchgear. • Check that the gas insulation level on the pressure indicator is in the green area before operating the HV switchgear. • Make sure that all temporary earthing is removed, and that the transformer room is locked. • Bring all personell to a safe position outside the turbine before operating the switchgear. • Only the switchgear operator and authorised subcontractors or representatives from the responsible power company must stay in the bottom of the tower during switching to the grid. • Operate the switchgear remotely, if possible.	Risk of exposure to arcing, flashover, fire, and explosion resulting in severe injuries.	5	1	5	Risk of exposure to arcing, flashover, fire, and explosion resulting in severe injuries.	• All personnel must use the required PPE sheet 5 and 6.	

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Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 3.75	Using power tools.	Risk of exposure to electric shock resulting in injury or death of technician.	5	2	10	Attention needed	• Follow the manufacturer's instructions. • Do not remove protective guards. • Prior to use, inspect all power tools for defects, loose parts, altered safety devices, and worn or defective power cords. • Earth or double-insulate power tools according to local regulations. • Unplug tools when not in use.	Risk of electric shock	5	1	5	Risk of electric shock	• Follow the manufacturer's instructions.	
RW 3.76	Service work on signaling and communication circuits (sensors and ethernet connections).	No risk of exposure to electric shock from these voltages.	1	1	1	None								
RW 3.77	Welding and cutting work.	Risk of exposure to electric shock, arcing, flashover, fire, and explosion, resulting in severe injuries and death.	5	2	10	Attention needed	• Use correct equipment, cables, and tools. • Only qualified personnel are allowed to perform welding and cutting work. • Provide correct return path while welding. • Unplug tools which are not going to be used. • Remove all combustible or flammable material.	Risk of electric shock	5	1	5	Risk of electric shock	• Use correct equipment, cables, and tools.	
RW 3.78	Working on hot components.	Risk of burns resulting in injuries.	2	4	8	Attention needed	• Use required PPE according to PPE sheet 3.	Risk of contact with hot parts	2	1	2	Risk of contact with hot parts	• Use required PPE according to PPE sheet 3.	
RW 3.79	Unintended remote turbine operation.	Risk of unintended electrical or mechanical hazards resulting in death if the turbine is remotely activated during service work.	5	3	15	Correction needed	• Ensure that the turbine cannot be controlled or operated remotely during this procedure.	Risk of electric shock and crushing	5	1	5	Risk of electric shock and crushing	• Ensure that the turbine cannot be controlled or operated remotely during this procedure.	
RW 3.80	Turbine stop caused by an unknown error.	Risk of unknown electrical or mechanical hazards resulting in death.	5	2	10	Attention needed	• Do not enter the turbine until the error has been identified and trained personnel have been consulted. • Follow the general safety rules and instructions. • Use required PPE according to the situation.	Risk of electric shock and crushing	5	1	5	Risk of electric shock and crushing	• Do not enter the turbine until the error has been identified and trained personnel have been consulted.	
RW 3.81	Using a pressure washer.	Risk of injury due to incorrect use of the tool.	3	2	6	Attention needed	• Follow the manufacturer's instructions. • Do not dismantle the system without releasing the pressure. • Ensure safe and easy access to the area being cleaned. • Use required PPE.	Risk of injury with contact to high pressure liquid	3	1	3	Risk of injury with contact to high pressure liquid	• Follow the manufacturer's instructions.	

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Section 4: Working on Pressurised Systems

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction: Type of hazard	Statements to be transferred to the work instruction: How to avoid	Reference
4.01	Connecting and using pressure gauges.	Risk of injury, if a low-range pressure gauge is connected in a higher-range pressure connector.	4	2	8	Attention needed	• Use required PPE which include Safety glasses, cut resistant gloves • Switch off the pump. • Always carry low-range and high-range pressure gauge when servicing the hydraulic power unit. • Always connect the high-range pressure gauge first. • If oil is spilled, clean up immediately to avoid slip/fall hazard.	Risk of being struck by flying parts	4	1	4	Risk of being struck by flying parts	• Use required PPE which include Safety glasses, cut resistant gloves	
4.02	Service and maintenance of hydraulic pumps.	Risk of unintended starting of pump leading to crushed fingers.	4	2	8	Attention needed	• Follow the appropriate LOTO procedures. • Make sure that the circuit breaker is switched off and mechanically locked. • Ensure that the ball valves are closed.	Risk of crushed fingers	4	1	4	Risk of crushed fingers	• Follow the appropriate LOTO procedures.	
4.03	Service and maintenance of hydraulic pumps.	Risk of direct contact with hot oil leading to burn injury.	3	2	6	Attention needed	• Use required PPE according to PPE sheet G and 3. • Avoid direct contact with hydraulic oil. • Switch off the pump. • Release the stored pressure in hoses, pipes, or storage tank.	Risk of exposure to hot oil	3	1	3	Risk of exposure to hot oil	• Avoid direct contact with hydraulic oil. • Use required PPE according to PPE sheet G and 3.	
4.04	Refilling hydraulic oil / taking samples.	Risk of splashing of oil on body/face.	2	2	4	None								
4.05	Refilling hydraulic oil / taking samples.	Risk of spillage of oil when opening the hoses creating a slip/fall hazard.	3	2	6	Attention needed	• Clean spilled oil immediately. • De-pressurise the hydraulic system (also accumulators). • Before removing the hoses, completely drain the oil from the system.	Risk of slip/fall due to slippery surface	3	1	3	Risk of slip/fall due to slippery surface	• Clean spilled oil immediately	
4.06	Hydraulic oil under high pressure.	Risk of piercing injury injuries to body or face from pressurised oil.	4	2	8	Attention needed	• Use required PPE which include Safety glasses, cut resistant gloves. • Clean spilled oil immediately • Switch off the pump. • Release the stored pressure in hoses/pipes/components. • Verify that there is no pressure in the hydraulic system before disconnecting hoses/pipes/components from the system.	Risk of piercing injury injuries to body or face from pressurised oil.	4	1	4	Risk of piercing injury injuries to body or face from pressurised oil.	• Use required PPE which include Safety glasses, cut resistant gloves. • Clean spilled oil immediately	
4.07	Moving the pitch cylinders.	Risk of severe crushing injuries to technicians in the hub.	4	3	12	Correction needed	• Ensure that no persons are present in the hub during movement of the pitch system.	Risk of severe crushing injuries.	4	1	4	Risk of severe crushing injuries.	• Ensure that no persons are present in the hub during movement of the pitch system.	
4.08	Operating the turning gear.	Risk of uncontrolled movement of the hub due to broken turning gear hydraulic motor resulting in death of technician.	5	3	15	Correction needed	• Do not operate the turning gear without all hydraulic motors installed.	Risk of severe crushing injuries.	5	1	5	Risk of severe crushing injuries.	• Do not operate the turning gear without all hydraulic motors installed.	
4.09	Hot oil.	Risk of burns from contact with hot oil.	2	4	8	Attention needed	• Avoid direct contact with hot oil. • Use required PPE according to PPE sheet G and 3.	Risk of burns from contact with hot oil.	2	3	6	Risk of burns from contact with hot oil.	• Avoid direct contact with hot oil. • Use required PPE according to PPE sheet G and 3.	
4.10	Working with pressurised systems.	Risk of injuries from contact with high-pressure air or fluids.	4	3	12	Correction needed	• Use required PPE which include Safety glasses, cut resistant gloves. • Follow the appropriate procedures for releasing the pressure in the system before opening any system connections or ports.	Risk of skin and eye damage injuries from contact with high-pressure air or fluids.	4	1	4	Risk of skin and eye damage injuries from	• Use required PPE which include Safety glasses, cut resistant gloves.	
4.11	Replacing hoses or fittings.	Risk of injuries from contact with pressurised oil and/or hot oil.	4	3	12	Correction needed	• Use required PPE which include Safety glasses, cut resistant gloves. • Follow the appropriate procedures for releasing the pressure in the system before replacing a hose or fitting. • Drain the fluid from the system before performing the procedure if the part being	Risk of skin and eye damage injuries from contact with high-pressure air or fluids.	4	1	4	Risk of skin and eye damage injuries from contact with high-	• Use required PPE which include Safety glasses, cut resistant gloves.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 4.75	Using a pressure washer.	Risk of injury due to incorrect use of the tool.	3	2	6	Attention needed	• Follow the manufacturer's instructions. • Do not dismantle the system without releasing the pressure. • Ensure safe and easy access to the area being cleaned. • Use required PPE.	Risk of injury with contact to high pressure liquid	3	1	3	Risk of injury with contact to high pressure liquid	• Follow the manufacturer's instructions.	
RW 4.76	Using air pressure (air compressors, vaccums, etc.)	Risk of eye injuries from airborne fluids, dirt, metal shavings, or the like, resulting in eye injuries or penetrating injuries.	3	4	12	Correction needed	• Do not use more pressure than is needed to solve the task. • Use required PPE according to PPE sheet S. • Shield the work area to prevent injuries to other technicians.	Risk of eye injury	3	1	3	Risk of eye injury	• Do not use more pressure than is needed to solve the task. • Use required PPE according to PPE sheet S. • Shield the work area to prevent injuries to other technicians.	

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Section 5: Working on Mechanical Systems

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
5.01	Unintended restarting of wind turbine.	Risk of unintended rotation of parts resulting in crushing injuries.	5	2	10	Attention needed	• Follow the appropriate LOTO procedures. • Stop the wind turbine to avoid unintended starting and remote operation. • Apply the brake prior to removal of covers. • Lock the rotor mechanically prior to removal of covers.	Risk of severe crushing injuries.	5	1	5	Risk of severe crushing injuries.	• Follow the appropriate LOTO procedures.	
5.02	Working near rotating parts on the main shaft.	Risk of getting caught in between the rotating parts leading to fatality.	5	2	10	Attention needed	• Follow the appropriate LOTO procedures. • Stop the wind turbine to avoid unintended starting and remote operation. • Apply the brake prior to removal of covers. • Lock the rotor mechanically prior to removal of covers.	Risk of severe crushing injuries.	5	1	5	Risk of severe crushing injuries.	• Follow the appropriate LOTO procedures.	
5.03	Working near rotating parts on the yaw system.	Risk of getting caught in between the rotating parts leading to major injury.	4	2	8	Attention needed	• Follow the appropriate LOTO procedures. • Stop the wind turbine to avoid unintended starting and remote operation. • Apply the brake prior to removal of covers. • Lock the rotor mechanically prior to removal of covers.	Risk of severe crushing injuries.	4	1	4	Risk of severe crushing injuries.	• Follow the appropriate LOTO procedures.	
5.04	Lubricating rotating parts.	Risk of getting caught in between the rotating parts leading to crushing of body parts.	4	2	8	Attention needed	• Keep all body parts, clothing, accessories, and PPE clear of the rotating parts. • Remove the full-body harness prior to working on rotating parts.	Risk of severe crushing injuries.	4	1	4	Risk of severe crushing injuries.	• Keep all body parts, clothing, accessories, and PPE clear of the rotating parts.	
5.05	Visual inspection of the rotating gearbox.	Risk of getting caught or entangled between rotating parts resulting in serious injury.	4	2	8	Attention needed	• Keep all body parts, clothing, accessories, and PPE clear of the rotating parts. • Remove the full-body harness prior to inspecting rotating parts. • The coupling cover must always be mounted when working on the gearbox. • Two technicians are required to release the brake, run the rotor (only idling), and stop the rotor, in case of emergency. • Remove gearbox cover only after locking the rotor and applying the brake. • Only perform inspection during low wind conditions and when the emergency brake function is available.	Risk of severe crushing injuries.	4	1	4	Risk of severe crushing injuries.	• Keep all body parts, clothing, accessories, and PPE clear of the rotating parts.	
5.06	Un-intended restarting of yaw system.	Risk of getting caught in between the rotating parts leading to major injury.	4	2	8	Attention needed	• Follow the appropriate LOTO procedures. • Lock the rotor mechanically. • Apply the yaw lock.	Risk of severe crushing injuries.	4	1	4	Risk of severe crushing injuries.	• Follow the appropriate LOTO procedures.	
5.07	Un-intended restarting of pitch system.	Risk of getting caught in between the rotating parts leading to fatality.	5	2	10	Attention needed	• Follow the appropriate LOTO procedures. • Lock the rotor mechanically. • Apply the pitch lock.	Risk of severe crushing injuries.	5	1	5	Risk of severe crushing injuries.	• Follow the appropriate LOTO procedures.	
5.08	Unexpected moving parts.	Risk of getting caught in rotating parts resulting in death.	4	2	8	Attention needed	• Keep a safe distance from parts that could move unexpectedly because of an emergency stop.	Risk of severe crushing injuries.	4	1	4	Risk of severe crushing injuries.	• Keep a safe distance from parts that could move unexpectedly because of an emergency stop.	
5.09	Working in the hub or nose cone.	Risk of unintended pitch system movement resulting in severe crushing injuries.	4	3	12	Correction needed	• Do not enter the hub or perform any procedures on the hub or nose cone without performing the appropriate LOTO and ensuring that the pitch system is in a safe state. • Follow the rules for working at height.	Risk of severe crushing injuries.	4	1	4	Risk of severe crushing injuries.	• Do not enter the hub or perform any procedures on the hub or nose cone without performing the appropriate LOTO and ensuring that the pitch system is in a safe state.	
5.10	Removing a yaw motor.	Risk of unintended movement of yaw motor or gears resulting in severe injuries to technicians.	4	2	8	Attention needed	• Do not remove a yaw motor without first releasing any residual energy from the yaw gear.	Risk of severe crushing injuries.	4	1	4	Risk of severe crushing injuries.	• Do not remove a yaw motor without first releasing any residual energy from the yaw gear.	
5.11	Moving the pitch cylinders.	Risk of severe crushing injuries to technicians in the hub.	4	3	12	Correction needed	• Vacate the hub during movement of the pitch system.	Risk of severe crushing injuries.	4	1	4	Risk of severe crushing injuries.		
5.12	Pitch system commissioning or repair.	Risk of catastrophic turbine failure resulting in serious injury or death.	5	2	10	Attention needed	• Do not leave the turbine without locking the blades. • Pitch out the blades as described in the procedure. • Ensure that the locking mandrels on the pitch locks are engaged.	Risk of severe crushing injuries.	5	1	5	Risk of severe crushing injuries.	• Do not leave the turbine without locking the blades.	
5.13	Hot oil.	Risk of burns from contact with hot oil.	2	4	8	Attention needed	• Avoid direct contact with hot oil. • Use required PPE accoding to PPE sheet G and 3.	Risk of burn from hot oil	2	1	2	Risk of burns from contact with hot oil.	• Avoid direct contact with the hot oil. • Use required PPE according to PPE sheet G and 3.	

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5.14	Working on or near rotating parts.	Risk of entanglement resulting in severe injury or death of technician.	5	3	15	Correction needed	• Follow the appropriate LOTO procedures. • Stop the wind turbine to avoid unintended starting and remote operation. • Apply locks, brakes, and/or mechanically prevent all rotation of the parts prior to beginning work.	Risk of severe crushing injuries.	5	1	5	Risk of severe crushing injuries.	• Follow the appropriate LOTO procedures.	
5.15	Reference is made to ID#5.09													Deleted ID #5.09 (Working in the hub) in V10.
5.16	Working near an unshielded permanent magnet generator.	Risk of disruption of medical devices (insulin pump, pacemaker, etc.) or influence upon magnetic materials (Intra Uterine Device [IUD], surgical pin, etc.) resulting in serious injury or death.	5	2	10	Attention needed	• Strong magnetic fields may be encountered when working near the permanent magnet generator with any shielding removed. Personnel are required to know where these hazards are in advance. • Carriers of active implants (for example pacemaker, cochlear implant, insulin pump) must keep a safety distance of at least 0.5 m from the magnetised object. • Carriers of passive implants (for example hip joint, metal implants) may only approach within 0.1 m of the magnetised object after having passed an individual ability test. • Keep loose magnetic materials (for example tools, parts, debris) away from the magnetised object. • All service technicians must undergo specific module training on permanent magnet generator turbines.	Risk of disruption of medical devices	5	1	5	Risk of disruption of medical devices	All personnel with medical devices which can be affected by magnet fields must seek medical advice before entering the turbine.	
5.17	Inspection/test of gearbox, bearings, and generator during operation for unusual noises from rotating parts.	Risk of breaking up of mechanical parts. Risk of short circuits in the electrical system.	5	3	15	Correction needed	• Do not stay in the nacelle while the wind turbine is in operation unless there is a special task to be performed and a special instruction to follow to complete the task.	Risk of running turbine breaking down during the inspection.	5	1	5	Risk of running turbine breaking down during the inspection.	• Do not stay in the nacelle while the wind turbine is in operation unless there is a special task to be performed and a special instruction to follow to complete the task.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.															
RW 5.75	Tightening/torqueing of bolts.	Risk of injury or squeezing of hands or fingers, if placed between tool and nearby stationary parts.	4	2	8	Attention needed	• DO NOT place fingers/hands between tool and nearby parts such as callipers, brackets, etc. • Use the right tools for the right job. • Maintain and keep tools in good condition to avoid slipping. • Use required PPE.	Risk of crushing injury of body parts	4	1	4	Risk of crushing injury of body parts	• DO NOT place fingers/hands between tool and nearby parts such as callipers, brackets, etc.	
RW 5.76	Turbine stop caused by an unknown error.	Risk of unknown electrical or mechanical hazards resulting in death.	5	2	10	Attention needed	• Do not enter the turbine until the error has been identified and trained personnel have been consulted. • Follow the general safety rules and instructions. • Use required PPE according to the situation.	Risk of electric shock and crushing	5	1	5	Risk of electric shock and crushing	• Do not enter the turbine until the error has been identified and trained personnel have been consulted.	

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Section 6: Working With Portable Electrical Tools

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction: Type of hazard	Statements to be transferred to the work instruction: How to avoid	Reference
6.01	Using metal cutting and grinding tools.	Risk of short circuit or arc flash from metal shavings causing severe injury or death.	5	2	10	Attention needed	• Use required PPE including protective goggles. • Contain shavings to prevent hazards to personnel or equipment. • After service work, inspect and clean for metal shavings on wiring terminals, components, and the interior and exterior of the electrical cabinet.	Risk of short circuit or arc flash from metal shavings causing severe injury or death.	5	1	5	Risk of short circuit or arc flash from metal shavings causing severe injury or	• Use required PPE including protective goggles.	PPE sheet not identified
6.02	Working in dusty environment.	Risk of lung or eye irritation from contact with dust.	3	2	6	Attention needed	• Use required PPE according to PPE sheet S.	Risk of lung or eye irritation from contact with dust.	3	1	3	Risk of lung or eye irritation from contact with dust.	• Use required PPE according to PPE sheet S.	
6.03	Working with lasers.	Risk of serious eye injury from improper use of lasers.	3	2	6	Attention needed	• Use appropriate PPE, including eye protection. • Never look directly into the laser light beam. • Do not position laser measuring tools at eye level, if possible. • Read and follow the manufacturer's instructions.	Risk of serious eye injury from improper use of lasers.	3	1	3	Risk of serious eye injury from improper use of lasers.	• Use appropriate PPE, including eye protection. • Never look directly into the laser light beam.	PPE sheet not identified
6.04	Torquing bolts and nuts	Risk of catastropic system failure resulting from improper bolt torque.	5	1	5	Attention needed	• Always ensure that the proper torque has been applied. • Do not mark the bolts before they have been tightened to the correct torque setting. • When marking bolts and nuts, be sure that the marking extends from the top surface, down the side, and onto the mating surface to ensure that future inspections can verify that the bolt or nut has not loosened.	Risk of falling tower.	5	1	5	Risk of falling tower.	• Always ensure that the proper torque has been applied.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 6.75	Handling of portable electrical hand tools when working at height.	Risk of tools falling down resulting in serious injury or death of technicians working below.	5	2	10	Attention needed	• Tie the tools to prevent them from falling to the ground. • Ensure that no persons are present in areas where overhead work is being performed. • Use a separate tool bag/holder to prevent tools and equipment from falling to the ground.	Risk of falling objects	5	1	5	Risk of falling objects	• Tie the tools to prevent them from falling to the ground. • Ensure that no persons are present in areas where overhead work is being performed.	
RW 6.76	Using electrical tools on site.	Risk of injuries when established safety measures are not followed.	5	2	10	Attention needed	• Read and follow the manufacturer's instructions. • Do not use electric tools in wet location unless approved for that use. • Do not remove protection covers from the tools. • Use required PPE. • Disconnect tools when not in use. • Never carry a tool by the cord or by the hose. • Keep walk ways and work areas clear of electrical cords to prevent tripping hazards. • Keep other persons at a safe distance from the workspace. • Only use tools with appropriate approvals. • Follow the manufacturer's instructions. • Consider ergonomic issues associated with using the tool and make appropriate adjustments.	Risk of electrical shock	5	1	5	Risk of electrical shock	• Read and follow the manufacturer's instructions.	PPE sheet not identified
RW 6.77	Using electrical tools on site.	Risk of tool sparks causing a fire, resulting in death.	5	2	10	Attention needed	• If sparks from tools present a fire hazard, take appropriate fire prevention measures and ensure that a fire extinguisher is nearby. • Read and follow the manufacturer's instructions. • Use required PPE.	Risk of fire	5	1	5	Risk of fire	• If sparks from tools present a fire hazard, take appropriate fire prevention measures and ensure that a fire extinguisher is nearby.	PPE sheet not identified
RW 6.78	Working with power tools.	Risk of exposure to noise level above 80 dB(A) or tool vibrations resulting in injuries.	3	5	15	Correction needed	• Use required PPE according to PPE sheet 10. • Do not use tools longer than stated in the user manual. • The tools must be maintained according to the user manual. • Check the noise level in the user manual for the tool.	Risk of hearing loss and white fingers	3	1	3	Risk of hearing loss and white fingers	• Use required PPE according to PPE sheet 10.	
RW 6.79	Handling of electrical tools on site when not in use.	Risk of injury from accidentally switching on tools	4	2	8	Attention needed	• Disconnect power to tools when not in use. • Keep the walk way clear of electrical cords to prevent tripping hazards. • Remove damaged tools and tag them 'Do Not Use'.	Risk of injury due to unintentional start of tool	4	1	4	Risk of injury due to unintentional start of tool	• Disconnect power to tools when not in use.	

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Section 7: Working with Heat (Hot Work)

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
7.01	Cutting, welding, or grinding work.	Risk of fire resulting from cutting, welding, or grinding works causing death of technicians.	5	2	10	Attention needed	• Use required PPE. Wear PPE according to PPE sheet '3'. • Warning sign must be placed for hot surfaces. • Separate, protect, or cover all combustible or flammable material or installations with a fireproof cover. • Read and follow the manufacturer's instructions. • Do not remove protective covers from the tools. • Obtain an approved and signed HOT WORK PERMIT. • Have appropriate first-aid and fire fighting equipment nearby.	Risk of severe injuries from fire.	5	1	5	Risk of severe injuries from fire.	• Use required PPE. Wear PPE according to PPE sheet '3'. • Warning sign must be placed for hot surfaces.	
7.02	Arc welding / cutting work.	Risk of exposure to toxic fumes or gases, which may cause long-term health damage.	4	3	12	Correction needed	• Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapours to form highly toxic and irritating gases. • Do not weld on coated metals, such as galvanised, lead, or cadmium-plated steel, as they can emit toxic fumes during welding. • Use fresh-air-supplied protection equipment. • Establish the best possible ventilation at the work place by opening skylights, hatches and doors.	Risk of exposrue to toxic fumes or gases	4	1	4	Risk of exposrue to toxic fumes or gases	• Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapours to form highly toxic and irritating gases. • Do not weld on coated metals, such as galvanised, lead, or cadmium-plated steel, as they can emit toxic fumes during welding. • Use fresh-air-supplied protection equipment.	
7.03	Arc welding/cutting work.	Risk of arcing, flashover, fire, and explosion due to loose connection, welding spark, and short circuit resulting in risk of burns.	4	2	8	Attention needed	• Use required PPE including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava. • Warning sign must be placed for hot surfaces. • Use certified and correct equipment, cables, and tools. • All welding transformers must be connected with return electrical cable. • Separate, protect, or cover all combustible or flammable material or installations with a fireproof cover. • Draw up a HOT WORK PERMIT and have it signed. • Remove all combustible or flammable material. • All equipment must be equipped with guards. • Have appropriate first-aid and fire fighting equipment nearby.	Risk of arcing, flashover, fire, and explosion	4	1	4	Risk of arcing, flashover, fire, and explosion	• Use required PPE including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava. • Warning sign must be placed for hot surfaces.	
7.04	Touching welded or cut items.	Risk of burns due to contact with objects or material with high temperature.	3	3	9	Attention needed	• Use required PPE according to PPE shhet 3 including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava. • Warning sign must be placed for hot surfaces. • Hot surfaces must be isolated. • Keep working area clear of equipment.	Risk of burns caused by unintentional contact with hot parts.	3	1	3	Risk of burns caused by unintentional contact with hot parts.	• Use required PPE according to PPE shhet 3 including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava. • Warning sign must be placed for hot surfaces.	
7.05	Gas cutting/welding work.	Risk of arcing, flashover, fire, and explosion due to gas leakage resulting in risk of burns.	5	3	15	Correction needed	• Use required PPE including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava. • Cylinders must have flashback arrestor and check valve (non-return valve). • Hoses and hose clamps must be approved and free from defects. • All cylinders must be in upright position and with the trolley. • No open flames in the vicinity of working location and cylinder storage. • Separate and protect or cover all combustible or flammable material or installations with a fireproof cover, in particular those that are placed behind partitions near the working area. • Remove all combustible or flammable equipment. • Draw up a HOT WORK PERMIT and have it signed. • Pay attention to incandescent emissions and the points where they fall. • Install fireproof covers, where required. • Have appropriate first-aid and fire fighting equipment nearby. • The gas cylinder protective cap must be put back when the job is completed.	Risk of arcing, flashover, fire, and explosion due to gas leakage	5	1	5	Risk of arcing, flashover, fire, and explosion due to gas leakage	• Use required PPE including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava.	
7.06	Touching gas-cut or welded items.	Risk of burns due to contact with objects or material with high temperature.	3	3	9	Attention needed	• Use required PPE according to PPE sheet 3 including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava. • Warning signs must be placed for hot surfaces. • Hot surfaces must be isolated. • Keep the working area clear of equipment.	Risk of burns caused by unintentional contact with hot surfaces.	3	1	3	Risk of burns caused by unintentional contact with hot surfaces.	• Use required PPE according to PPE sheet 3 including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava. • Warning signs must be placed for hot	

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7.07	Gas cutting/welding work.	Risk of burns due to falling sparks and fire hazards.	3	3	9	Attention needed	• Use required PPE according to PPE sheet 3. • Warning signs must be posted to warn employees passing the work area. • Draw up a HOT WORK PERMIT and have it signed. • Fire blanket must be used to prevent falling sparks. • Keep all combustible material away from work area. • Have appropriate first-aid and fire fighting equipment nearby.	Risk of burns due to falling sparks and fire hazards.	3	1	3	Risk of burns due to falling sparks and fire hazards.	• Use required PPE according to PPE sheet 3. • Warning signs must be posted to warn employees passing the work area.	
7.08	Use of heating plate for bearings.	Risk of burns due to contact with objects or material with high temperatures.	3	3	9	Attention needed	• Use required PPE according to PPE sheet 3 including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava. • Warning sign must be placed for hot surfaces. • Hot surfaces must be isolated. • Keep the working area clear of equipment.	Risk of burns caused by unintentional contact with hot surfaces.	3	1	3	Risk of burns caused by unintentional contact with hot surfaces.	• Use required PPE according to PPE sheet 3 including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava. • Warning sign must be placed for hot surfaces.	
7.09	Use of open-flame torch to pre-heat components.	Risk of burns due to contact with objects or material with high temperatures.	3	3	9	Attention needed	• Use required PPE according to PPE sheet 3 including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava. • Warning sign must be placed for hot surfaces. • Hot surfaces must be isolated. • Keep the working area clear of equipment.	Risk of burns caused by unintentional contact with hot surfaces.	3	1	3	Risk of burns caused by unintentional contact with hot surfaces.	• Use required PPE according to PPE sheet 3 including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava. • Warning sign must be placed for hot surfaces.	
7.10	Use of open-flame torch to pre-heat components.	Risk of fire resulting from torch flame resulting in death of technicians.	5	2	10	Attention needed	• Use required PPE according to PPE sheet 3 including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava. • Warning sign must be placed for hot surfaces. • Separate, protect, or cover all combustible or flammable material or installations with a fireproof cover. • Read and follow the manufacturer's instructions. • Obtain an approved and signed HOT WORK PERMIT. • Have appropriate first-aid and fire-fighting equipment nearby.	Risk of burn injury from fire due to torch flame work.	5	1	5	Risk of burn injury from fire due to torch flame work.	• Use required PPE according to PPE sheet 3 including leather boots, hand and wrist protections, fire-resistant work clothes, leather apron, and fireproof balaclava. • Warning sign must be placed for hot surfaces.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.															

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Section 8: Working With Hand Tools

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
8.01	Working with lasers.	Risk of optical injuries resulting from improper use of lasers.	3	2	6	Attention needed	• Use appropriate PPE, including eye protection. • Never look directly into the laser light beam. • Read and follow the manufacturer's instructions. • Do not position laser measuring tools at eye level if possible.	Risk of optical injuries	3	1	3	Risk of optical injuries	• Use appropriate PPE, including eye protection. • Never look directly into the laser light beam.	PPE sheet not identified
8.02	Torquing bolts and nuts	Risk of catastropic system failure resulting from improper bolt torque.	5	1	5	Attention needed	• Always ensure that the proper torque has been applied. • Do not mark the bolts before they have been tightened to the correct torque setting. • When marking bolts and nuts, be sure that the marking extends from the top surface, down the side, and onto the mating surface to ensure that future inspections can verify that the bolt or nut has not loosened.	Risk of improper torqued tower bolts.	5	1	5	Risk of improper torqued tower bolts.	• Always ensure that the proper torque has been applied.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 8.75	Using tools.	Risk of ergonomic or personal injury resulting from misuse of hand tools causing injuries.	3	2	6	Attention needed	• Use required PPE according to PPE sheet 2. • Use only approved tools and equipment. • Follow the manufacturer's instructions. • Consider ergonomic issues associated with using the tool and make appropriate adjustments. • Use the right tools for the right job.	Risk of accidental cuts or minor injuries.	2	1	2	Risk of accidental cuts or minor injuries.	• Use required PPE according to PPE sheet 2.	
RW 8.76	Crushing hazard.	Risk of crushing body parts resulting in severe injuries.	4	3	12	Correction needed	• Keep body parts clear of pinch points.	Risk of crushing body parts	4	1	4	Risk of crushing body parts	• Keep body parts clear of pinch points.	

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Section 9: Working With Pneumatic/Hydraulic Tools

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
9.01	Working with hydraulic/pneumatic tools.	Risk of exposure to high pressure due to breakage of hoses / improper clamping.	4	3	12	Correction needed	• Avoid holding pressure hoses by hand, when tools are in operation. • Use required PPE. • Do not connect the high-pressure hose before the bolt-tensioning cylinder is seated and correctly attached to the nut. • Check the system visually for any abnormality, including gaskets and seals, prior to starting the work. • Ensure that the pressure system is calibrated and checked periodically by a competent person. • Check the pressure prior to starting the work. • Only qualified persons are allowed to carry out the work.	Risk of exposure to high pressure oil or air due to breakage of hoses / improper clamping.	4	1	4	Risk of exposure to high pressure due to breakage of hoses / improper clamping.	• Avoid holding pressure hoses by hand, when tools are in operation. • Use required PPE.	PPE sheet not identified
9.02	Working with hydraulic/pneumatic tools.	Risk of being hit by broken parts or risk of crushing fingers resulting in severe injuries.	4	3	12	Correction needed	• Use required PPE. • Check that the correct pressure is set on the equipment. • Keep fingers and other body parts free from operation areas and torque arm. • Only use tools/equipment with appropriate approvals. • Only authorised/trained persons are allowed to carry out the work.	Risk of being hit by broken parts or risk of crushing fingers.	4	2	8	Risk of being hit by broken parts or risk of crushing fingers.	• Use required PPE.	PPE sheet not identified
9.03	Working with hydraulic/pneumatic tools.	Risk of exposure to noise level above 80 dB(A) or tool vibrations resulting in injuries.	3	5	15	Correction needed	• Use required PPE according to PPE sheet 10. • The tools must be maintained according to the user manual. • Check the noise level in the user manual for the tool.	Risk of exposure to noise level above 80 dB(A) or tool vibrations.	3	2	6	Risk of exposure to noise level above 80 dB(A) or tool vibrations.	• Use required PPE according to PPE sheet 10.	
9.04	Working with the hydraulic power unit.	Risk of exposure to high-pressure oil if pressure limits are exceeded resulting in severe injuries.	4	2	8	Attention needed	• Stay clear of the cylinders and pressurised hoses. • Do not allow the pressure to exceed the predefined pressure.	Risk of exposure to high-pressure oil if pressure limits are exceeded.	4	1	4	Risk of exposure to high-pressure oil if pressure limits are exceeded.	• Stay clear of the cylinders and pressurised hoses.	
9.05	Applying excess pressure on the tool.	Risk of injury due to improper fixing tool.	3	2	6	Attention needed	• Ensure that there is no oil on the tools. • Check that fixing tools are used.	Risk of eye injury	3	1	3	Risk of eye injury	• Ensure that there is no oil on the tools.	
9.06	Vapour from hydraulic oil.	Risk of eczema or allergic reaction.	3	1	3	None								
9.07	Spillage of hydraulic oil.	Risk of slipping due to spilled oil resulting in injuries.	3	2	6	Attention needed	• Clean spilled oil immediately. • Check the system for any oil leakages. • Ensure that the workplace is free from oil.	Risk of slipping due to spilled oil	3	1	3	Risk of slipping due to spilled oil	• Clean spilled oil immediately.	
9.08	Crushing hazard.	Risk of crushing body parts resulting in severe injuries.	4	3	12	Correction needed	• Keep body parts clear of pinch points.	Risk of crushing body parts resulting in severe injuries.	4	2	8	Risk of crushing body parts resulting in severe injuries.	• Keep body parts clear of pinch points.	
9.09	Torquing bolts and nuts	Risk of catastropic system failure resulting from improper bolt torque.	5	1	5	Attention needed	• Always ensure the proper torque has been applied. • Do not mark the bolts before they have been tightened to the correct torque setting. • When marking bolts and nuts, be sure that the marking extends from the top surface, down the side, and onto the mating surface to ensure that future inspections can verify that the bolt or nut has not loosened.	Risk of falling tower.	5	1	5	Risk of falling tower.	• Always ensure the proper torque has been applied.	
9.10	Working on pressurised systems	Risk of exposure to high pressure air and oil.	2	3	6	Attention needed	• Verify proper LOTO measures have been applied to prevent pump motors from being turned on. • Use appropriate PPE. • Using safe methods release any stored pressure in hoses, pipes, or storage tanks. • Avoid direct contact with chemicals that may be inside the pressurised system.	Risk of exposure to high pressure air and oil.	2	1	2	Risk of exposure to high pressure air and oil.	• Verify proper LOTO measures have been applied. • Use appropriate PPE.	PPE sheet not identified
9.11	Cleaning with pressurised air.	Risk of exposure to airborne fluids, dirt, metal shavings, or the like, resulting in eye injuries or penetrating injuries.	4	3	12	Correction needed	• Limit air pressure to 2 bar (30 psi). • Use required PPE. • Shield the work area to prevent injuries to other personnel.	Risk of exposure to airborne fluids, dirt, metal shavings, or the like, resulting in eye injuries.	4	1	4	Risk of exposure to airborne fluids, dirt, metal shavings, or the like, resulting in eye injuries.	• Limit air pressure to 2 bar (30 psi). • Use required PPE.	PPE sheet not identified
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														

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Section 10: Prevention of Explosive Atmosphere (ATEX)

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction: Type of hazard	Statements to be transferred to the work instruction: How to avoid	Reference
10.01	Performing internal blade repair.	Risk of creating an explosive atmosphere leading to an explosion resulting in severe injury or fatality.	5	2	10	Attention needed	• Do not ignite or carry out hot work near explosive atmospheres. • Ensure sufficient ventilation to prevent formation of explosive atmospheres. • If necessary, install an explosion-proof mechanical ventilator or extractor. • Ensure that there is no source of ignition. • Provide explosion-proof electrical installations in the explosive atmospheres.	Risk of explosion	5	1	5	Risk of explosion	• Do not ignite or carry out hot work near explosive atmospheres.	
10.02	Charging of batteries.	Risk of creating an explosive atmosphere, leading to an explosion resulting in severe injury or fatality.	5	2	10	Attention needed	• Do not ignite or carry out hot work near explosive atmospheres. • Ensure sufficient ventilation to prevent formation of explosive atmospheres. • Ensure that there is no source of ignition.	Risk of explosion	5	1	5	Risk of explosion	• Do not ignite or carry out hot work near explosive atmospheres.	
10.03	Working with acetylene during heating of items.	Risk of creating an explosive atmosphere leading to an explosion resulting in severe injury or fatality.	5	2	10	Attention needed	• Do not ignite or carry out hot work near explosive atmospheres. • Ensure sufficient ventilation to prevent formation of explosive atmospheres. If necessary, install an explosion-proof mechanical ventilator or extractor. • Ensure that there is no source of ignition.	Risk of explosion	5	1	5	Risk of explosion	• Do not ignite or carry out hot work near explosive atmospheres.	
10.04	Storage of flammable, chemical products.	Risk of creating an explosive atmosphere leading to an explosion resulting in severe injury or fatality.	5	2	10	Attention needed	• Do not store flammable products together with combustible materials, e.g. metal cleaner and epoxy. • Ensure sufficient ventilation to prevent formation of explosive atmospheres. • If necessary, install an explosion-proof mechanical ventilator or extractor. • Ensure that there is no source of ignition. • Provide explosion-proof electrical installations in the explosive atmospheres.	Risk of explosion	5	1	5	Risk of explosion	• Do not store flammable products together with combustible materials, e.g. metal cleaner and epoxy.	
10.05	Working in explosive atmospheres.	Risk of lung injuries or loss of consciousness due to contaminates in the air and lack of oxygen resulting in death.	5	2	10	Attention needed	• Use required PPE according to PPE sheet 9 • Use fresh-air-supplied protection mask.	Risk pf injury due to lack of oxygen or contaminants in the air	5	1	5	Risk pf injury due to lack of oxygen or contaminants in the air	• Use required PPE according to PPE sheet 9	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														

NB: Please follow the below-mentioned instructions for risk assessment of chemicals:

1) If you have a new chemical to introduce, follow the process in the VPP under "Business Support Processes - Sustainability Management - Management of Chemicals and Dangerous Goods - Release chemical for purchase" (SUS-CHM-CRP)

http://dkrdsarisvpp01.vestas.net/businesspublisher/index.do

2) In the work instruction, insert a hazard statement whose title is the name of the chemical. If a PPE sheet can be referenced, use 2.02 and identify the proper PPE sheet. Otherwise, use 2.01.

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VESTAS PROPRIETARY NOTICE

Section 11: Painting on Site

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
11.01	Surface preparation: sanding.	Risk of exposure to dust during surface preparation.	4	2	8	Attention needed	• Wear PPE according to PPE sheet 'S'. • Use a dust extraction device.	Risk of exposure to dust	4	1	4	Risk of exposure to dust	• Wear PPE according to PPE sheet 'S'.	
11.02	Use of solvents and liquors.	Risk of burns, as fire may occur when using solvents.	3	3	9	Attention needed	• Do not use ignition sources or carry out hot work near wet paint. • Use appropriate containers in which to mix or to store solvents/paint. • Ensure that there is no source of ignition.	Risk of burn injuries	3	1	3	Risk of burn injuries	• Do not use ignition sources or carry out hot work near wet paint.	
11.03	Use of paint.	Risk of splashes of paint while mixing or using paint.	3	2	6	Attention needed	• Use appropriate PPE as stated in PPE sheet 'C'. Read and comply with relevant SDS. • Use appropriate containers to mix or to store solvents/paint. • Keep eye wash bottles at hand.	Risk of exposure to hazardous paint	3	1	3	Risk of exposure to hazardous paint	• Use appropriate PPE as stated in PPE sheet 'C'. Read and comply with relevant SDS.	
11.04	Use of paint or solvents.	Risk of skin dryness and cracking due to repeated exposure to paint and solvents.	3	2	6	Attention needed	• Use appropriate PPE as stated in PPE sheet 'C'. Read and comply with relevant SDS. • Practice good hygiene. Wash the hands thoroughly after working with paint and before having food.	Risk of skin dryness and cracking	3	1	3	Risk of skin dryness and cracking	• Use appropriate PPE as stated in PPE sheet 'C'. Read and comply with relevant SDS.	
11.05	Painting of parts above the ground level.	Risk of falling from height leading to injury.	3	3	9	Attention needed	• Use a harness and anchor with anchor points, if the parts are more than two meters from the ground. • Use appropriate access equipment such as ladders and access platforms to reach the heights.	Injuries due to fall from height while painting the parts above ground level.	3	2	6	Injuries due to fall from height while painting the parts above ground level.	• Use a harness and anchor with anchor points, if the parts are more than two meters from the ground. • Use appropriate access equipment such as ladders and access platforms to reach the heights.	
11.06	Use of pneumatic tools.	For pneumatic painting tool hazards, see tab 'Working with Pneumatic/Hydraulic Tools'.												
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 11.75	Bring the paint, solvent and other accessories to the painting area.	Spillage of paint and solvents on to	2	2	4	None								
RW 11.76	Cleaning of the area after completing the painting work.	Spillage of paint and solvents	2	2	4	None								

NB: Please follow the below-mentioned instructions for risk assessment of chemicals:

1) If you have a new chemical to introduce, follow the process in the VPP under 'Business Support Processes - Sustainability Management - Management of Chemicals and Dangerous Goods - Release chemical for purchase' (SUS-CHM-CRP).

http://dkrdsarisvpp01.vestas.net/businesspublisher/index.do

2) In the work instruction, insert a hazard statement whose title is the name of the chemical. If a PPE sheet can be referenced, use 2.02 and identify the proper PPE sheet. Otherwise, use 2.01.

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Section 12: Fibreglass Work on Site

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction: Type of hazard	Statements to be transferred to the work instruction: How to avoid	Reference
12.01	Air quality in nacelle during fibreglass work.	Risk of exposure to fumes or suffocation due to low oxygen level.	4	3	12	Correction needed	• Use required PPE: Wear PPE according to PPE sheet 'E'. • Check the air quality by means of gas monitor prior to entering the nacelle. • Apply proper natural or mechanical ventilation.	Risk of exposure to fumes or suffocation due to low oxygen level.	4	1	4	Risk of exposure to fumes or suffocation due to low oxygen level.	• Use required PPE: Wear PPE according to PPE sheet 'E'.	
12.02	Preparing the working location (grinding and sandingblasting of fibreglass surface).	Risk of exposure to high levels of dust resulting in lung injuries to technicians.	3	3	9	Attention needed	• Wear PPE according to PPE sheet 'S'. • Use dust extraction device.	Risk of exposure to dust.	3	1	3	Risk of exposure to dust.	• Wear PPE according to PPE sheet 'S'.	
12.03	Preparing fibreglass mats (cutting, resizing).	Risk of injuries from cutting tools when preparing fibreglass mats.	3	3	9	Attention needed	• Use required PPE. Wear PPE according to PPE sheet '2'. • Only use tools with appropriate approvals.	Risk of injuries from cut.	3	2	6	Risk of injuries from cut.	• Use required PPE. Wear PPE according to PPE sheet '2'.	
12.04	Preparing fibreglass mats (cutting, resizing).	Risk of inhaling fiberglass dust resulting in health hazards.	2	3	6	Attention needed	• Wear PPE according to PPE sheet 'S'. • Use dust extraction device.	Risk of exposure to dust.	2	1	2	Risk of exposure to dust.	• Wear PPE according to PPE sheet 'S'.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														

NB: Please follow the below-mentioned instructions for risk assessment of chemicals:

1) If you have a new chemical to introduce, follow the process in the VPP under 'Business Support Processes - Sustainability Management - Management of Chemicals and Dangerous Goods - Release chemical for purchase' (SUS-CHM-CRP).

http://dkrdsarisvpp01.vestas.net/businesspublisher/index.do

2) In the work instruction, insert a hazard statement whose title is the name of the chemical. If a PPE sheet can be referenced, use 2.02 and identify the proper PPE sheet. Otherwise, use 2.01.

Section 13: Epoxy Work on Site

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
13.01	On-site chemical storage.	Risk of burns due to fire and explosion.	4	2	8	Attention needed	• Do not use ignition, nor carry out hot work in the vicinity of explosive atmospheres. • Ensure sufficient ventilation preventing formation of explosive atmosphere. • If necessary, install a mechanical ventilator or extractor. • Ensure that there is no source of ignition.	Risk of burns injury due to fire.	4	1	4	Risk of burns injury due to fire.	• Do not use ignition, nor carry out hot work in the vicinity of explosive atmospheres. • Ensure sufficient ventilation preventing	
13.02	Preparing the working location (grinding and sandblasting of fibreglass surface).	Risk of exposure to high levels of dust.	3	2	6	Attention needed	• Wear PPE according to PPE sheet S. • Use dust extraction device.	Risk of exposure to dust.	3	1	3	Risk of exposure to dust.	• Wear PPE according to PPE sheet S.	
13.03	Preparing chemical mixture (preparation of epoxy).	Risk of exposure to chemical splashes/spill age while applying chemicals.	4	2	8	Attention needed	• Keep eye wash bottles at hand. • Read and comply with PPE sheet E and relevant SDS. • Use appropriate containers to mix or to store the chemical.	Risk of exposure to hazardous substances.	4	1	4	Risk of exposure to hazardous substances.	• Read and comply with PPE sheet E and relevant SDS. • Keep eye wash bottles at hand.	
13.04	Preparing fibreglass mats (cutting, resizing).	Risk of cutting injury.	2	3	6	Attention needed	• Use cut-resistant gloves. • Cutting equipment must be approved and certified.	Risk of cutting injury.	2	2	4	Risk of cutting injury.	• Use cut-resistant gloves.	
13.05	Preparing fibreglass mats (cutting, resizing).	Health hazard due to fibreglass dust.	2	3	6	Attention needed	• Wear PPE according to PPE sheet S. • Use dust extraction device.	Risk of exposure to dust.	2	1	2	Risk of exposure to dust.	• Wear PPE according to PPE sheet S.	
13.06	Applying epoxy on blade surface.	Risk of exposure to chemical splashes/spill age while applying chemicals.	4	2	8	Attention needed	• Read and comply with PPE sheet E and relevant SDS. • Keep eye wash bottles at hand. • Use appropriate containers in which to mix or to store the chemical.	Risk of exposure to hazardous substances.	4	1	4	Risk of exposure to hazardous substances.	• Read and comply with PPE sheet E and relevant SDS. • Keep eye wash bottles at hand.	
13.07	Heating a surface to increase exothermic reaction.	Risk of injury if body parts get in contact with the hot surface.	3	2	6	Attention needed	• Wear heat-resistant working gloves. • Heating equipment must be approved and certified.	Risk of burns.	2	2	4	Risk of burns.	• Wear heat-resistant working gloves.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														

NB: Please follow the below-mentioned instructions for risk assessment of chemicals:
1) If you have a new chemical to introduce, follow the process in the VPP under "Business Support Processes - Sustainability Management - Management of Chemicals and Dangerous Goods - Release chemical for purchase" (SUS-CHM-CRP)
http://dkrdsarisvpp01.vestas.net/businesspublisher/index.do
2) In the work instruction, insert a hazard statement whose title is the name of the chemical. If a PPE sheet can be referenced, use 2.02 and identify the proper PPE sheet. Otherwise, use 2.01.

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Section 14: Manual Item Handling

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction: Type of hazard	Statements to be transferred to the work instruction: How to avoid	Reference
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 14.75	Manual handling of heavy load.	Risk of load slipping from the hands leading to personal injury.	3	3	9	Attention needed	• Use required PPE according to PPE sheet 11. • Ensure that the load gripping points do not have any traces of oil, grease, or other similar materials. • Bulky loads must be handled by more than one person. • Containers used to transport loads must have handles to grip. • Ensure that the load rests on the root of the fingers, not only on the fingertips, to avoid injuring muscles and tendons in fingers.	Risk of falling objects	3	1	3	Risk of falling objects	• Use required PPE according to PPE sheet 11.	
RW 14.76	Manual handling of heavy load.	Risk of sharp edges leading to cuts and abrasions.	2	3	6	Attention needed	• Use required PPE according to PPE sheet 4. • Check whether the load has any dangerous zones or surfaces, such as square corners, sharp edges, nails, etc. • Ensure the body is not exposed to these zones or surfaces when picking up and handling the load.	Risk of cut injury	2	1	2	Risk of cut injury	• Use required PPE according to PPE sheet 4.	
RW 14.77	Manual handling of heavy load.	Risk of technician falling while moving the load leading to injuries.	3	3	9	Attention needed	• Load handling area must be free from obstacles, debris, and slippery surfaces. • Use safety shoes with a suitable anti-slip sole. • Check that shoe soles are free from grease, oil, or other similar materials.	Risk of falling	3	1	3	Risk of falling	• Load handling area must be free from obstacles, debris, and slippery surfaces.	
RW 14.78	Manual handling of heavy load.	Risk of fingers or hands getting trapped between the load and the fixed or mobile structures leading to crushing injury.	2	3	6	Attention needed	• Use required PPE according to PPE sheet 11 • Before manually moving a load, check that the path does not have any narrow passes. • When selecting the point for gripping a load, keep hands away from the bottom of the load.	Risk of crushing body parts	2	1	2	Risk of crushing body parts	• Use required PPE according to PPE sheet 11	
RW 14.79	Manual handling of heavy load.	Risk of musculoskeletal injuries caused by incorrect handling of the load.	4	3	12	Correction needed	• Use mechanical aids when ever possible • Do not twist the torso while lifting the load, pivot on the feet. • Five basic rules while lifting a load: • Spread the feet to a stable position. • Place one foot in front of the other in the direction of movement. • Bend the knees, keeping the back straight or tilted slightly forwards at all times. • Bring the object as close to the body as possible; lift the weight gradually, without any sudden movements, using the strength of the legs. • Enlist assistance if required.	Risk of musculoskeletal injuries.	4	1	4	Risk of musculoskeletal injuries.	• Use mechanical aids whenever possible.	
RW 14.80	Manual handling of heavy load.	Risk of back injuries caused by incorrect handling of the load.	4	3	12	Correction needed	• Use mechanical aids whenever possible. • Do not bend the neck while carrying a load. • Do not twist the torso with a raised load. • Carry the load at waist height and as close as possible to the body. • While carrying it with one arm, avoid tilting the spine to the side. • While lifting the load from the floor to a height above the shoulders, rest the load halfway to change grip. • Always ensure that the load rests at the root of the fingers, not only on the fingertips, to avoid injuring muscles and tendons in fingers. • Push and pull the load using the weight of the body, leaning forward to push and backwards to pull, but always avoid twisting or bending the back. • Enlist assistance if required.	Risk of musculoskeletal disorders.	4	1	4	Risk of musculoskeletal disorders.	• Use mechanical aids whenever possible.	
RW 14.81	Manual handling of heavy load.	Risk of muskuloskeletal injuries caused by incorrect handling of the load.	4	3	12	Correction needed	• Use mechanical aids whenever possible. • For heavy or awkward lifting enlist the assistance of other technicians. • Use proper lifting techniques.	Risk of musculoskeletal disorders.	4	1	4	Risk of musculoskeletal disorders.	• Use mechanical aids whenever possible. • For heavy or awkward lifting enlist the assistance of other technicians.	

Original Instruction: T09 0004-4159 VER 12

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Section 15: Working with Hot Surfaces

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
15.01	Working close to hot parts (heaters, generator, gearbox, slip ring, or high-speed brake).	Risk of burn injuries due to touching hot surfaces while working near hot parts.	3	3	9	Attention needed	• Use required PPE: Wear PPE according to PPE sheet 3. • Allow parts to cool prior to starting work, if possible. • If necessary, open the nacelle skylights to facilitate cooling.	Risk of burn injuries from contact with hot parts.	2	1	2	Risk of burn injuries	• Use required PPE: Wear PPE according to PPE sheet 3.	
15.02	Working on/inside hot components (heaters, generator, gearbox, slip ring, or high-speed brake).	Risk of burn injuries due to touching hot surfaces or consumables on or inside components.	3	3	9	Attention needed	• Use required PPE: Wear PPE according to PPE sheet 3. • When working with hot components, be sure to protect against contact with hot fluids. • Allow parts to cool prior to starting work, if possible. • If necessary, open the nacelle skylights to facilitate cooling.	Risk of burn injuries from contact with hot parts.	3	1	3	Risk of burn injuries	• Use required PPE: Wear PPE according to PPE sheet 3.	
15.03	Working on a slip ring assembly.	Risk of burns due to touching hot slip rings.	2	3	6	Attention needed	• When opening into the slip rings, wear PPE according to PPE sheet S and whear heat-resistant gloves. • During work with slip rings, it is necessary to open the generator a few minutes prior to intervention. • If necessary, open the nacelle skylights.	Risk of burn injuries from contact with hot parts.	2	1	2	Risk of burn injuries	• When opening into the slip rings, wear PPE according to PPE sheet S and whear heat-resistant gloves.	
15.04	Working close to the brake.	Risk of burns due to touching the brake when it is hot.	2	3	6	Attention needed	• Use required PPE: Wear PPE according to PPE sheet 3. • When changing a plate, the brake can be hot, if having been activated recently.	Risk of burn injuries	2	1	2	Risk of burn injuries	• Use required PPE: Wear PPE according to PPE sheet 3.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														

Original Instruction: T09 0004-4159 VER 12

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Section 16: Working Posture

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 16.75	Sustained, forced postures.	Risk of musculoskeletal disorders/injuries.	3	3	9	Attention needed	• If possible implement job rotation. • Work must be scheduled so that technicians can alternate demanding tasks with non-demanding tasks, and when work is being performed, involving sustained, forced postures, these tasks must be arranged so that they alternate with other tasks that utilise different muscle groups. • Take regular breaks while performing tasks.	Risk of musculoskeletal disorders/injuries.	3	1	3	Risk of musculoskeletal disorders/injuries.	• If possible implement job rotation.	
RW 16.76	Sustained work with arms above head height.	Risk of musculoskeletal injuries.	3	3	9	Attention needed	• Use working platforms that prevent the technician from having to work for extended periods with his/her arms above head level. • Take regular breaks while performing tasks. • Implement job rotation.	Risk of musculoskeletal disorders/injuries.	3	1	3	Risk of musculoskeletal disorders/injuries.	• Use working platforms that prevent the technician from having to work for extended periods with	
RW 16.77	Sustained work with repeated wrist rotation or twisting movements.	Risk of musculoskeletal injuries.	3	3	9	Attention needed	• Use tools that minimise the need for repeated twisting or rotating movements of the wrist. • Take regular breaks while performing tasks. • Implement job rotation.	Risk of musculoskeletal disorders/injuries.	3	1	3	Risk of musculoskeletal disorders/injuries.	• Use tools that minimise the need for repeated twisting or rotating movements of	
RW 16.78	Sustained work with the upper body twisted or considerably tilted.	Risk of musculoskeletal injuries.	4	3	12	Correction needed	• Whenever possible, work that requires considerable effort with a sustained twisted or considerably tilted position of the upper body must be avoided. • Work must be scheduled so that technicians can alternate demanding tasks with non-demanding tasks, and when performing work that involves sustained, forced postures, these tasks must be arranged so that they alternate with other tasks that imply different muscle groups. • Take regular breaks while performing tasks. • Implement job rotation.	Risk of musculoskeletal disorders/injuries.	4	1	4	Risk of musculoskeletal disorders/injuries.	• Whenever possible, work that requires considerable effort with a sustained twisted or considerably tilted position of the upper body must be avoided.	

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Section 17: Transportation or Storage of Parts on Site

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
17.01	Storing components.	Risk of unstable components falling over while in storage and crushing technicians causing serious injury or death.	5	2	10	Attention needed	• Do not store components without the required covers and lashing. • Do not store components on uneven surfaces. • Do not store components on soft ground. • Place approved load-bearing structure under components to distribute the load if the ground-bearing capacity is unable to sustain the load at any point. • Ensure that the components are properly stored and secured on adequate equipment. • Ensure that the storage area meets the requirements set by Vestas.	Risk of crushing injuries due to falling components.	5	1	5	Risk of crushing injuries due to falling components.	• Do not store components without the required covers and lashing. • Do not store components on uneven surfaces. • Do not store components on soft ground.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 17.75	Transportation by truck.	Risk of heavy single items falling from truck onto persons, due to poor securing of components or transport frame, resulting in death.	5	2	10	Attention needed	• Do not work under suspended load unless being in the safe zone. • Use a transport frame designed for the purpose. • Secure components to transport frame and truck. • Secure the transport frame to the truck on all four sides. • Use tie downs with a weight rating greater than load.	Risk of falling objects	5	1	5	Risk of falling objects	• Do not work under suspended load unless being in the safe zone.	
RW 17.76	Transportation by truck.	Risk of road accident due to speeding / non-adherence to road safety rules / poor maintenance of truck, resulting in death.	5	2	10	Attention needed	• Follow road safety rules including adherence to prescribed speed limits. • All vehicles in use must be checked at the beginning of the shift to ensure that parts, equipment, and accessories are in safe operating condition and free of apparent damage which could cause failure while in use.	Risk of vehicle accidents due to unforeseen conditions or non-turbine related individuals resulting in severe injury or death.	5	1	5	Risk of vehicle accidents due to unforeseen conditions or non-turbine related individuals resulting in	• Follow road safety rules including adherence to prescribed speed limits. • All vehicles in use must be checked at the beginning of the shift to ensure that parts, equipment, and accessories are in safe	
RW 17.77	Transportation by truck.	Risk of toppling of truck due to poor road condition / narrow bends, causing severe injury.	4	2	8	Attention needed	• Follow road safety rules and adhere to prescribed speed limits. • Clear the truck route to avoid narrow bends which can affect the truck stablity. • Strengthen the road/soil condition wherever required.	Risk of vehicle accidents due to unforeseen conditions or non-turbine related individuals resulting in severe injury.	4	1	4	Risk of vehicle accidents due to unforeseen conditions or non-turbine	• Follow road safety rules and adhere to prescribed speed limits. • Clear the truck route to avoid narrow bends which can affect the truck stablity.	
RW 17.78	Entering the nacelle during long-term transportation or storage.	Risk of movement of transportation turning gear, causing severe injury if caught in rotating parts.	4	2	8	Attention needed	• Turn off power supply to the transportation turning gear and dehumidifier prior to entering the nacelle. • Make sure that the main shaft does not turn.	Risk of crushing body parts	4	1	4	Risk of crushing body parts	• Turn off power supply to the transportation turning gear and dehumidifier prior to entering the nacelle.	

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Section 18: Using the Service Crane

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
18.01	Working inside the nacelle with the crane hatch opened.	Risk of falling out of the nacelle resulting in death.	5	2	10	Attention needed	• Only open the crane hatch when technicians inside the nacelle are wearing personal fall arrest equipment attached to an approved anchor point.	Risk of falling out of the nacelle resulting in death.	5	1	5	Risk of falling out of the nacelle resulting in death.	• Only open the crane hatch when technicians inside the nacelle are wearing personal fall arrest equipment attached to an approved anchor point.	
18.02	Movement of load or nacelle during lifting.	Risk of falling load causing fatal or severe injury.	5	2	10	Attention needed	• Ensure that the nacelle cannot yaw or unwind when the lifting operation takes place. • Ensure that the rotor is locked.	Risk of falling load causing fatal or severe injury.	5	1	5	Risk of injury due to falling load.	• Ensure that the nacelle cannot yaw or unwind when the lifting operation takes place. • Ensure that the rotor is locked.	
18.03	Unloading components.	Risk of crushing body parts when unloading components resulting in severe injuries.	4	2	8	Attention needed	• Keep the component fully supported by the lifting equipment until it is properly secured in its final position.	Risk of crushing injury when unloading components.	4	1	4	Risk of crushing injury when unloading components.	• Keep the component fully supported by the lifting equipment until it is properly secured in its final position.	
18.04	Lifting operation inside the nacelle.	Risk of suspended load failure resulting in severe injuries.	4	2	8	Attention needed	• Do not stand or work under a suspended load. • Do not operate the lifting equipment without proper training. • Lifting equipment must have proper ratings. • Verify that the crane is inspected and tested according to local legislation. • Use only certified lifting equipment and thoroughly inspect the same prior to use. • Follow correct slinging arrangement or use proper lifting points. • Portable lifting equipment must be visually checked for any damage prior to use. • Portable hoists must be attached to an appropriate lifting point.	Risk of suspended load failure.	4	1	4	Risk of suspended load failure.	• Do not stand or work under a suspended load.	
18.05	Installing HV cables.	Risk of falling HV cables resulting in severe injuries or death.	5	2	10	Attention needed	• Do not stand or work under cables during installation. • Do not release the lifting equipment until the cables are properly fastened in the nacelle and the additional chain hoist is attached to the cables below the tower loop. • Evacuate the tower until the cables are properly secured.	Risk of falling HV cables resulting in injuries.	5	1	5	Risk of falling HV cables resulting in injuries.	• Do not stand or work under cables during installation.	
18.06	Lowering the service lift wires.	Risk of falling service lift cables resulting in severe injuries or death of technicians below.	5	2	10	Attention needed	• Do not stand or work under service lift wires during installation. • Use required PPE. • Have at least two technicians lower the wires to prevent wires from falling. • Special precautions must be taken when lowering the wires, since they in large towers are very heavy. • Evacuate the tower while wires are being lowered.	Risk of falling cables resulting in injuries.	5	1	5	Risk of falling cables resulting in injuries.	• Do not stand or work under service lift wires during installation.	
18.07	Lifting operation.	Risk of load falling from height on personnel resulting in a fatality due to misuse of guiding ropes.	5	2	10	Attention needed	• Do not stand or work under a suspended load. • Each guiding rope must be held by a service technician to control the movement of the suspended load, if necessary. • Guiding ropes must be actively held and monitored by service technicians during the lifting operation and may NOT be tied off to stationary, movable, or other similar uncontrolled equipment. • Guiding rope service technicians must clear of the drop zone. • Locations for the guiding rope teams must be approved by the crane operator or site supervisor. • Guiding ropes may be wrapped to a maximum of 180° around a solid object. The solid object must be smooth and free of potential rope entrapments that could prevent the movement of the guiding rope.	Risk of suspended load failure.	5	1	5	Risk of suspended load failure.	• Do not stand or work under a suspended load.	

Original Instruction: T09 0004-4159 VER 12

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18.08	Lifting operation.	Risk of suspended load failure resulting in severe injuries or death.		5	2	10	Attention needed	• Standing or working under a suspended load or drop zone is strictly prohibited. The only exception to this rule is performing approved work in a Vestas-defined protective zone. • Do not perform lifting operations when wind speed exceeds the maximum value according to the wind speed guidelines for the task. See the safety regulations for the specific turbine. • A lifting plan must be produced and communicated to all staff prior to the lifting operation. • Only trained and qualified technicians and crane operators are allowed to carry out the lifting operation. • Verify that the crane is inspected and tested according to local legislation. • Use only certified lifting equipment and thoroughly inspect the lifting equipment prior to use. • All hoists and lifting equipment must be formally checked prior to use. • Follow correct slinging arrangement and lifting procedures. • Use lifting equipment approved for the specific task. • Use guiding ropes when situations are made dangerous by the rotation or uncontrolled motion of a load. • Use caution to avoid becoming entangled when attaching or detaching the load.	Risk of suspended load failure.	5	1	5	Risk of suspended load failure.	• Standing or working under a suspended load or drop zone is strictly prohibited.	

Original Instruction: T09 0004-4159 VER 12

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Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 18.75	Removing lifting equipment.	Risk of uncontroled movement of loads before and after lifting procedures resulting in crushing injuries.	4	2	8	Attention needed	• Do not remove the lifting equipment until the component is appropriately secured.	Risk of crushing body parts	4	1	4	Risk of crushing body parts	• Do not remove the lifting equipment until the component is appropriately secured.	
RW 18.76	Crushing hazard.	Risk of crushing body parts when moving suspended loads through hatches or in confined work areas resulting in severe injuries.	4	3	12	Correction needed	• Keep body parts clear of pinch points.	Risk of crushing body parts resulting in severe injuries.	4	1	4	Risk of crushing body parts resulting in severe injuries.	• Keep body parts clear of pinch points.	
RW 18.77	Fastening and unfastening load.	Risk of fingers, arms, accessories, or loose clothing getting entangled with the hook causing severe injuries.	4	2	8	Attention needed	• Stay clear of pinch points when attaching or detaching load to the lifting hook. • Do not start lifting until the banksman has indicated that all personnel are clear of the lifting area. • All personnel must be clear of the lifting area before the lifting commences. • The ground banksman must ensure that all persons are clear of the hook before communicating to the hoist operator to commence the lift. • The service crane operator must maintain a practicable view of the load while lifting. • Remove accessories and confine loose clothing when working close to pinch points. • A lifting plan must be produced prior to the lifting. • Use only certified lifting equipment and thoroughly inspect the same prior to use. • All service cranes, hoists, lifting and anchorage equipment must be formally checked prior to use. • Follow correct slinging arrangement and lifting procedures. • Only trained and qualified technician and lifting operators are allowed to fasten and unfasten load.	Risk of crushing body parts resulting in severe injuries.	4	1	4	Risk of crushing body parts resulting in severe injuries.	• Stay clear of pinch points when attaching or detaching load to the lifting hook.	
RW 18.78	Fastening and unfastening load.	Risk of trips/slips/falls causing broken or fractured ankles or legs,	3	3	9	Attention needed	• The turbine must be yawed prior to the nacelle hoist operation to ensure that it is taking place in a clear ground area. • The service crane ground landing area must be clear of obstacles, potholes, and stones prior to traversing.	Risk of trips/slips/falls is minimised.	3	1	3	Risk of trips/slips/falls	• The turbine must be yawed prior to the nacelle hoist operation to ensure that it is taking place in a clear ground area.	
RW 18.79	Signalling and communication.	Risk of load falling down on rigging team causing severe injury or death due to wrong signalling and poor communicatio n between teams.	5	2	10	Attention needed	• Ensure good two-way communication between the service crane operator in the nacelle and the technician by means of two-way radio/mobile phone or hand signals. • Service crane operator and other persons must only use standard signals. • At all times, only one person at a time must be signalling to the service crane operator. If more than one signal is given, the operation must be stopped immediately. • Where communication between service crane operator and technician is broken, the lifting operation must stop. • Ensure that communication devices are fully charged prior to the lifting operation.	Risk of injury due to wrong signalling, miscommunication, or external interference.	5	1	5	Risk of injury due to falling object.	• Ensure good two-way communication between the service crane operator in the nacelle and the technician by means of two-way radio/mobile phone or hand signals. • Where communication between service crane operator and technician is broken, the lifting operation must stop.	
RW 18.80	Use of turbine service crane in high winds.	Risk of falling load or equipment causing serious injury or death to personnel below.	5	2	10	Attention needed	• Do not perform the lifting operation when wind speed exceeds the maximum value according to the wind speed guidelines for specific jobs. • Do not stand/work under suspended load. • A weather forecast must be made prior to lifting taking place, and the wind speed must be monitored on the turbine anemometer or site met mast prior to and during the lifting operation.	Risk of falling objects	5	1	5	Risk of falling objects	• Do not perform the lifting operation when wind speed exceeds the maximum value according to the wind speed guidelines for specific jobs.	
RW 18.81	Lifting operation in poor visibility.	Risk of suspended load mis-management due to poor visibility resulting in severe injuries or death.	5	2	10	Attention needed	• Do not perform any lifting of equipment in conditions that obscure the visibility of load or personnel. • Use required PPE according to PPE sheet 12.	Risk of falling objects	5	1	5	Risk of falling objects	• Do not perform any lifting of equipment in conditions that obscure the visibility of load or personnel. • Use required PPE according to PPE sheet 12.	

Original Instruction: T09 0004-4159 VER 12

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Section 19: Crane and Lifting Operations

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
19.01	Lifting operation.	Risk of suspended load failure resulting in severe injuries or death.	5	2	10	Attention needed	• Standing or working under a suspended load or drop zone is strictly prohibited. The only exception to this rule is performing approved work in a Vestas-defined protective zone. • Do not perform lifting operations when the wind speed exceeds the maximum value according to the wind speed guidelines for the task. See the safety regulations for the specific turbine. • A lifting plan must be produced and communicated to all staff prior to the lifting operation. • Only trained and qualified service technicians and crane operators are allowed to carry out the lifting operation. • Verify that the crane is inspected and tested according to local legislation. • Use only certified lifting equipment and thoroughly inspect the lifting equipment prior to use. • All hoists and lifting equipment must be formally checked prior to use. • Follow correct slinging arrangement and lifting procedures. • Use lifting equipment approved for the specific task. • Use guiding ropes when situations are made dangerous by the rotation or uncontrolled motion of a load. • Use caution to avoid becoming entangled when attaching or detaching the load.	Risk of suspended load failure.	5	1	5	Risk of suspended load failure.	• Standing or working under a suspended load or drop zone is strictly prohibited.	
19.02	Suspended load.	Risk of suspended load failure resulting in severe injuries or death.	5	2	10	Attention needed	• Standing or working under a suspended load or drop zone is strictly prohibited. The only exception to this rule is performing approved work in a Vestas-defined protective zone.	Risk of suspended load failure.	5	1	5	Risk of suspended load failure.	• Standing or working under a suspended load or drop zone is strictly prohibited. The only exception to this rule is performing approved work in a Vestas-defined protective zone.	
19.03	Lifting operation.	Risk of load falling from height on personnel resulting in a fatality due to misuse of guiding ropes.	5	2	10	Attention needed	• Do not stand or work under a suspended load. • Each guiding rope must be held by a service technician to control the movement of the suspended load, if necessary. • Guiding ropes must be actively held and monitored by service technicians during the lifting operation and may NOT be tied off to stationary, movable, or other similar uncontrolled equipment. • Guiding rope service technicians must clear of the drop zone. • Locations for the guiding rope teams must be approved by the crane operator or site supervisor. • Guiding ropes may be wrapped to a maximum of 180° around a solid object. The solid object must be smooth and free of potential rope entrapments that could prevent the movement of the guiding rope.	Risk of suspended load failure.	5	1	5	Risk of suspended load failure.	• Do not stand or work under a suspended load.	
19.04	Placing the nacelle on top of the tower.	Risk of suspended load failure resulting in severe injuries or death.	5	2	10	Attention needed	• Keep personnel on the ground, at a safe distance from the turbine. • Lift the nacelle to maximum distance stated by the tower strenght calculation above the top flange allowing the necessary clearance between tower and nacelle before turning it into position above the centre of the tower.	Risk of suspended load failure.	5	1	5	Risk of suspended load failure.	• Keep personnel on the ground, at a safe distance from the turbine.	
19.05	Falling guiding ropes.	Risk of injuries to technicians on the ground if guiding ropes are dropped from the roof of the nacelle.	3	2	6	Attention needed	• Do not stand under guiding ropes when they are being lowered. • Do not drop the guiding ropes from height. • Attach guiding ropes to lifting hook or accessory to lower them safely to the ground.	Risk of being struck by falling objects.	3	1	3	Risk of being struck by falling objects.	• Do not stand under guiding ropes when they are being lowered.	
19.06	Lifting by using the J-hook.	Risk of suspended load failure resulting in severe injuries or death.	5	2	10	Attention needed	• Do not use the J-hook on the top flange of the tower section. • Release J-hook	Risk of suspended load failure.	5	1	5	Risk of suspended load failure.	• Do not use the J-hook on the top flange of the tower section.	
19.07	Leaving the tower without the nacelle installed.	Risk of catastrophic tower failure at specific wind speeds resulting in death of technicians.	5	2	10	Attention needed	• Do not leave a complete tower without a nacelle installed. • Do not install more than the first tower section when the forecasted wind speed exceeds the specified value according to the wind speed guidelines for the tasks.	Risk of injury from falling tower.	5	1	5	Risk of injury from falling tower.	• Do not leave a complete tower without a nacelle installed.	

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19.08	Installing a tower section.	Risk of suspended load failure resulting in severe injuries or death.	5	2	10	Attention needed	• Keep personnel on the ground, at a safe distance from the tower. • Lift the nacelle to maximum distance stated by the tower strenght calculation above the top flange allowing the necessary clearance between tower and nacelle before turning it into position above the centre of the tower.	Risk of suspended load failure.	5	1	5	Risk of suspended load failure.	• Keep personnel on the ground, at a safe distance from the tower.	
19.09	Excessive weight on platforms.	Risk of platform failure causing a fall from heights resulting in death of technicians.	5	3	15	Correction needed	• Do not exceed the maximum platform loads which are stated on the site assembly drawing of the specific tower. Contact a Vestas technical advisor for a copy of the site assembly drawing. • Place heavy components and tools along the tower wall to prevent overloading the platform.	Risk of platform failure.	5	1	5	Risk of platform failure.	• Do not exceed the maximum platform loads which are stated on the site assembly drawing of the specific tower.	
19.10	Unloading components.	Risk of crushing body parts when unloading components resulting in severe injuries.	4	2	8	Attention needed	• Keep the component fully supported by the lifting equipment until it is properly secured in its final position.	Risk of being struck by falling objects.	4	1	4	Risk of being struck by falling objects.	• Keep the component fully supported by the lifting equipment until it is properly secured in its final position.	
19.11	Removing the transport feet.	Risk of crushing injuries from dropping a transport foot onto a technician.	4	2	8	Attention needed	• Do not stand directly below a transport foot when it is being released or removed.	Risk of being struck by falling objects.	4	1	4	Risk of being struck by falling objects.	• Do not stand directly below a transport foot when it is being released or removed.	
19.12	Loading components for transport.	Risk of death from dropping the components onto a technician.	5	3	15	Correction needed	• Keep the components fully supported by the lifting equipment until it is properly secured to the means of transport.	Risk of being struck by falling objects.	5	1	5	Risk of being struck by falling objects.	• Keep the component fully supported by the lifting equipment until it is properly secured in its final position.	
19.13	Assembling the CoolerTop® on the ground.	Risk of falling from heights when working more than 2 m off the ground resulting in severe injuries or death.	5	2	10	Attention needed	• Do not work at heights exceeding 2 m from the ground without wearing appropriate PPE according to PPE sheet 8. • Do not use the fall arrest anchor points on the CoolerTop® until it has been completely installed. • Only one person at a time is allowed to work on a the service ladder.	Risk of falling from height.	5	1	5	Risk of falling from height.	• Do not work at heights exceeding 2 m from the ground without wearing appropriate PPE according to PPE sheet 8.	
19.14	Removing a blade from the CBF frame.	Risk of dropping the blade or blade frame on technician resulting in death.	5	2	10	Attention needed	• Do not stand or work inside the drop zone. • Attach lifting equipment prior to loosening the CBF frame.	Risk of dropping the blade or blade frame resulting in injuries.	5	1	5	Risk of dropping the blade or blade frame resulting in injuries.	• Do not stand or work inside the drop zone. • Attach lifting equipment prior to loosening the CBF frame.	
19.15	Removing and installing the nacelle roof panels.	Risk of roof panel collapse causing technician to fall, resulting in severe injuries or death.	5	2	10	Attention needed	• Complete the installation of the rear roof panel before accessing the roof. • Use required PPE according to PPE sheet 8.	Risk of falling from height.	5	1	5	Risk of falling from height.	• Complete the installation of the rear roof panel before accessing the roof. • Use required PPE according to PPE sheet 8.	
19.16	Storing components.	Risk of unstable components falling over, while in storage, and crushing technicians causing serious injury or death.	5	2	10	Attention needed	• Do not store components without the required covers and lashing. • Do not store components on uneven surfaces. • Do not store components on soft ground. • Place approved load-bearing structure under components to distribute the load if the ground-bearing capacity is unable to sustain the load at any point. • Ensure that the components are properly stored and secured on adequate equipment. • Ensure that the storage area meets the requirements set by Vestas.	Risk of crushing injuries due to falling components.	5	1	5	Risk of crushing injuries due to falling components.	• Do not store components without the required covers and lashing. • Do not store components on uneven surfaces. • Do not store components on soft ground.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.															
RW 19.75	Removing lifting equipment.	Risk of uncontroled movement of loads before and after lifting procedures resulting in crushing injuries.	4	2	8	Attention needed	• Do not remove the lifting equipment until the component is appropriately secured.	Risk of crushing injury of body parts	4	1	4	Risk of crushing injury of body parts	• Do not remove the lifting equipment until the component is appropriately secured.	
RW 19.76	Crushing hazard.	Risk of crushing body parts when moving suspended loads through hatches or in confined work areas resulting in severe injuries.	4	3	12	Correction needed	• Keep body parts clear of pinch points.	Risk of crushing body parts	4	1	4	Risk of crushing body parts	• Keep body parts clear of pinch points.	

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RW 19.77	Fastening and unfastening load.	Risk of fingers, arms, accessories, or loose clothing getting entangled with the hook causing severe injuries.	4	2	8	Attention needed	• Stay clear of pinch points when attaching or detaching load to the lifting hook. • Do not start lifting until the banksman has indicated that all personnel are clear of the lifting area. • All personnel must be clear of the lifting area before the lifting commences. • The ground banksman must ensure that all persons are clear of the hook before communicating to the hoist operator to commence the lift. • The service crane operator must maintain a practicable view of the load while lifting. • Remove accessories and confine loose clothing when working close to pinch points. • A lifting plan must be produced prior to the lifting. • Use only certified lifting equipment and thoroughly inspect the same prior to use. • All service cranes, hoists, lifting and anchorage equipment must be formally checked prior to use. • Follow correct slinging arrangement and lifting procedures. • Only trained and qualified technician and lifting operators are allowed to fasten and unfasten load.	Risk of crushing body parts resulting in severe injuries.	4	1	4	Risk of crushing body parts resulting in severe injuries.	• Stay clear of pinch points when attaching or detaching load to the lifting hook.	
RW 19.78	Fastening and unfastening load.	Risk of trips/slips/falls causing broken or fractured ankles or legs,	3	3	9	Attention needed	• The turbine must be yawed prior to the nacelle hoist operation to ensure that it is taking place in a clear ground area. • The service crane ground landing area must be clear of obstacles, potholes, and stones prior to traversing.	Risk of trips/slips/falls is minimised.	3	1	3	Risk of trips/slips/falls	• The turbine must be yawed prior to the nacelle hoist operation to ensure that it is taking place in a clear ground area.	
RW 19.79	Signalling and communication.	Risk of load falling down on rigging team causing severe injury or death due to wrong signalling and poor communication between teams.	5	2	10	Attention needed	• Ensure good two-way communication between the service crane operator in the nacelle and the technician by means of two-way radio/mobile phone or hand signals. • Service crane operator and other persons must only use standard signals. • At all times, only one person at a time must be signalling to the service crane operator. If more than one signal is given, the operation must be stopped immediately. • Where communication between service crane operator and technician is broken, the lifting operation must stop. • Ensure that communication devices are fully charged prior to the lifting operation.	Risk of injury due to wrong signalling, miscommunication, or external interference.	5	1	5	Risk of injury due to falling object.	• Ensure good two-way communication between the service crane operator in the nacelle and the technician by means of two-way radio/mobile phone or hand signals. • Where communication between service crane operator and technician is broken, the lifting operation must stop.	
RW 19.80	Use of turbine service crane in high winds.	Risk of falling load or equipment causing serious injury or death to personnel below.	5	2	10	Attention needed	• Do not perform the lifting operation when wind speed exceeds the maximum value according to the wind speed guidelines for specific jobs. • Do not stand/work under suspended load. • A weather forecast must be made prior to lifting taking place, and the wind speed must be monitored on the turbine anemometer or site met mast prior to and during the lifting operation.	Risk of falling objects	5	1	5	Risk of falling objects	• Do not perform the lifting operation when wind speed exceeds the maximum value according to the wind speed guidelines for specific jobs.	
RW 19.81	Lifting operation in poor visibility.	Risk of suspended load mismanagement due to poor visibility resulting in severe injuries or death.	5	2	10	Attention needed	• Do not perform any lifting of equipment in conditions that obscure the visibility of load or personnel. • Use required PPE according to PPE sheet 12.	Risk of falling objects	5	1	5	Risk of falling objects	• Do not perform any lifting of equipment in conditions that obscure the visibility of load or personnel. • Use required PPE according to PPE sheet 12.	
RW 19.82	Contact with energised overhead power lines or other obstacles.	Risk of electrocution to crane operator and technicians near the crane.	5	2	10	Attention needed	• Crane boom, wires, and loads must be kept at a safe distance from high-voltage power lines. If this is not possible, the power lines must be de-energised. • Ensure that the lifting plan considers risks related to overhead power lines and obstacles.	Risk of electrical shock	5	1	5	Risk of electrical shock	• Crane boom, wires, and loads must be kept at a safe distance from high-voltage power lines. If this is not possible, the power lines must be de-energised.	

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Section 20: Loading and Unloading of Components

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
20.01	Unloading components.	Risk of crushing body parts when unloading components resulting in severe injuries.	4	2	8	Attention needed	• Keep the component fully supported by the lifting equipment until it is properly secured in its final position.	Risk of crushing body parts	4	1	4	Risk of crushing body parts	• Keep the component fully supported by the lifting equipment until it is properly secured in its final position.	
20.02	Loading components for transport.	Risk of death from dropping the components onto a technician.	5	3	15	Correction needed	• Keep the component fully supported by the lifting equipment until it is properly secured to the means of transport.	Risk of crushing body parts	5	1	5	Risk of crushing body parts	• Keep the component fully supported by the lifting equipment until it is properly secured to the means of transport. • Do not stand under suspended loads	
20.03	Storing components.	Risk of unstable components falling over while in storage and crushing technicians causing serious injury or death	5	2	10	Attention needed	• Ensure the storage area meets the requirements set by Vestas. • Do not store components without the required covers and lashing. • Ensure the components are properly stored and secured on adequate equipment. • Do not store components on uneven surfaces. • Do not store components on soft ground. Place approved load-bearing structure under components to distribute the load if the ground-bearing capacity is unable to sustain the load at any point.	Risk of crushing body parts	5	1	5	Risk of crushing body parts	• Ensure the storage area meets the requirements set by Vestas.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 20.75	Movement of service vans/trucks/forklifts/cranes on site.	Risk of accidents due to speeding/reversing/non-adherence to rules and instructions.	5	2	10	Attention needed	• Follow the site-specific instructions regarding movement of vehicles. • Wear high-visibility clothing on site. • Ensure that no persons stand behind a truck during reversing. • Unauthorised persons must be kept clear during unloading/loading.	Risk of trafic accident	5	1	5	Risk of trafic accident	• Follow the site-specific instructions regarding movement of vehicles. • Wear high-visibility clothing on site.	
RW 20.76	Transporting components by using forklifts.	Risk of tipping of forklift due to overloading or soft soil condition, causing severe injury.	4	2	8	Attention needed	• Forks and shovels must be lowered as far as safely possible before moving the equipment. • Forks must be spread as far apart as possible. The stability of the load must always be checked before moving it. • Ensure that the forklift is loaded according to the loading chart. • Ensure prior to use that ground conditions are appraised for slopes or gradients with regard to loading and forklift brake capacity. • Potholes in the road surface must be filled before traversing the forklift.	Risk of crushing injury of body parts	4	1	4	Risk of crushing injury of body parts	• Forks and shovels must be lowered as far as safely possible before moving the equipment.	
RW 20.77	Leaving the forklifts without lowering the forks completely.	Risk of other moving equipment striking against forks causing	3	2	6	Attention needed	• Forks and shovels must be lowered completely before leaving the equipment.	Risk of crushing injury of body parts	3	1	3	Risk of crushing injury of body parts	• Forks and shovels must be lowered completely before leaving the equipment.	

Original Instruction: T09 0004-4159 VER 12

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Section 21: Using the Service Lift

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
21.01	Transporting heavy components with service lift.	Risk of muskuloskeletal injuries to service personnel from lifting heavy components into the service lift.	4	3	12	Correction needed	• Use mechanical aids whenever possible to move the load into and out of the service lift. • Enlist assistance if required.	Risk of muskuloskeletal injuries from lifting heavy components into the service lift.	3	2	6	Risk of muskuloskeletal injuries	• Use mechanical aids whenever possible to move the load into and out of the service lift.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 21.75	Exiting a stalled service lift.	Risk of service personnel falling from height during self-rescue to the ladder causing severe injury or death.	5	2	10	Attention needed	• Follow the evacuation procedure when climbing out of a stalled service lift to the ladder. • Always wear personal fall arrest equipment with two lanyards. At least one of the lanyards must be attached to an approved anchor point. • Never attempt a self-rescue without sufficient light.	Risk of falling from height	5	1	5	Risk of falling from height	• Follow the evacuation procedure when climbing out of a stalled service lift to the ladder.	
RW 21.76	Closing the service lift gate.	Risk to service personnel of crushing or cutting injuries if body parts are caught in the service lift gate when it closes.	3	2	6	Attention needed	• Keep hands and fingers clear of the pinch point when the service lift gate is closing.	Risk of crushing body parts	3	1	3	Risk of crushing body parts	• Keep hands and fingers clear of the pinch point when the service lift gate is closing.	
RW 21.77	Entry into service lift.	Lift doors constitute ergonomic hazards and lower fixed portion can be a risk for tripping, falling, and causing injury to service personnel.	3	2	6	Attention needed	• Do not climb over lower fixed portion of the gate while carrying heavy loads.	Risk of slip/trip and fall	3	1	3	Risk of slip/trip and fall	• Do not climb over lower fixed portion of the gate while carrying heavy loads.	
RW 21.78	Travelling in service lift.	Risk of injury to service personnel if body parts are outside of the service lift cage when it is in motion.	4	2	8	Attention needed	• Only qualified service personnel may operate the service lift. • To reduce the risk of personal injury, keep hair, loose clothing, fingers, and all body parts inside of the service lift cage and away from moving parts. • Never attempt to open the service lift gate while it is in motion. • Ensure that everyone is clear around the service lift before operating it.	Risk of crushing body parts	4	1	4	Risk of crushing body parts	• Only qualified service personnel may operate the service lift.	
RW 21.79	Stopping the service lift.	Risk of tripping and falling if the service lift gate is opened and the service lift is not level with the platform floor.	4	2	8	Attention needed	• Open the service lift door only when the service lift is level with the platform floor.	Risk of slip/trip and fall	4	1	4	Risk of slip/trip and fall	• Open the service lift door only when the service lift is level with the platform floor.	

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Section 22: Weather Conditions

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction: Type of hazard	Statements to be transferred to the work instruction: How to avoid	Reference
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 22.75	High winds.	Risk of high winds causing the turbine to be unstable, resulting in falling loads	5	2	10	Attention needed	• Follow the instructions on wind speed limits for the specific task while working on different parts of the turbine.	Risk of falling objects	5	1	5	Risk of falling objects	• Follow the instructions on wind speed limits for the specific task while working on different parts of the turbine.	
RW 22.76	Lightning and thunderstorms.	Risk of lightning striking the different parts of the turbine possibly resulting in severe injuries or	5	2	10	Attention needed	• Leave the turbine in case of risk of lightning during work. • Check the lightning forecast. • In offshore towers stay in a safe place inside the tower	Risk of electical shock	5	1	5	Risk of electical shock	• Leave the turbine in case of risk of lightning during work.	
RW 22.77	Snow and icing of blades or other parts of the turbine.	Risk of ice being thrown when stopping the turbine resulting in severe injury or death of technicians.	5	2	10	Attention needed	• Do not approach the turbine if there are risk of falling ice. • If ice in the area is noticed, and there is a suspicion of ice on the turbine blades, temporarily remote stop all the turbines in the immediate area when a vehicle is approaching the area. • If possible, yaw the turbine remotely so that the severest hazard (typically ice on the blades) is on the opposite side of the tower from the entrance door. • One technician approaches the turbine and clears the work way; meanwhile the second technician is watching. • The second technician does not approch the turbine, until the first technician is inside the turbine. • Stay clear of the turbine blades while approaching. • Park the service car approximately 100 m away from the turbine. • Once ALL employees are inside the turbine to do the assigned work, a call can be made to	Risk of falling objects	5	1	5	Risk of falling objects	• Do not approach the turbine if there are risk of falling ice.	
RW 22.78	Snow and icing of blades or other parts of the turbine.	Risk of ice being thrown from the blades while being on the nacelle roof causing injury	5	2	10	Attention needed	• Open the nacelle roof hatch furthest from the blades. • Inspect the blades visually for ice build-up. • If the blades still have ice attached, DO NOT ENTER THE NACELLE ROOF.	Risk of falling objects	5	1	5	Risk of falling objects	• Open the nacelle roof hatch furthest from the blades. • Inspect the blades visually for ice build-up. • If the blades still have	
RW 22.79	Snow and icing of blades or other parts of the turbine.	Risk of slipping and falling from the nacelle roof because of icy surface resulting in death of technician.	5	3	15	Correction needed	• If the Nacelle or blades still have ice attached, DO NOT ENTER THE NACELLE ROOF.	Risk of falling objects	5	1	5	Risk of falling objects	• If the Nacelle or blades still have ice attached, DO NOT ENTER THE NACELLE ROOF.	
RW 22.80	Snow and icing of blades or other parts of the turbine.	Risk of ice being thrown during start-up of turbine resulting in death of technicians.	5	3	15	Correction needed	• Keep a safety distance of approx. 300 m to the turbine during start up. • Yaw the blades away from the access tower door. • Be aware of the wind direction and make sure, if possible, that the wind does not blow ice in the direction of the access way. • The technicians leave the turbine one at the time. • Start up the turbine remotely.	Risk of falling objects	5	1	5	Risk of falling objects	• Keep a safety distance of approx. 300 m to the turbine during start up.	
RW 22.81	Working inside the turbine in conditions with high temperatures.	Tiredness, dehydration and, at worst, loss of conscious-ness.	2	3	6	Attention needed	• Drink plenty of water. • Ventilate the place wherever possible. • Take regular breaks.	Risk of dehydration	2	1	2	Risk of dehydration	• Drink plenty of water. • Ventilate the place wherever possible.	
RW 22.82	Working inside the turbine in foggy weather.	Risk of low visibility during work.	2	2	4	None								
RW 24.79	Working inside tower or nacelle in cold or wet weather	Risk of falling or tripping due to slippery surfaces	3	3	9	Attention needed	Clean any slippery surfaces before work starts. Use correct footwear, clothing, gloves and safety helmet.	Risk of falling	3	2	6	Risk of falling or tripping due to slippery surfaces	Clean any slippery surfaces before work starts.	

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VESTAS PROPRIETARY NOTICE

Section 23: Working Environment

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
23.01	Working in a noisy atmosphere.	Risk of irreversible hearing loss to service personnel from exposure to loud noise exceeding levels of 80 dB(A).	4	3	12	Correction needed	• Use required PPE according to PPE sheet 10. • Restrict entry of unauthorised persons into the work area.	Risk of irreversible hearing loss	4	1	4	Risk of irreversible hearing loss	• Use required PPE according to PPE sheet 10.	
23.02	Working near spilled fluids.	Risk of slips and falls resulting in injuries to service personnel.	3	3	9	Attention needed	• Clean up any spilled fluids immediately. • Use fluid containers to collect fluids to avoid spillage on the floor. • Remove cleaning materials from the turbine. • Check the system for possible fluid leakages.	Risk of slips and falls	3	1	3	Risk of slips and falls	• Clean up any spilled fluids immediately.	
23.03	Working inside the turbine being exposed to vibrations.	Risk of numbness and fatigue.	2	2	4	None								
23.04	Working with air filters.	Risk of exposure to dust particles resulting in lung damage.	2	3	6	Attention needed	• Use required PPE according to PPE sheet S.	Risk of exposure to dust particles	2	1	2	Risk of exposure to dust particles	• Use required PPE according to PPE sheet S.	
23.05	Working near the switchgear exhaust zone.	Risk of exposure to extremely hot, SF6 gases and toxic, corrosive metallic fluoride dust resulting in severe injuries or death.	5	1	5	Attention needed	• De-energise the switchgear if any work is being performed that increases the likelihood of the switchgear opening (for example, other work on electrical systems or work that may move or damage cables connected to the switchgear). • Do not perform the work while the turbine is in production. • Verify safe SF6 gas levels before entering the switchgear exhaust zone. • Ensure that the switchgear exhaust zone is clear before intentionally operating the switchgear.	Risk of exposure to extremely hot gas	5	1	5	Risk of exposure to extremely hot gas	• De-energise the switchgear if any work is being performed that increases the likelihood of the switchgear opening.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 23.75	Working inside the turbine in conditions with high temperatures.	Risk of fatigue, dehydration, heat stroke, and loss of consciousness of personnel from working in high temperatures.	2	3	6	Attention needed	• Open skylight hatches in the nacelle in order to increase the ventilation inside the nacelle. • Carry drinking water to the work spot, while working in hot conditions. • Take regular breaks.	Risk of dehydration	2	1	2	Risk of dehydration	• Open skylight hatches in the nacelle in order to increase the ventilation inside the nacelle. • Carry drinking water to the work spot, while working in hot conditions.	
RW 23.76	Working on hot surfaces.	Risk of burns due to contact with hot surfaces resulting in injuries to service personnel.	2	4	8	Attention needed	• Do not work on components if they are hot. • Allow parts to cool prior to performing service work. • Use required PPE according to PPE sheet 3.	Risk of contact with hot parts	2	2	4	Risk of contact with hot parts	• Do not work on components if they are hot. • Allow parts to cool prior to performing service work. • Use required PPE according to PPE	
RW 23.77	Working close to hot parts.	Risk of burn injuries to service personnel due to radient heat from hot surfaces.	2	3	6	Attention needed	• Do not work on components if they are hot. • Allow parts to cool prior to performing service work. • Use required PPE according to PPE sheet 3.	Risk of contact with hot parts	2	2	4	Risk of contact with hot parts	• Do not work on components if they are hot. • Allow parts to cool prior to performing service work. • Use required PPE according to PPE sheet 3.	
RW 23.78	Lighting requirement due to darkness when working inside the turbine.	Risk of injury to service personnel from hitting against objects or falling due to slipping in low	3	2	6	Attention needed	• Do not climb/work in the dark. • Bring illumination. • Always carry emergency light in case of power/UPS failure.	Risk of slip/trip and fall	3	1	3	Risk of slip/trip and fall	• Do not climb/work in the dark. • Bring illumination. • Always carry emergency light in case of power/UPS failure.	
RW 23.79	Working on an oily floor.	Risk of skin irritation or allergies due to continued exposure to oil resulting in eczema or allergic reaction.	3	2	6	Attention needed	• Clean up spilled oil • Avoid direct contact with oil. • Use PPE according to PPE sheet G.	Risk of exposure to oil	3	1	3	Risk of exposure to oil	• Clean up spilled oil • Avoid direct contact with oil. • Use PPE according to PPE sheet G.	
RW 23.80	Working on floor with spilled fluids.	Risk of slips and falls due to spilled fluids resulting in injuries.	3	3	9	Attention needed	• Clean up all spilled fluids .	Risk of slip/trip and fall	3	1	3	Risk of slip/trip and fall	• Clean up all spilled fluids .	

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Section 24: Working in Enclosed Spaces

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction: Type of hazard	Statements to be transferred to the work instruction: How to avoid	Reference
24.01	Working in enclosed spaces with poor air quality.	Risk of lung injuries or loss of consciousness due to contaminates in the air and lack of oxygen, resulting in death.	5	2	10	Attention needed	• Use required PPE according to PPE sheet 9. • Provide adequate fresh-air ventilation into the space. • Test the air within the work space before entering. • Determine if local regulations or policies classify the work space as a confined space or otherwise require special procedures. Follow all local regulations and policies and obtain any required permits.	Risk of lung injuries	5	1	5	Risk of lung injuries	• Use required PPE according to PPE sheet 9.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														
RW 24.75	Working with noisy equipment in a enclosed space.	Risk of exposure to noise level above 80 dB(A) or tool vibrations resulting in injuries.	3	5	15	Correction needed	• Use required PPE according to PPE sheet 10.	Risk of hearing loss	3	1	3	Risk of hearing loss	• Use required PPE according to PPE sheet 10.	
RW 24.76	Working in an enclosed space with a confined entrance/exit.	Unable to exit the area in the event of an emergency such as a fire, resulting in death.	5	2	10	Attention needed	• Always ensure that a technician is on standby in case of emergency outside the entrance of the confined area. • Follow policies and procedures, and local legislation for confined spaces. • Ensure that an emergency rescue plan is in place prior to the start of work.	Risk of being trapped in confined space	5	1	5	Risk of being trapped in confined space	• Always ensure that a technician is on standby in case of emergency outside the entrance of the confined area. • Follow policies and procedures, and local legislation for confined spaces. • Ensure that an emergency rescue plan is in place prior to the start of work.	
RW 24.77	Working in an enclosed space with a confined entrance/exit.	Self-rescue by an injured technician not possible, resulting in a more severe injury or possibly death.	5	2	10	Attention needed	• Always ensure that a technician is on standby in case of emergency outside the entrance of the confined area. • Follow policies and procedures, and local legislation for confined spaces. • Ensure that an emergency rescue plan is in place prior to the start of work.	Risk of being trapped in confined space	5	1	5	Risk of being trapped in confined space	• Always ensure that a technician is on standby in case of emergency outside the entrance of the confined area. • Follow policies and procedures, and local legislation for confined spaces. • Ensure that an emergency rescue plan is in place prior to the start of work.	
RW 24.78	Working in an enclosed space with a confined entrance/exit.	Rescue of an injured person is more difficult, resulting in more severe injuries due to inability to receive immediate medical attention.	5	2	10	Attention needed	• Always ensure that a technician is on standby in case of emergency outside the entrance of the confined area. • Follow policies and procedures, and local legislation for confined spaces. • Ensure that an emergency rescue plan is in place prior to the start of work.	Risk of being trapped in confined space	5	1	5	Risk of being trapped in confined space	• Always ensure that a technician is on standby in case of emergency outside the entrance of the confined area. • Follow policies and procedures, and local legislation for confined spaces. • Ensure that an emergency rescue plan is in place prior to the start of work.	
RW 24.79	Working inside tower or nacelle in cold or wet weather	Risk of falling or tripping due to slippery surfaces	3	3	9	Attention needed	• Clean any slippery surfaces before starting the work. • Use correct footwear, clothing, gloves and safety helmet.	Risk of falling	3	2	6	Risk of falling	• Clean any slippery surfaces before starting the work. • Use correct footwear, clothing, gloves and safety helmet.	

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Section 25: Permanent Magnets & Electromagnets

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
25.01	Working or staying near strong permanent magnets	Risk of influence from magnetic fields on persons using implanted electronic devices	5	1	5	Attention needed	• Users of pacemakers and other implanted electronic devices must be aware of the risks from electronic force from permanent magnets.	• The risk cannot be mitigated because ladders are mounted with permanent magnets. • The risk is evaluated to be extremely low.	5	1	5	Risk of influence from magnetic fields on persons using implanted electronic devices	• Users of pacemakers and other implanted electronic devices must be aware of the risks from electronic force from permanent magnets.	
25.02	Working or staying near strong tools or components emitting magnetic fields	Risk of influence from magnetic fields on persons using implanted electronic devices	5	3	15	Correction needed	• Users of pacemakers and other implanted electronic devices must be aware of the risks from electronic force from magnetic fields. • Read and comply with the instructions for the tools or components carefully.	If instructions are followed, the risk is very low.	5	1	5	Risk of influence from magnetic fields on persons using implanted electronic devices	• Users of pacemakers and other implanted electronic devices must be aware of the risks from electronic force from permanent magnets.	
Routine work (RW) section. These hazards are for service technician reference and are covered by basic service technician training. These hazards shall not result in hazard statement in procedures unless by special HSE request.														

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Section 26: Routine Work

SPRA ID No.	Condition under assessment	Description of hazard	Severity	Likelihood	Risk	Action required	Action to reduce risk	Residual hazard	Severity	Likelihood	Risk	Statements to be transferred to the work instruction		Reference
												Type of hazard	How to avoid	
RW 1.75	Recovering from a fall from heights.	Risk of a fall from heights with properly worn personal fall arrest equipment resulting in suspension trauma, resulting in severe injury or death.	5	3	15	Correction needed	• Minimum 2 persons must have GWO basic safety training. • Always notify first responders, rescue personnel, and ambulance staff of the possibility of suspension trauma.	Risk of suspension trauma.	5	1	5	Risk of falling from height	• Minimum 2 persons must have GWO basic safety training	
RW 1.76	Working from a portable ladder.	Risk of falling from ladder resulting in significant injuries.	3	3	9	Attention needed	• Evaluate if the job is suitable for being performed from a portable ladder. • Do not move or shift a ladder while a person or equipment is on the ladder. • Do not use the top step/rung of a ladder as a step/rung, unless it was designed for that purpose. • Do not exceed the maximum load rating of a ladder. • Inspect the ladder prior to use to ensure that it is in good condition. • Use a ladder only on a stable and level surface, unless it has been secured (top or bottom) to prevent displacement. • Ladders must be free of any slippery material on rungs, steps, or shoes. • Always maintain a 3-point contact (two hands and one foot, or two feet and one hand) on the ladder when climbing. • Keep body near the middle of the step and always face the ladder while climbing. • Be sure that all locks on an extension ladder are properly engaged.	Risk of falling from height	3	2	6	Risk of falling from height	• Evaluate if the job is suitable for being performed from a portable ladder.	
RW 1.77	Climbing the ladder inside the tower.	Risk of falling from heights resulting in severe injury or death.	5	3	15	Correction needed	• Always wear personal fall arrest equipment. • If there is a permanently installed ladder fall protection device, it must be utilised.	Risk of suspension trauma	5	1	5	Risk of falling from height	• Always wear personal fall arrest equipment.	
RW 3.75	Using power tools.	Risk of exposure to electric shock resulting in injury or death of technician.	5	2	10	Attention needed	• Follow the manufacturer's instructions. • Do not remove protective guards. • Prior to use, inspect all power tools for defects, loose parts, altered safety devices, and worn or defective power cords. • Earth or double-insulate power tools according to local regulations. • Unplug tools when not in use.	Risk of electric shock	5	1	5	Risk of electric shock	• Follow the manufacturer's instructions.	
RW 3.76	Service work on signaling and communication circuits (sensors and ethernet connections).	No risk of exposure to electric shock from these voltages.	1	1	1	None								
RW 3.77	Welding and cutting work.	Risk of exposure to electric shock, arcing, flashover, fire, and explosion, resulting in severe injuries and	5	2	10	Attention needed	• Use correct equipment, cables, and tools. • Only qualified personnel are allowed to perform welding and cutting work. • Provide correct return path while welding. • Unplug tools which are not going to be used. • Remove all combustible or flammable material.	Risk of electric shock	5	1	5	Risk of electric shock	• Use correct equipment, cables, and tools.	
RW 3.78	Working on hot components.	Risk of burns resulting in injuries.	2	4	8	Attention needed	• Use required PPE according to PPE sheet 3.	Risk of contact with hot parts	2	1	2	Risk of contact with hot parts	• Use required PPE according to PPE sheet 3.	
RW 3.79	Unintended remote turbine operation.	Risk of unintended electrical or mechanical hazards resulting in death if the turbine is remotely activated during service work.	5	3	15	Correction needed	• Ensure that the turbine cannot be controlled or operated remotely during this procedure.	Risk of electric shock and crushing	5	1	5	Risk of electric shock and crushing	• Ensure that the turbine cannot be controlled or operated remotely during this procedure.	
RW 3.80	Turbine stop caused by an unknown error.	Risk of unknown electrical or mechanical hazards resulting in death.	5	2	10	Attention needed	• Do not enter the turbine until the error has been identified and trained personnel have been consulted. • Follow the general safety rules and instructions. • Use required PPE according to the situation.	Risk of electric shock and crushing	5	1	5	Risk of electric shock and crushing	• Do not enter the turbine until the error has been identified and trained personnel have been consulted.	
RW 3.81	Using a pressure washer.	Risk of injury due to incorrect use of the tool.	3	2	6	Attention needed	• Follow the manufacturer's instructions. • Do not dismantle the system without releasing the pressure. • Ensure safe and easy access to the area being cleaned. • Use required PPE.	Risk of injury with contact to high pressure liquid	3	1	3	Risk of injury with contact to high pressure liquid	• Follow the manufacturer's instructions.	

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RW 4.75	Using a pressure washer.	Risk of injury due to incorrect use of the tool.	3	2	6	Attention needed	• Follow the manufacturer's instructions. • Do not dismantle the system without releasing the pressure. • Ensure safe and easy access to the area being cleaned. • Use required PPE.	Risk of injury with contact to high pressure liquid	3	1	3	Risk of injury with contact to high pressure liquid	• Follow the manufacturer's instructions.	
RW 4.76	Using air pressure (air compressors, vaccums, etc.)	Risk of eye injuries from airborne fluids, dirt, metal shavings, or the like, resulting in eye injuries or penetrating injuries.	3	4	12	Correction needed	• Do not use more pressure than is needed to solve the task. • Use required PPE according to PPE sheet S. • Shield the work area to prevent injuries to other technicians.	Risk of eye injury	3	1	3	Risk of eye injury	• Do not use more pressure than is needed to solve the task. • Use required PPE according to PPE sheet S. • Shield the work area to prevent injuries to other technicians.	
RW 5.75	Tightening/torqueing of bolts.	Risk of injury or squeezing of hands or fingers, if placed between tool and nearby stationary parts.	4	2	8	Attention needed	• DO NOT place fingers/hands between tool and nearby parts such as callipers, brackets, etc. • Use the right tools for the right job. • Maintain and keep tools in good condition to avoid slipping. • Use required PPE.	Risk of crushing injury of body parts	4	1	4	Risk of crushing injury of body parts	• DO NOT place fingers/hands between tool and nearby parts such as callipers, brackets, etc.	
RW 5.76	Turbine stop caused by an unknown error.	Risk of unknown electrical or mechanical hazards resulting in death.	5	2	10	Attention needed	• Do not enter the turbine until the error has been identified and trained personnel have been consulted. • Follow the general safety rules and instructions. • Use required PPE according to the situation.	Risk of electric shock and crushing	5	1	5	Risk of electric shock and crushing	• Do not enter the turbine until the error has been identified and trained personnel have been consulted.	
RW 6.75	Handling of portable electrical hand tools when working at height.	Risk of tools falling down resulting in serious injury or death of technicians working below.	5	2	10	Attention needed	• Tie the tools to prevent them from falling to the ground. • Ensure that no persons are present in areas where overhead work is being performed. • Use a separate tool bag/holder to prevent tools and equipment from falling to the ground.	Risk of falling objects	5	1	5	Risk of falling objects	• Tie the tools to prevent them from falling to the ground. • Ensure that no persons are present in areas where overhead work is being performed.	
RW 6.76	Using electrical tools on site.	Risk of injuries when established safety measures are not followed.	5	2	10	Attention needed	• Read and follow the manufacturer's instructions. • Do not use electric tools in wet location unless approved for that use. • Do not remove protection covers from the tools. • Use required PPE. • Disconnect tools when not in use. • Never carry a tool by the cord or by the hose. • Keep walk ways and work areas clear of electrical cords to prevent tripping hazards. • Keep other persons at a safe distance from the workspace. • Only use tools with appropriate approvals. • Follow the manufacturer's instructions. • Consider ergonomic issues associated with using the tool and make appropriate adjustments.	Risk of electrical shock	5	1	5	Risk of electrical shock	• Read and follow the manufacturer's instructions.	PPE sheet not identified
RW 6.77	Using electrical tools on site.	Risk of tool sparks causing a fire, resulting in death.	5	2	10	Attention needed	• If sparks from tools present a fire hazard, take appropriate fire prevention measures and ensure that a fire extinguisher is nearby. • Read and follow the manufacturer's instructions. • Use required PPE.	Risk of fire	5	1	5	Risk of fire	• If sparks from tools present a fire hazard, take appropriate fire prevention measures and ensure that a fire extinguisher is nearby.	PPE sheet not identified
RW 6.78	Working with power tools.	Risk of exposure to noise level above 80 dB(A) or tool vibrations resulting in injuries.	3	5	15	Correction needed	• Use required PPE according to PPE sheet 10. • Do not use tools longer than stated in the user manual. • The tools must be maintained according to the user manual. • Check the noise level in the user manual for the tool.	Risk of hearing loss and white fingers	3	1	3	Risk of hearing loss and white fingers	• Use required PPE according to PPE sheet 10.	
RW 6.79	Handling of electrical tools on site when not in use.	Risk of injury from accidentally switching on tools	4	2	8	Attention needed	• Disconnect power to tools when not in use. • Keep the walk way clear of electrical cords to prevent tripping hazards. • Remove damaged tools and tag them 'Do Not Use'.	Risk of injury due to unintentional start of tool	4	1	4	Risk of injury due to unintentional start of tool	• Disconnect power to tools when not in use.	
RW 8.75	Using tools.	Risk of ergonomic or personal injury resulting from misuse of hand tools causing injuries.	3	2	6	Attention needed	• Use required PPE according to PPE sheet 2. • Use only approved tools and equipment. • Follow the manufacturer's instructions. • Consider ergonomic issues associated with using the tool and make appropriate adjustments. • Use the right tools for the right job.	Risk of accidental cuts or minor injuries.	2	1	2	Risk of accidental cuts or minor injuries.	• Use required PPE according to PPE sheet 2.	
RW 8.76	Crushing hazard.	Risk of crushing body parts resulting in severe injuries.	4	3	12	Correction needed	• Keep body parts clear of pinch points.	Risk of crushing body parts	4	1	4	Risk of crushing body parts	• Keep body parts clear of pinch points.	
RW 11.75	Bring the paint, solvent and other accessories to the painting area.	Spillage of paint and solvents on to the ground due to dropping them.	2	2	4	None								
RW 11.76	Cleaning of the area after completing the painting work.	Spillage of paint and solvents leading to fire and pollution.	2	2	4	None								

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RW 14.75	Manual handling of heavy load.	Risk of load slipping from the hands leading to personal injury.	3	3	9	Attention needed	• Use required PPE according to PPE sheet 11. • Ensure that the load gripping points do not have any traces of oil, grease, or other similar materials. • Bulky loads must be handled by more than one person. • Containers used to transport loads must have handles to grip. • Ensure that the load rests on the root of the fingers, not only on the fingertips, to avoid injuring muscles and tendons in fingers.	Risk of falling objects	3	1	3	Risk of falling objects	• Use required PPE according to PPE sheet 11.	
RW 14.76	Manual handling of heavy load.	Risk of sharp edges leading to cuts and abrasions.	2	3	6	Attention needed	• Use required PPE according to PPE sheet 4. • Check whether the load has any dangerous zones or surfaces, such as square corners, sharp edges, nails, etc. • Ensure the body is not exposed to these zones or surfaces when picking up and handling the load.	Risk of cut injury	2	1	2	Risk of cut injury	• Use required PPE according to PPE sheet 4.	
RW 14.77	Manual handling of heavy load.	Risk of technician falling while moving the load leading to injuries.	3	3	9	Attention needed	• Load handling area must be free from obstacles, debris, and slippery surfaces. • Use safety shoes with a suitable anti-slip sole. • Check that shoe soles are free from grease, oil, or other similar materials.	Risk of falling	3	1	3	Risk of falling	• Load handling area must be free from obstacles, debris, and slippery surfaces.	
RW 14.78	Manual handling of heavy load.	Risk of fingers or hands getting trapped between the load and the fixed or mobile structures leading to crushing injury.	2	3	6	Attention needed	• Use required PPE according to PPE sheet 11 • Before manually moving a load, check that the path does not have any narrow passes. • When selecting the point for gripping a load, keep hands away from the bottom of the load.	Risk of crushing body parts	2	1	2	Risk of crushing body parts	• Use required PPE according to PPE sheet 11	
RW 14.79	Manual handling of heavy load.	Risk of musculoskeletal injuries caused by incorrect handling of the load.	4	3	12	Correction needed	• Use mechanical aids when ever possible • Do not twist the torso while lifting the load, pivot on the feet. • Five basic rules while lifting a load: • Spread the feet to a stable position. • Place one foot in front of the other in the direction of movement. • Bend the knees, keeping the back straight or tilted slightly forwards at all times. • Bring the object as close to the body as possible; lift the weight gradually, without any sudden movements, using the strength of the legs. • Enlist assistance if required.	Risk of musculoskeletal injuries.	4	1	4	Risk of musculoskeletal injuries.	• Use mechanical aids whenever possible.	
RW 14.80	Manual handling of heavy load.	Risk of back injuries caused by incorrect handling of the load.	4	3	12	Correction needed	• Use mechanical aids whenever possible. • Do not bend the neck while carrying a load. • Do not twist the torso with a raised load. • Carry the load at waist height and as close as possible to the body. • While carrying it with one arm, avoid tilting the spine to the side. • While lifting the load from the floor to a height above the shoulders, rest the load halfway to change grip. • Always ensure that the load rests at the root of the fingers, not only on the fingertips, to avoid injuring muscles and tendons in fingers. • Push and pull the load using the weight of the body, leaning forward to push and backwards to pull, but always avoid twisting or bending the back. • Enlist assistance if required.	Risk of musculoskeletal disorders.	4	1	4	Risk of musculoskeletal disorders.	• Use mechanical aids whenever possible.	
RW 14.81	Manual handling of heavy load.	Risk of muskuloskeletal injuries caused by incorrect handling of the load.	4	3	12	Correction needed	• Use mechanical aids whenever possible. • For heavy or awkward lifting enlist the assistance of other technicians. • Use proper lifting techniques.	Risk of musculoskeletal disorders.	4	1	4	Risk of musculoskeletal disorders.	• Use mechanical aids whenever possible. • For heavy or awkward lifting enlist the assistance of other technicians.	
RW 16.75	Sustained, forced postures.	Risk of musculoskeletal disorders/injuries.	3	3	9	Attention needed	• If possible implement job rotation. • Work must be scheduled so that technicians can alternate demanding tasks with non-demanding tasks, and when work is being performed, involving sustained, forced postures, these tasks must be arranged so that they alternate with other tasks that utilise different muscle groups. • Take regular breaks while performing tasks.	Risk of musculoskeletal disorders/injuries.	3	1	3	Risk of musculoskeletal disorders/injuries.	• If possible implement job rotation.	
RW 16.76	Sustained work with arms above head height.	Risk of musculoskeletal injuries.	3	3	9	Attention needed	• Use working platforms that prevent the technician from having to work for extended periods with his/her arms above head level. • Take regular breaks while performing tasks. • Implement job rotation.	Risk of musculoskeletal disorders/injuries.	3	1	3	Risk of musculoskeletal disorders/injuries.	• Use working platforms that prevent the technician from having to work for extended periods with his/her arms above head level.	
RW 16.77	Sustained work with repeated wrist rotation or twisting movements.	Risk of musculoskeletal injuries.	3	3	9	Attention needed	• Use tools that minimise the need for repeated twisting or rotating movements of the wrist. • Take regular breaks while performing tasks. • Implement job rotation.	Risk of musculoskeletal disorders/injuries.	3	1	3	Risk of musculoskeletal disorders/injuries.	• Use tools that minimise the need for repeated twisting or rotating movements of the wrist.	

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RW 16.78	Sustained work with the upper body twisted or considerably tilted.	Risk of musculoskeletal injuries.	4	3	12	Correction needed	• Whenever possible, work that requires considerable effort with a sustained twisted or considerably tilted position of the upper body must be avoided. • Work must be scheduled so that technicians can alternate demanding tasks with non-demanding tasks, and when performing work that involves sustained, forced postures, these tasks must be arranged so that they alternate with other tasks that imply different muscle groups. • Take regular breaks while performing tasks. • Implement job rotation.	Risk of musculoskeletal disorders/injuries.	4	1	4	Risk of musculoskeletal disorders/injuries.	• Whenever possible, work that requires considerable effort with a sustained twisted or considerably tilted position of the upper body must be avoided.	
RW 17.75	Transportation by truck.	Risk of heavy single items falling from truck onto persons, due to poor securing of components or transport frame, resulting in death.	5	2	10	Attention needed	• Do not work under suspended load unless being in the safe zone. • Use a transport frame designed for the purpose. • Secure components to transport frame and truck. • Secure the transport frame to the truck on all four sides. • Use tie downs with a weight rating greater than load.	Risk of falling objects	5	1	5	Risk of falling objects	• Do not work under suspended load unless being in the safe zone.	
RW 17.76	Transportation by truck.	Risk of road accident due to speeding / non-adherence to road safety rules / poor maintenance of truck, resulting in death.	5	2	10	Attention needed	• Follow road safety rules including adherence to prescribed speed limits. • All vehicles in use must be checked at the beginning of the shift to ensure that parts, equipment, and accessories are in safe operating condition and free of apparent damage which could cause failure while in use.	Risk of vehicle accidents due to unforeseen conditions or non-turbine related individuals resulting in severe injury or death.	5	1	5	Risk of vehicle accidents due to unforeseen conditions or non-turbine related individuals resulting in severe injury or death.	• Follow road safety rules including adherence to prescribed speed limits. • All vehicles in use must be checked at the beginning of the shift to ensure that parts, equipment, and accessories are in safe operating condition and free of apparent damage which could cause failure while in use.	
RW 17.77	Transportation by truck.	Risk of toppling of truck due to poor road condition / narrow bends, causing severe injury.	4	2	8	Attention needed	• Follow road safety rules and adhere to prescribed speed limits. • Clear the truck route to avoid narrow bends which can affect the truck stablity. • Strengthen the road/soil condition wherever required.	Risk of vehicle accidents due to unforeseen conditions or non-turbine related individuals resulting in severe injury.	4	1	4	Risk of vehicle accidents due to unforeseen conditions or non-turbine related individuals resulting in severe injury.	• Follow road safety rules and adhere to prescribed speed limits. • Clear the truck route to avoid narrow bends which can affect the truck stablity. • Strengthen the road/soil condition wherever required.	
RW 17.78	Entering the nacelle during long-term transportation or storage.	Risk of movement of transportation turning gear, causing severe injury if caught in rotating parts.	4	2	8	Attention needed	• Turn off power supply to the transportation turning gear and dehumidifier prior to entering the nacelle. • Make sure that the main shaft does not turn.	Risk of crushing body parts	4	1	4	Risk of crushing body parts	• Turn off power supply to the transportation turning gear and dehumidifier prior to entering the nacelle.	
RW 18.75	Removing lifting equipment.	Risk of uncontroled movement of loads before and after lifting procedures resulting in crushing injuries.	4	2	8	Attention needed	• Do not remove the lifting equipment until the component is appropriately secured.	Risk of crushing body parts	4	1	4	Risk of crushing body parts	• Do not remove the lifting equipment until the component is appropriately secured.	
RW 18.76	Crushing hazard.	Risk of crushing body parts when moving suspended loads through hatches or in confined work areas resulting in severe injuries.	4	3	12	Correction needed	• Keep body parts clear of pinch points.	Risk of crushing body parts resulting in severe injuries.	4	1	4	Risk of crushing body parts resulting in severe injuries.	• Keep body parts clear of pinch points.	

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RW 18.77	Fastening and unfastening load.	Risk of fingers, arms, accessories, or loose clothing getting entangled with the hook causing severe injuries.	4	2	8	Attention needed	• Stay clear of pinch points when attaching or detaching load to the lifting hook. • Do not start lifting until the banksman has indicated that all personnel are clear of the lifting area. • All personnel must be clear of the lifting area before the lifting commences. • The ground banksman must ensure that all persons are clear of the hook before communicating to the hoist operator to commence the lift. • The service crane operator must maintain a practicable view of the load while lifting. • Remove accessories and confine loose clothing when working close to pinch points. • A lifting plan must be produced prior to the lifting. • Use only certified lifting equipment and thoroughly inspect the same prior to use. • All service cranes, hoists, lifting and anchorage equipment must be formally checked prior to use. • Follow correct slinging arrangement and lifting procedures. • Only trained and qualified technician and lifting operators are allowed to fasten and unfasten load.	Risk of crushing body parts resulting in severe injuries.	4	1	4	Risk of crushing body parts resulting in severe injuries.	• Stay clear of pinch points when attaching or detaching load to the lifting hook.	
RW 18.78	Fastening and unfastening load.	Risk of trips/slips/falls causing broken or fractured ankles or legs, strains, or bruises to the banksman.	3	3	9	Attention needed	• The turbine must be yawed prior to the nacelle hoist operation to ensure that it is taking place in a clear ground area. • The service crane ground landing area must be clear of obstacles, potholes, and stones prior to traversing.	Risk of trips/slips/falls is minimised.	3	1	3	Risk of trips/slips/falls	• The turbine must be yawed prior to the nacelle hoist operation to ensure that it is taking place in a clear ground area. • The service crane ground landing area must be clear of obstacles, potholes,	
RW 18.79	Signalling and communication.	Risk of load falling down on rigging team causing severe injury or death due to wrong signalling and poor communication between teams.	5	2	10	Attention needed	• Ensure good two-way communication between the service crane operator in the nacelle and the technician by means of two-way radio/mobile phone or hand signals. • Service crane operator and other persons must only use standard signals. • At all times, only one person at a time must be signalling to the service crane operator. If more than one signal is given, the operation must be stopped immediately. • Where communication between service crane operator and technician is broken, the lifting operation must stop. • Ensure that communication devices are fully charged prior to the lifting operation.	Risk of injury due to wrong signalling, miscommunication, or external interference.	5	1	5	Risk of injury due to falling object.	• Ensure good two-way communication between the service crane operator in the nacelle and the technician by means of two-way radio/mobile phone or hand signals. • Where communication between service crane operator and technician is broken, the lifting operation must stop.	
RW 18.80	Use of turbine service crane in high winds.	Risk of falling load or equipment causing serious injury or death to personnel below.	5	2	10	Attention needed	• Do not perform the lifting operation when wind speed exceeds the maximum value according to the wind speed guidelines for specific jobs. • Do not stand/work under suspended load. • A weather forecast must be made prior to lifting taking place, and the wind speed must be monitored on the turbine anemometer or site met mast prior to and during the lifting operation.	Risk of falling objects	5	1	5	Risk of falling objects	• Do not perform the lifting operation when wind speed exceeds the maximum value according to the wind speed guidelines for specific jobs.	
RW 18.81	Lifting operation in poor visibility.	Risk of suspended load mis-management due to poor visibility resulting in severe injuries or	5	2	10	Attention needed	• Do not perform any lifting of equipment in conditions that obscure the visibility of load or personnel. • Use required PPE according to PPE sheet 12.	Risk of falling objects	5	1	5	Risk of falling objects	• Do not perform any lifting of equipment in conditions that obscure the visibility of load or personnel. • Use required PPE according to PPE sheet 12.	
RW 19.75	Removing lifting equipment.	Risk of uncontroled movement of loads before and after lifting procedures resulting in crushing injuries.	4	2	8	Attention needed	• Do not remove the lifting equipment until the component is appropriately secured.	Risk of crushing injury of body parts	4	1	4	Risk of crushing injury of body parts	• Do not remove the lifting equipment until the component is appropriately secured.	
RW 19.76	Crushing hazard.	Risk of crushing body parts when moving suspended loads through hatches or in confined work areas resulting in severe injuries.	4	3	12	Correction needed	• Keep body parts clear of pinch points.	Risk of crushing body parts	4	1	4	Risk of crushing body parts	• Keep body parts clear of pinch points.	

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RW 19.77	Fastening and unfastening load.	Risk of fingers, arms, accessories, or loose clothing getting entangled with the hook causing severe injuries.	4	2	8	Attention needed	• Stay clear of pinch points when attaching or detaching load to the lifting hook. • Do not start lifting until the banksman has indicated that all personnel are clear of the lifting area. • All personnel must be clear of the lifting area before the lifting commences. • The ground banksman must ensure that all persons are clear of the hook before communicating to the hoist operator to commence the lift. • The service crane operator must maintain a practicable view of the load while lifting. • Remove accessories and confine loose clothing when working close to pinch points. • A lifting plan must be produced prior to the lifting. • Use only certified lifting equipment and thoroughly inspect the same prior to use. • All service cranes, hoists, lifting and anchorage equipment must be formally checked prior to use. • Follow correct slinging arrangement and lifting procedures. • Only trained and qualified technician and lifting operators are allowed to fasten and unfasten load.	Risk of crushing body parts resulting in severe injuries.	4	1	4	Risk of crushing body parts resulting in severe injuries.	• Stay clear of pinch points when attaching or detaching load to the lifting hook.	
RW 19.78	Fastening and unfastening load.	Risk of trips/slips/falls causing broken or fractured ankles or legs,	3	3	9	Attention needed	• The turbine must be yawed prior to the nacelle hoist operation to ensure that it is taking place in a clear ground area. • The service crane ground landing area must be clear of obstacles, potholes, and stones prior to traversing.	Risk of trips/slips/falls is minimised.	3	1	3	Risk of trips/slips/falls	• The turbine must be yawed prior to the nacelle hoist operation to ensure that it is taking place in a clear ground area.	
RW 19.79	Signalling and communication.	Risk of load falling down on rigging team causing severe injury or death due to wrong signalling and poor communication between teams.	5	2	10	Attention needed	• Ensure good two-way communication between the service crane operator in the nacelle and the technician by means of two-way radio/mobile phone or hand signals. • Service crane operator and other persons must only use standard signals. • At all times, only one person at a time must be signalling to the service crane operator. If more than one signal is given, the operation must be stopped immediately. • Where communication between service crane operator and technician is broken, the lifting operation must stop. • Ensure that communication devices are fully charged prior to the lifting operation.	Risk of injury due to wrong signalling, miscommunication, or external interference.	5	1	5	Risk of injury due to falling object.	• Ensure good two-way communication between the service crane operator in the nacelle and the technician by means of two-way radio/mobile phone or hand signals. • Where communication between service crane operator and technician is broken, the lifting operation must stop.	
RW 19.80	Use of turbine service crane in high winds.	Risk of falling load or equipment causing serious injury or death to personnel below.	5	2	10	Attention needed	• Do not perform the lifting operation when wind speed exceeds the maximum value according to the wind speed guidelines for specific jobs. • Do not stand/work under suspended load. • A weather forecast must be made prior to lifting taking place, and the wind speed must be monitored on the turbine anemometer or site met mast prior to and during the lifting operation.	Risk of falling objects	5	1	5	Risk of falling objects	• Do not perform the lifting operation when wind speed exceeds the maximum value according to the wind speed guidelines for specific jobs.	
RW 19.81	Lifting operation in poor visibility.	Risk of suspended load mismanagement due to poor visibility resulting in severe injuries or death.	5	2	10	Attention needed	• Do not perform any lifting of equipment in conditions that obscure the visibility of load or personnel. • Use required PPE according to PPE sheet 12.	Risk of falling objects	5	1	5	Risk of falling objects	• Do not perform any lifting of equipment in conditions that obscure the visibility of load or personnel. • Use required PPE according to PPE sheet 12.	
RW 19.82	Contact with energised overhead power lines or other obstacles.	Risk of electrocution to crane operator and technicians near the crane.	5	2	10	Attention needed	• Crane boom, wires, and loads must be kept at a safe distance from high-voltage power lines. If this is not possible, the power lines must be de-energised. • Ensure that the lifting plan considers risks related to overhead power lines and obstacles.	Risk of electrical shock	5	1	5	Risk of electrical shock	• Crane boom, wires, and loads must be kept at a safe distance from high-voltage power lines. If this is not possible, the power lines must be de-energised. • Ensure that the lifting plan considers risks related to overhead power lines and obstacles.	
RW 20.75	Movement of service vans/trucks/forklifts/cranes on site.	Risk of accidents due to speeding/reversing/non-adherence to rules and instructions.	5	2	10	Attention needed	• Follow the site-specific instructions regarding movement of vehicles. • Wear high-visibility clothing on site. • Ensure that no persons stand behind a truck during reversing. • Unauthorised persons must be kept clear during unloading/loading.	Risk of trafic accident	5	1	5	Risk of trafic accident	• Follow the site-specific instructions regarding movement of vehicles. • Wear high-visibility clothing on site.	
RW 20.76	Transporting components by using forklifts.	Risk of tipping of forklift due to overloading or soft soil condition, causing severe injury.	4	2	8	Attention needed	• Forks and shovels must be lowered as far as safely possible before moving the equipment. • Forks must be spread as far apart as possible. The stability of the load must always be checked before moving it. • Ensure that the forklift is loaded according to the loading chart. • Ensure prior to use that ground conditions are appraised for slopes or gradients with regard to loading and forklift brake capacity. • Potholes in the road surface must be filled before traversing the forklift.	Risk of crushing injury of body parts	4	1	4	Risk of crushing injury of body parts	• Forks and shovels must be lowered as far as safely possible before moving the equipment.	

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RW 20.77	Leaving the forklifts without lowering the forks completely.	Risk of other moving equipment striking against forks causing tipping of forklift resulting in injuries to driver.	3	2	6	Attention needed	• Forks and shovels must be lowered completely before leaving the equipment.	Risk of crushing injury of body parts	3	1	3	Risk of crushing injury of body parts	• Forks and shovels must be lowered completely before leaving the equipment.	
RW 21.75	Exiting a stalled service lift.	Risk of service personnel falling from height during self-rescue to the ladder causing severe injury or death.	5	2	10	Attention needed	• Follow the evacuation procedure when climbing out of a stalled service lift to the ladder. • Always wear personal fall arrest equipment with two lanyards. At least one of the lanyards must be attached to an approved anchor point. • Never attempt a self-rescue without sufficient light.	Risk of falling from height	5	1	5	Risk of falling from height	• Follow the evacuation procedure when climbing out of a stalled service lift to the ladder.	
RW 21.76	Closing the service lift gate.	Risk to service personnel of crushing or cutting injuries if body parts are caught in the service lift gate when it closes.	3	2	6	Attention needed	• Keep hands and fingers clear of the pinch point when the service lift gate is closing.	Risk of crushing body parts	3	1	3	Risk of crushing body parts	• Keep hands and fingers clear of the pinch point when the service lift gate is closing.	
RW 21.77	Entry into service lift.	Lift doors constitute ergonomic hazards and lower fixed portion can be a risk for tripping, falling, and causing injury to service personnel.	3	2	6	Attention needed	• Do not climb over lower fixed portion of the gate while carrying heavy loads.	Risk of slip/trip and fall	3	1	3	Risk of slip/trip and fall	• Do not climb over lower fixed portion of the gate while carrying heavy loads.	
RW 21.78	Travelling in service lift.	Risk of injury to service personnel if body parts are outside of the service lift cage when it is in motion.	4	2	8	Attention needed	• Only qualified service personnel may operate the service lift. • To reduce the risk of personal injury, keep hair, loose clothing, fingers, and all body parts inside of the service lift cage and away from moving parts. • Never attempt to open the service lift gate while it is in motion. • Ensure that everyone is clear around the service lift before operating it.	Risk of crushing body parts	4	1	4	Risk of crushing body parts	• Only qualified service personnel may operate the service lift.	
RW 21.79	Stopping the service lift.	Risk of tripping and falling if the service lift gate is opened and the service lift is not level with the platform floor.	4	2	8	Attention needed	• Open the service lift door only when the service lift is level with the platform floor.	Risk of slip/trip and fall	4	1	4	Risk of slip/trip and fall	• Open the service lift door only when the service lift is level with the platform floor.	
RW 22.75	High winds.	Risk of high winds causing the turbine to be unstable, resulting in falling loads	5	2	10	Attention needed	• Follow the instructions on wind speed limits for the specific task while working on different parts of the turbine.	Risk of falling objects	5	1	5	Risk of falling objects	• Follow the instructions on wind speed limits for the specific task while working on different parts of the turbine.	
RW 22.76	Lightning and thunderstorms.	Risk of lightning striking the different parts of the turbine possibly resulting in severe injuries or death.	5	2	10	Attention needed	• Leave the turbine in case of risk of lightning during work. • Check the lightning forecast. • In offshore towers stay in a safe place inside the tower	Risk of electical shock	5	1	5	Risk of electical shock	• Leave the turbine in case of risk of lightning during work.	
RW 22.77	Snow and icing of blades or other parts of the turbine.	Risk of ice being thrown when stopping the turbine resulting in severe injury or death of technicians.	5	2	10	Attention needed	• Do not approach the turbine if there are risk of falling ice. • If ice in the area is noticed, and there is a suspicion of ice on the turbine blades, temporarily remote stop all the turbines in the immediate area when a vehicle is approaching the area. • If possible, yaw the turbine remotely so that the severest hazard (typically ice on the blades) is on the opposite side of the tower from the entrance door. • One technician approaches the turbine and clears the work way; meanwhile the second technician is watching. • The second technician does not approch the turbine, until the first technician is inside the turbine. • Stay clear of the turbine blades while approaching. • Park the service car approximately 100 m away from the turbine. • Once ALL employees are inside the turbine to do the assigned work, a call can be made to restart the other turbines, outside a 300 m safety	Risk of falling objects	5	1	5	Risk of falling objects	• Do not approach the turbine if there are risk of falling ice.	

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RW 22.78	Snow and icing of blades or other parts of the turbine.	Risk of ice being thrown from the blades while being on the nacelle roof causing injury to personnel.	5	2	10	Attention needed	• Open the nacelle roof hatch furthest from the blades. • Inspect the blades visually for ice build-up. • If the blades still have ice attached, DO NOT ENTER THE NACELLE ROOF.	Risk of falling objects	5	1	5	Risk of falling objects	• Open the nacelle roof hatch furthest from the blades. • Inspect the blades visually for ice build-up. • If the blades still have ice attached, DO NOT ENTER THE NACELLE ROOF.	
RW 22.79	Snow and icing of blades or other parts of the turbine.	Risk of slipping and falling from the nacelle roof because of icy surface resulting in death of technician.	5	3	15	Correction needed	• If the Nacelle or blades still have ice attached, DO NOT ENTER THE NACELLE ROOF.	Risk of falling objects	5	1	5	Risk of falling objects	• If the Nacelle or blades still have ice attached, DO NOT ENTER THE NACELLE ROOF.	
RW 22.80	Snow and icing of blades or other parts of the turbine.	Risk of ice being thrown during start-up of turbine resulting in death of technicians.	5	3	15	Correction needed	• Keep a safety distance of approx. 300 m to the turbine during start up. • Yaw the blades away from the access tower door. • Be aware of the wind direction and make sure, if possible, that the wind does not blow ice in the direction of the access way. • The technicians leave the turbine one at the time. • Start up the turbine remotely.	Risk of falling objects	5	1	5	Risk of falling objects	• Keep a safety distance of approx. 300 m to the turbine during start up.	
RW 22.81	Working inside the turbine in conditions with high temperatures.	Tiredness, dehydration and, at worst, loss of conscious-ness.	2	3	6	Attention needed	• Drink plenty of water. • Ventilate the place wherever possible. • Take regular breaks.	Risk of dehydration	2	1	2	Risk of dehydration	• Drink plenty of water. • Ventilate the place wherever possible.	
RW 22.82	Working inside the turbine in foggy weather.	Risk of low visibility during work.	2	2	4	None								
RW 23.75	Working inside the turbine in conditions with high temperatures.	Risk of fatigue, dehydration, heat stroke, and loss of consciousnes s of personnel from working in high temperatures.	2	3	6	Attention needed	• Open skylight hatches in the nacelle in order to increase the ventilation inside the nacelle. • Carry drinking water to the work spot, while working in hot conditions. • Take regular breaks.	Risk of dehydration	2	1	2	Risk of dehydration	• Open skylight hatches in the nacelle in order to increase the ventilation inside the nacelle. • Carry drinking water to the work spot, while working in hot conditions.	
RW 23.76	Working on hot surfaces.	Risk of burns due to contact with hot surfaces resulting in injuries to service personnel.	2	4	8	Attention needed	• Do not work on components if they are hot. • Allow parts to cool prior to performing service work. • Use required PPE according to PPE sheet 3.	Risk of contact with hot parts	2	2	4	Risk of contact with hot parts	• Do not work on components if they are hot. • Allow parts to cool prior to performing service work. • Use required PPE according to PPE sheet 3.	
RW 23.77	Working close to hot parts.	Risk of burn injuries to service personnel due to radient heat from hot surfaces.	2	3	6	Attention needed	• Do not work on components if they are hot. • Allow parts to cool prior to performing service work. • Use required PPE according to PPE sheet 3.	Risk of contact with hot parts	2	2	4	Risk of contact with hot parts	• Do not work on components if they are hot. • Allow parts to cool prior to performing service work. • Use required PPE according to PPE sheet 3.	
RW 23.78	Lighting requirement due to darkness when working inside the turbine.	Risk of injury to service personnel from hitting against objects or falling due to slipping in low lighting.	3	2	6	Attention needed	• Do not climb/work in the dark. • Bring illumination. • Always carry emergency light in case of power/UPS failure.	Risk of slip/trip and fall	3	1	3	Risk of slip/trip and fall	• Do not climb/work in the dark. • Bring illumination. • Always carry emergency light in case of power/UPS failure.	
RW 23.79	Working on an oily floor.	Risk of skin irritation or allergies due to continued exposure to oil resulting in eczema or allergic reaction.	3	2	6	Attention needed	• Clean up spilled oil • Avoid direct contact with oil. • Use PPE according to PPE sheet G.	Risk of exposure to oil	3	1	3	Risk of exposure to oil	• Clean up spilled oil • Avoid direct contact with oil. • Use PPE according to PPE sheet G.	
RW 23.80	Working on floor with spilled fluids.	Risk of slips and falls due to spilled fluids resulting in injuries.	3	3	9	Attention needed	• Clean up all spilled fluids .	Risk of slip/trip and fall	3	1	3	Risk of slip/trip and fall	• Clean up all spilled fluids .	
RW 24.75	Working with noisy equipment in a enclosed space.	Risk of exposure to noise level above 80 dB(A) or tool vibrations resulting in injuries.	3	5	15	Correction needed	• Use required PPE according to PPE sheet 10.	Risk of hearing loss	3	1	3	Risk of hearing loss	• Use required PPE according to PPE sheet 10.	

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RW 24.76	Working in an enclosed space with a confined entrance/exit.	Unable to exit the area in the event of an emergency such as a fire, resulting in death.	5	2	10	Attention needed	• Always ensure that a technician is on standby in case of emergency outside the entrance of the confined area. • Follow policies and procedures, and local legislation for confined spaces. • Ensure that an emergency rescue plan is in place prior to the start of work.	Risk of being trapped in confined space	5	1	5	Risk of being trapped in confined space	• Always ensure that a technician is on standby in case of emergency outside the entrance of the confined area. • Follow policies and	
RW 24.77	Working in an enclosed space with a confined entrance/exit.	Self-rescue by an injured technician not possible, resulting in a more severe injury or possibly death.	5	2	10	Attention needed	• Always ensure that a technician is on standby in case of emergency outside the entrance of the confined area. • Follow policies and procedures, and local legislation for confined spaces. • Ensure that an emergency rescue plan is in place prior to the start of work.	Risk of being trapped in confined space	5	1	5	Risk of being trapped in confined space	• Always ensure that a technician is on standby in case of emergency outside the entrance of the confined area. • Follow policies and procedures, and local legislation for confined	
RW 24.78	Working in an enclosed space with a confined entrance/exit.	Rescue of an injured person is more difficult, resulting in more severe injuries due to inability to receive immediate medical attention.	5	2	10	Attention needed	• Always ensure that a technician is on standby in case of emergency outside the entrance of the confined area. • Follow policies and procedures, and local legislation for confined spaces. • Ensure that an emergency rescue plan is in place prior to the start of work.	Risk of being trapped in confined space	5	1	5	Risk of being trapped in confined space	• Always ensure that a technician is on standby in case of emergency outside the entrance of the confined area. • Follow policies and procedures, and local legislation for confined spaces. • Ensure that an emergency rescue	
RW 24.79	Working inside tower or nacelle in cold or wet weather	Risk of falling or tripping due to slippery surfaces	3	3	9	Attention needed	• Clean any slippery surfaces before starting the work. • Use correct footwear, clothing, gloves and safety helmet.	Risk of falling	3	2	6	Risk of falling	• Clean any slippery surfaces before starting the work. • Use correct footwear, clothing, gloves and safety helmet.	

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History of the document

Date	Version	Description	Author
04-jun-09	V0	New document	CHKRI
14-aug-09	V1	Technical problems.	CHKRI
23-apr-10	V2	Live electrical work risk added in sheet 3. Certified and approved cutting hand tools are removed from sheet 8. History of document is added.	PPAPA
11-jun-10	V3	• Main menu - 'Drilling operation' included in 'Working with Heat (Hot Work)'. (D 11). • Sheet 1 - 'Working on the portable ladder 'added. • Sheet 1 - Correction made regarding 'anchorage of fall protection lanyard'. • Sheet 7 - Drilling operation added (Row 15 & 16) • History of document is added.	PPAPA
04-mar-13	V4	Content revisions to align with standardised hazard statements, include routine work, standardised all hazards, and reviews by all R&D HSE staff globally.	TYLNG
25-okt-13	V5	• Included unique ID numbers for all hazards and added tab Directions for Updates • 3.03 - Updated ARRs for use of generator / electrical shock based on SBU input • Updated title page row 4 to correct "GRA" to "SPRA", and removed "Generic" from column C • 23.01 - Reduced sound level for working in noisy environments from 85 dB to 80 dB. • 1.02 - Aligned fall from heights when working in tower ARRs with those for the Service Crane. • 5.15 - Added crushing hazard when working in the hub. • 4.10 - Added risk of working with high pressure air or fluids. • Minor corrections to spelling and language as needed. • 3.12 - re-wrote hazard to specify noise level at 80 dB(A) rather than "loud noise" and added (A) to noise level in ARR. • 9.09, 8.02, and 6.04 - have been added to cover marking bolts and nuts when torqueing. • 1.04 & 4.15 - Clarification / correction to actions to reduce risk • 3.13, 3.14, 3.15, 3.16 Added to cover working on slip rings, electrical hazard due to discharge time after shut-down, working on LCTU, and testing overspeed guards. • 5.05 - Actions to reduce risk revised • 9.10 - Working on pressurised systems added • 23.04 - Working with air filters added • RW 23.80 - Working on floor with spilled fluids added • RW 14.81 - Generic Manual lifting added with most appropriate and minimal ARRs. • Risk Evaluation ratings aligned with New HSE RA Template. 9 and 10 are now yellow and Attention needed, all sheets updated • Directions for updates tab/sheet has been added • The Definitions of Likelihood and Severity have been updated to align with the HSE RA template and the definitions in the Incident Management System. • The order of the Likelihood and Severity columns has been changed to align with the HSE RA Template.	TYLNG PEGIL
13-nov-13	V06	• 1.06 - Deleted "Only one technician at a time is allowed to climb the tower ladder." This is routine practice and need not be clarified in the work instruction hazard statements. • Column G formula corrected in sheets 2-25.	TYLNG
07-jan-14	V07	• 3.17 and 3.18 Hazards have been added to cover access to and working in the HV Transformer room. Hazards were reviewed by SBU HSE specialist JATYL. • 4.76 was added to cover usage of compressed air to clean parts, reviewed and accepted by FLEPE.	TYLNG GIROH
14-jan-14	V07	• 3.19 Hazard has been added to cover working with systems requiring isolation of switchgear circuit breakers. • Broken formulae fixed in section 3. • CTRL+Home each sheet to A1 and return to cover sheet for final Save to clean up document opening. • Updated chemical instructions in sheets 2, 10, 11, 12 & 13	PEGIL
24-jan-14	V07	• 3.20 hazard has been added for 'Performing service work on the rotating generator'.	FLEPE
28-jan-14	V07	• 'Standardized' replaced by 'Standardised' globally. • Entire workbook (i.e. all SPRA sheets) language reviewed (in agreement with TYLNG, Dec. 2013).	GIROH
29-jan-14	V07	• 3.20 Hazard "Incident energy" made generic • 5.16 Hazard "Magnetic fields" added • 24.01 Hazard "Poor air quality" updated	PEGIL
30-jan-14	V07	Added who may edit this document and how in the 'Directons for Updates' tab.	FLEPE
08-apr-14	V08	Version skipped, likely due to accidental "Create New Version".	PEGIL
08-apr-14	V09	• 3.21 Working on circuit breakers with a motor- or manually-charged activation spring. • 9.11 Cleaning with pressurised air • 23.05 Working near the switchgear exhaust zone	PEGIL
17-jul-14	V10	• 1.04: Edited/rephrased the last sentence. Syntax only. (Ensure, by setting up a perimeter and providing signage, that no persons are present in areas **where overhead work is being performed**).	GIROH
06-aug-14	V10	Revised sheet 2 'Working With Chemicals': • Deleted the following, invalid link: http://dkrdsarisvpp01.vestas.net/businesspublisher/index.do • Added the text: '2) For instructions and examples on how to insert chemical warnings in Service Work Instructions, see 0001-6937 'Use of Chemicals in Service Work Instructions – a Guideline'.	FLEPE/GIROH
06-aug-14	V10	• 5.15 'Working in the hub' deleted. Reference to ID#5.09 'Working in the hub or nose cone' made instead. • 5.17 'Inspection/test of gearbox, bearings, and generator during operation for unusual noises from rotating parts' added and updated according to the OH&S manual section 6, subsection 2.2.2.	GIROH
16-oct-14	V10	• 3.03 Two new points have been added about earthing (generator) • 3.04 Two points added about descent device when performing electrical work. • 3.13 Added: • Ensure that slip rings are completely dry from any liquid cleaners before energising. • 3.18 Added: • Ensure transformers are completely dry after cleaning prior to energising. • 3.22 A new number was created. 3.22 Deals with first connection to the grid or after failures, which is different to the standard connection to the grid. Cell in column H: No persons must be in the turbine during switching.Use remote equipment. • 5.17 Removed the GWO training for all personal. 5.17 is updated according to OH&S manual section 6 subsection 2.2.2.	FLEPE/JAHUA/ GIROH
12-mar-15	V11	3.06, 3.22, 7.09 and 7.10 updated and replaced "authorised" with "qualified" where adequate	GIROH/JAHUA/ FLEPE
25-jun-15	V11	Added a new section 25 'Permanent Magnets and Electromagnets'. 3.01: Removed 'Cables'. 5.03 added 'only in the IDLE mode'. Removed references to the 'Vestas corporate OH&S manual' in the warnings. Added specific PPE sheets where it was possible to identify the required PPE.	JAHUA/FLEPE
31-aug-15	V12	Update template to make it more printer friendly. Added RW 24.79, 25.02, under 22 and 26. Added 2 extra columns and blue letters for securing text is in the SWI.	JAHUA
05-nov-15			FLEPE

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Risk evaluation

L \ S	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Result	Action requried
1-4	None
5-10	Attention needed
11-25	Correction needed

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JSA - Job Safety Analysis

The JSA is to be used daily prior to each activity / bundle assignment.

Objective: Ensure everyone engaged in a specific activity has fully evaluated the situation, their role / scope / fit, planned & prepared, identified & mitigated all standard and potential risks.

Date:			
Location/Turbine ID:		**Wind Speed:**	
Description of Work/Task:			
First Responder Name:		**Location:**	
Contact Information (cell/radio channel):			

Safe Work Approach: Process Decision Tree	**Yes mark X**
1 **Are all team members qualified (certification level) to perform the task assignments?** *(If **yes**, continue on to Q2; if **no**, stop and contact a Lead or Supervisor)*	
2 **Has the team performed this task safely in the last 6 months?** *(If **yes**, continue on to Q3; if **no**, contact a Lead or Supervisor)*	
3 **Is there an AME released work instruction, Site approved Pre-Task Plan (PTP) or HSE policy / procedure that directly matches this task?** *(If **yes**, continue on to Q4; if **no**, create/modify PTP with appropriate oversight and approvals and then complete a new JSA.)*	
+ **The equipment configuration (CIM, Mark Version, BoP, Other upgrades/retrofits) matches the task document?**	
+ **Team member certification level > = the task document level?**	
4 **Are you confident that there are not multiple problems contributing to the symptom?** *(If **yes**, continue on to Q5; if **no**, contact a Lead or Supervisor)*	
5 **Do you have the tools and PPE specified in the task documentation (calibrated/certified)?** *(If **yes**, continue; if **no** address the gaps before continuing)*	
6 **Are you working with someone you haven't worked with recently.**	

TO BE COMPLETED PRIOR TO ENGAGING IN WORK ACTIVITY

Minimum requirement: identify top 3 highest potential risks

Do NOT document the obvious and the areas covered in the released work instruction or PTP *(e.g. fall protection for climbing)*

	Additional Risks ("What If" perspective) Potential unplanned, unexpected risks that are not documented. See below yellow highlighted for required considerations areas	**Prevention Methods** Special or additional protocol, test, procedure, PPE, tool, approach, breaks, stretches, etc.	**Risk Prevention** Verified *(initials)*	**Risk Prevention** measures removed / Ready to run *(initials)*
1				
2				
3				
4				
5				
6				
7				

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Vestas

JSA - Job Safety Analysis

The JSA is to be used daily prior to each activity / bundle assignment.

Team Member Considerations:	Circle "Y"-Yes / "N"-No	
Emergency Call Number / Method Documented and Known by all?	Y	N
Emergency Call Number:		
New Team Members Qualified and Certified for Task Scope (includes Vestas Technician, Loan Labor, DK, or Third Party)?	Y	N
New Team Members Compliant with Required Safety Training?	Y	N
Confirm Each Team Member has:	**Circle "Y"-Yes / "N"-No**	
Proper PPE?	Y	N
Communications (Radio, Channels, etc.)?	Y	N
Defined Emergency Response Roles (Evacuation, Medical, Equipment Shutdown, Fire Response Coordinators, etc.), Inc. backups?	Y	N

Pre-Use Inspection (per manufacturer's recommendations)/ Pre-Activity Preparation (check box with "X" when complete)

Check Standard PPE (both yours and your teammate's) - including Harness, Lad-safe, Lanyards, Gloves, Helmet, Boots, Eye Wear, Ear Protection

Check Standard Emergency Equipment - including Fire Extinguisher, Eye Wash, First Aid Kit, Decent Device

Check Electrical Equipment - including Voltage Gloves, Arc Flash Clothing, Arc Flash Hood, Multimeter, Extension Cords

Check LOTO Equipment - including Special Devices, Lockbox Inventory (control locks, non-conductive hasps, metal hasps, cable lockout device, breaker lockout devices)

Check Lifting and Rigging Equipment - including lifting yokes, tag lines, straps, hasps, specialized rigging or tools, etc.

Drop Zone cleared, established with physical markers (cones, signs, barricades), and entry protocols understood and communicated.

Check Proper Tools (Confirmed, Tested/Calibrated)?

Permits Required: **Hot Work Permit #** _____ **Confined Space Permit #** _____ **Lift Plan Permit #** _____ **Other Permit #** _____

Stretching / Warm-up (Back, Arms, Legs) Prior to Climbing / Physical Task Activity

TO BE COMPLETED FOLLOWING WORK ACTIVITY OR RETURN FROM TOWER

What were the Unplanned / Unexpected hazards identified during or after the task (Near Miss? New or revised JSA/PTP Required?)
This is to be completed following completion of work. Ask yourself did work go according to plan or not? If not, what actions did you take? Please list below.

	Risk/Hazard Source	Prevention Methods (Special or additional protocol, test, procedure, PPE, tool, approach, breaks, stretches, etc.)	LOTO/Risk Prevention Verified (initials)	LOTO/Risk Prevention measures removed / Ready to run (initials)
1				
2				
3				
4				
5				
6				

Load Lifting Awareness

What items will you work with today that A) will be bolted or connected to the turbine, B) will be disconnected or unbolted from the turbine, or C) is equipment that will need to be manually moved during the scope of your day; and what categories do they fall in for load lifting. Utilize appropriate category to determine lifting method.

Solo Lift	Partner Lift	Equipment Lift
		

My signature below indicates my active participation in identifying the risks / hazards outlined in this JSA. I fully understand the potential risks / hazards listed, the mitigation steps, the job scope, communication protocols, and team member roles / responsibilities. I fully understand and support the Safe Work Approach, Vestas Safety Principles, and Site Safety Protocols. I will maintain a Risk Adverse approach to my work and I will champion doing the safe thing with my team members.

JSA/Task Team Leader Name: _____ Signature _____

Team Print Name _____ Signature _____

Team Print Name _____ Signature _____

Team Print Name _____ Signature _____

Management/Lead Technician Review/Audit of JSA: _____ **Date:** _____

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Pre-Task Planning Worksheet

Description of work:	Created on:	Turbine Model:	CIM #:

A. Safety Risk Factors: Ensure control measures are listed in Section C for any item answered yes.

	1. Is barricading and or signage required to protect personnel, facilities or equipment?		20. Is there potential for material to be thrown out of area?
	2. Can employee be exposed to chemicals?		21. Are workers not qualified to complete the job / task?
	3. Is employee near electrical source or working on electrical equipment?		22. Any part of work performed "blind" (can you see your hands while you're working)?
	4. Stored energy? (hydraulic, pneumatic, kinetic, thermal, gravitational, electrical, etc.)		23. Are sources of fire/explosion present?
	5. Will any interlocks need to be defeated?		24. Is there potential for a spill or leak?
	6. Is work on an energized systems required?		25. Possible allergic reactions? (bees, snakes, spiders)
	7. Is your clothing not rated for the potential calorie of energy exposure level?		26. Introduction of hazardous chemicals or new chemicals not previously used?
	8. Is work involving confined space?		27. Do you need to have Safety Data Sheets reviewed with crew?
	9. Can an employee's head or body be impacted laterally or vertically?		28. Is rotating equipment in the area?
	10. Is there inadequate ambient lighting?		29. Do you not have ability to contact emergency services (cell service in area)?
	11. Is there inadequate ventilation?		30. Periodic stretching and or breaks recommended?
	12. Are any sharp edges present?		31. Is there any work adjacent / near to your work area that may cause a hazard?
	13. Can employee be caught in, on, or between objects?		32. Material handling exceeding 50 lbs. or have awkward lift?
	14. Is there an inadequate number employees need to complete the task?		33. If moving or traveling, are obstructions within path of travel?
	15. Can employee encounter hot or cold objects?		34. Do mobile equipment operators not have the appropriate certifications?
	16. Are any of the equipment calibrations / certifications out of date?		35. Is any mobile equipment missing the appropriate inspections or certifications?
	17. Can employee strain by pushing, pulling, twisting, lifting?		36. Working alone? (See Field Rescue Response Protocol for guidelines)
	18. Are any workers in the "line of fire"		37. Are tools/equipment missing, or in need of repair? (power tools grounded)?
	19. Is there potential for slick or oily walking surfaces?		38. Is there any work near overhead power lines?

B. Step by Step instruction		C. Hazard analysis	
	Work step:	Safety Risk Factors:	Hazard prevention method.
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

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Pre-Task Planning Worksheet

D. Personal Protective Equipment: Is any of the following PPE required to perform task?

Category	Personal Protective Equipment (PPE)								
Head		side impact		type 1 hard hat					
Eye		standard		goggles		welding mask		cutting glasses	
Ear		plugs		muffs		both (over 100 DB)			
Foot		standard		rubber (CSA)		steel/comp		electrical (ohm resistant)	
Face		full shield							
Hands		standard		Kevlar		rubber		rubber insulated	
Respirator		N95 dust mask		1/2 mask		full face		self contained breathing apparatus (SCBA)	
Body		arc flash suit		AR clothing		Tyvek			
Sleeves		Kevlar		leather		standard			
Fall Protection		climb gear		posit. Lanyard					
Other									
Up tower equipment		fire extinguisher		eye wash		first aid kit		pre-rigged descent device	

E. Pre-task Planning Approval

PTP must have written or verbal approval prior to start of task

Vestas Lead or Authorized SME:		Date:
Phone Authorization?		Time:
Regional Manager if Big 5 bypass req.:		Date:
Phone Authorization?		Time:

F. Pre-Work Briefing

All persons performing this task must print their name & initial

	Print Name:	Initials:		Print name:	Initials:
PIC:					

Have all affected areas / personnel been notified prior to the commencement of work? — **Yes or No**

G. Task Completion – Ensure equipment is returned to safe operational condition.

Print Name:	Initials:	Print Name:	Initials:

Signing this form only acknowledges awareness of the activity. Each technician is responsible for ensuring that the equipment is returned back to a safe state when activity is completed OR anytime the equipment will be left unattended.

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SPIDER Program Vestas System Instruction				Document ID: 0049-0618 INS SUS-SAF-SWO (AME) Spider Program
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.04.08		Version: 01

Version history

Version No.	Date	Description of Changes
01	2015.04.08	Converted T09 Document DMS 0037-5625 to To3 Added sections: 7.4, 7.5

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1 Purpose

This document defines the SPIDER program as it works in conjunction with VAME's Safe Work Approach. It details the steps to be taken to perform a SPIDER observation.

2 Scope

The SPIDER program applies to all Vestas employees working at construction and service sites - within the AME scope and any person who will be at a wind turbine with Vestas employees (to include visitors and contractors on site for more than 30 days.)

3 References

Document No.	Title
0037-5627	SPIDER Program FAQ

4 Forms

Document No.	Title
0037-5626	SPIDER Form

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5 Terms and Abbreviations

Term or Abbreviation	Definition
JSA	Job Safety Analysis
PTP	Pre-Task Plan
SPIDER	Stop, Protect, Identify, Discuss, Evaluate, Retrain

6 Responsibilities

6.1 Senior Management

6.1.1 Ensure SPIDERs are fully implemented at all areas under their responsibility.

6.1.2 Assist Site/Construction Manager/Authorized Supervisors in determining best solutions for submitted SPIDERs in accordance with this program.

6.1.3 Address any issues relating to implementation of the SPIDER program to Senior Management.

6.1.4 Ensure Site/Construction Management/Authorized Supervisors have adequate resources and support to carry out related responsibilities and obligations.

6.2 Site/Construction Manager/Authorized Supervisors

6.2.1 Implement the SPIDER Program at locations under their area of responsibility.

6.2.2 Ensure all personnel under Vestas supervision adhere to the Safe Work Approach to include SPIDERs.

6.2.3 Ensure all personnel under Vestas supervision have received training and have adequate knowledge and skills to perform their duties.

6.2.4 Review this program on an annual basis for applicability and accuracy and provide results of the review to QSE for improvements.

6.3 Quality, Safety and Environment (QSE)

6.3.1 Develop and monitor implementation of the SPIDER program including providing feedback on submitted SPIDERs to Site/Construction Manager/Authorized Supervisors.

6.3.2 Participate in initial Focus Group and training of the SPIDER program and maintain a library of submitted SPIDERs.

6.4 Personnel at Turbines

6.4.1 Complying with the requirements of the SPIDER program

6.4.2 Provide input to Site/Construction Manager/Authorized Supervisor's on ways to improve this program and/or how to effectively manage this program.

6.4.3 Commit to the intent of SPIDER and perform them.

7 Procedure

7.1 Observation Intent

7.1.1 SPIDERs are positive peer-to-peer interactions intended to coach and counsel all employees to improve safety performance. They are focused on reducing the risk of serious accidents and moving Vestas collectively to an incident and injury free workplace.

7.1.2 SPIDERs are intended to be performed by technicians and site leaders at turbines and include all aspects of operations (Service, Construction and 3rd Party Contractors).

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7.1.3 SPIDERs are dual focused on reinforcing good safety behaviors as well as annotating risky behaviors. They are not intended to be punitive.

7.1.4 SPIDERs do not replace Good Catches. Good Catches will still be recorded, received and reviewed by QSE as before but will no longer be tracked as a metric on the Operations Balanced Scorecard. Good catches and SPIDERs can be shared across the organization and with customers as appropriate.

7.2 Observation Requirements

7.2.1 Each technician working at a site is required to complete a minimum of one (1) SPIDER Form per month and submit it to site leadership (e.g. Site Supervisor) once completed.

7.2.2 Site leadership (e.g. Site Supervisor) is required to review all submitted SPIDERs each month. The focus of these reviews includes verifying quality of the observation information and providing coaching back to technicians (either to the Observer and Person Observed).

7.2.3 Site leadership (e.g. Site Supervisor) is required to select a specific number (based on a formula of one (1) observation per every six (6) technicians on site) from the submitted SPIDERs for upload to QSE and entry into the QSE Library

7.2.4 Failure to meet the observation requirements will impact site scores on the QSE Scorecard (a KPI on the 2014 Operations Balanced Scorecard).

7.3 Observation Flow

7.3.1 The SPIDER program should follow the sequence below:

7.3.1.1 Site leadership provides advance communication to technicians of the upcoming observations. (Note: This does not exclude the use of “spontaneous observations” which can be used at the discretion of regional and/or site leadership). *Example: Intent to perform SPIDER during a day or week is discussed during a weekly Safety Meeting.*

7.3.1.2 A technician begins the observation and determines it should be documented on the SPIDER form. Example: Observing technician notes observed person activity to include a conversation of proper methods, techniques or safe work practices, etc. **If during the course of an observation a safety violation is witnessed, the observation session is ended and immediate steps are to be taken to ensure corrective measures are taken.**

7.3.1.3 The observing technician provides immediate coaching and feedback to the person observed.

7.3.1.4 The observing technician completes the SPIDER form.

7.3.1.5 The SPIDER form is turned in to site Leadership or delegate upon return to the office.

7.3.1.6 Site leadership determines which SPIDERs should be entered into the QSE Library.

7.3.1.7 Site leadership or delegate uploads the observation into the QSE Library following the steps outlined in 6.5 – SPIDER Submittal.

7.4 Observation Form

7.4.1 The SPIDER form is a free-form document where observations are documented and captured for improvements, discussions, coaching, etc. See DMS 0037-5626

7.4.2 Definitions of each field

- *Title:* Discription of the Activity
- *Site Cost Center*: Required field to sort SPIDERs
- *Site Location*: Service/construction site where SPIDER took place
- *Date of Observation*: Date SPIDER took place
- *Observer*: Person who identifies the coaching opportunity and acts on the situation

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- *Person Observed*: Person witnessed doing the activity
- *Person Observed (Subcontractor):* Subcontractor observation
- *Observation: What was observed*? Free-form text that describes what activity was witnessed by the Observer.
- *Action & Improvement: What is the action plan to correct the behavior*? Free-form text that describes any actions put in place to improve/correct the risk activity.
- *Region:* Region site is located in.

7.5 QSE SPIDER submittal

7.5.1 Select “Submit a SPIDER” on the QSE Hub page

7.5.2 Completed the electronic SPIDER form on the computer and submit it to the VAME QSE Library.

7.5.3 QSE reviews the SPIDER and Approves or Rejects it in QSE SPIDER Library based on the following criteria:

7.5.3.1 Form is completed properly (names, date, dialogue, etc.)

7.5.3.2 Documented conversation imparting knowledge took place between the observer and the observed person took place

7.5.3.3 Conversation took place before the activity or incident

7.5.3.4 The agreed upon change or improvement that resulted from the peer to peer interaction

7.5.4 All Approved SPIDERS will be credited in the Balanced Score Card.

8 APPENDIX: version history

Version No.	Date	Description of Changes
00	2013.03.29	New Document
01	2014.10.08	Updated to L5 Template, Change all SWO references to SPIDER, HSE to QSE
00	2015.04.08	Loaded wrong document

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North America > S.P.I.D.E.R. > New Item

S.P.I.D.E.R.: New Item

Attach File | Spelling... * indicates a required field

Title *
Please include date and initials in your title!

Site Cost Center *

Site Location *
Please select your site location.

Date of Observation *

Observer
Employee performing observation

Observer (Subcontractor)

Person Observed
Employee being observed

Person Observed (Subcontractor)

Observation *
What was observed?

Actions & Improvements *
What are the changes, actions or improvements that will be implemented by you to improve safety behaviors? How can risks be further reduced throughout Vestas? (This section is to be completed by the person being observed.)

Region *

DMS# 0051-2356

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VAME Hot Work Plan System Instruction				Document ID: 0049-0566 INS SUS-SAF OPC (AME US/Can) Hot Work
Owner(s): BPO Del. SUS	Author(s): RIREG	Valid from: 2015.10.02	Valid until: 2018.10.02	Version: 01

Version history

Version No.	Date	Description of Changes
01	2015.10.02	Updated to include VCWT requirements, references.

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1 Purpose

The purpose of this program is to ensure that VAME employees are properly protected when performing **HOT WORK** which includes, but is not limited to welding, burning, grinding, heating bearings with open flames or using bearing heaters and have a clear understanding of the hazards involved and the proper way to control them. These requirements also help to ensure compliance with Federal, State and Provincial requirements.

2 Responsibilities

2.1 Senior Managers

2.1.1 Ensure effective program development and implementation.

2.1.2 Provide Site/Construction Management with adequate resources and support to carry out program responsibilities and obligations.

2.1.3 Require adherence to all policies, procedures, practices and rules related to site hazards.

2.1.4 Oversee and evaluate Site/Construction Management and Authorized Supervisor performance.

2.2 Site/Construction Managers/Authorized Supervisors

2.2.1 Assume responsibility for compliance with this program, including training to and practicing of the Emergency Response Plan;

2.2.2 Approve the Hot Work Permit before hot work is performed.

2.2.3 Ensure all confined space requirements are implemented per the applicable Confined Space Program.

2.2.4 Take immediate action to repair and/or replace defective equipment;

2.2.5 Ensure new and/or re-assigned employees on-site are trained in the Hot Work Plan and completion of the Hot Work Permit

2.2.6 Ensure detailed Emergency Response Plan instructions and equipment is in place.

2.2.7 Coordinate Hot Work operations in the event qualified contractors, sub-contractors and/or visitors are exposed hot work hazards.

2.2.8 Ensure Fire Watches are trained in their responsibilities and remain on duty for at least 30 minutes after hot work is completed.

2.2.9 Authorize, when and where necessary, the removal of equipment guards.

2.3 QSE Department

2.3.1 Develop and monitor implementation of this plan;

2.3.2 Provide efficient and effective hot work instruction and training;

2.3.3 Conduct regular worksite inspections and program audits; and

2.3.4 Review Hot Work Permits.

2.4 Personnel

2.4.1 Understand the hazards or potential hazards of Hot Work.

2.4.2 Properly complete all confined space requirements per the applicable Confined Space Program.

2.4.3 Properly complete a Hot Work Permit form DMS 0049-0567.

2.4.4 Be on the alert for any signs or symptoms that might indicate hazardous conditions before they arise.

2.4.5 All personnel must wear personal protective equipment that meets or exceeds requirements of the hazard they are exposed to.

2.4.6 Properly inspect the immediate and surrounding area where the hot work is being performed for potential combustible materials.

2.4.7 Remove or properly cover combustible materials that may be ignited due to the hot work being performed.

2.4.8 Stop hot work immediately if unforeseen hazards arise.

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2.4.9 If performing the duties of a fire watch:

2.4.9.1 Ensure an appropriate fire extinguisher is present and fully charge prior work beginning.

2.4.9.2 Remain at the site of the work for a minimum of 30 minutes following the completion of the hot work.

3 References

Document No.	Title
0049-0584	VAWT Confined Space Entry Program
0049-0679	Ontario Confined Space Alternate Entry
0049-0626	VCWT Confined Space Entry Program
0049-0696	Respiratory Protection Program
0049-0700	VCWT Respirator Protection Program
0049-0675	VCWT Emergency Preparedness
0008-9806	Emergency Preparedness

4 Scope

This program applies to all Vestas personnel, Suppliers and Contractors who may be performing non-electrical **HOT WORK**, welding, burning, and grinding operations at a Vestas job site. Improper welding, burning, and grinding can be dangerous, but can be performed safely by following simple common sense procedures. The following information includes a list of potential hazards associated with welding, burning, grinding and includes guidelines by which hazards of these operations can be controlled and/or eliminated.
NOTE: This information is intended for use on many different types of jobs and as such, very general in nature. Specific job rules-standards may dictate requirements that are more stringent.

5 Terms and Abbreviations

Term or Abbreviation	Definition
Hot work	Riveting, welding, grinding, flame cutting or other fire or spark-producing operation
SDS	Safety Data Sheets
VCWT	Vestas Canadian Wind Technologies
VAWT	Vestas American Wind Technologies
VAME	Vestas America (VAWT/VCWT)

6 Forms

Document No.	Title
0049-0567	Hot Work Permit form

7 Personal Protection

7.1 PPE Requirements

7.1.1 Long-sleeve leather gloves, high top shoes, hard hats, a leather jacket, and other protective clothing and equipment as required shall always be used. Ear protection shall always be used for protection from hot sparks and molten metal. Clothing must be non-melting.

7.1.2 Use the proper disposable particle and vapor type respirators, (Refer to the applicable VAWT or VCWT Respiratory Protection Program), and additional ventilation, as required, when welding, cutting, gouging or burning on coated materials, such as galvanized or heavily painted materials.

7.1.3 Wear high top boots to protect ankles.

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7.1.4 Wear the proper welding hood with shaded lens. Prior to welding, check hood for leaks.

7.1.5 Wear long pants without cuffs.

7.1.6 Don't wear excessively greasy or dirty clothing

7.1.7 Button your collars and sleeves to prevent sparks from entering.

7.2 Eye Injuries

7.2.1 Grinding or welding sparks or slag can cause eye injuries. Full-face shields and safety glasses should be worn at all times. (Specific job requirements may be more stringent.)

7.2.2 Use care in removing safety glasses, face shield and welding hoods so as not to cause residual dust particles to enter eyes.

7.2.3 When burning/cutting operations are taking place, personnel shall be protected with the proper burning goggles having the shaded lens required for the type of work being performed.

7.2.3.1 Light cutting, up to 1" No. 3 or No. 4

7.2.3.2 Medium cutting 1" to 6" No. 4 or No. 5

7.2.3.3 Heavy cutting, over 6" No. 5 or No. 6

7.3 Ear Injuries/Hearing Damage

7.3.1 Welding, cutting or grinding sparks can enter the ear and burn and possibly permanently damage the ear.

7.3.2 High noise levels from carbon-arc cutting or the plasma arc cutting processes can affect your hearing.

7.3.3 Always wear appropriate ear protection. Protection, which covers the entire ear, is recommended.

7.4 Burns

7.4.1 Exposed skin is an invitation to burns. Be sure to wear long-sleeved shirts that are not open at the chest and always fasten the top button of you shirt or jacket. Use leather jackets when appropriate.

7.4.2 Falling slag, spatter or molten filler metal can cause burns to ankles and feet. Wear high top safety shoes. Avoid trousers with cuffs.

7.4.3 Never carry flammable items such as matches and lighters in your pocket while involved with "hot work". Disposable butane pocket lighters are not allowed where any "hot work" is carried on.

7.4.4 Always wear the appropriate type of leather gloves for welding or cutting process being employed.

7.4.5 Be extremely cautious around weld joints that require high preheat temperatures and the use of added heat sources for maintenance of the required preheat temperature.

7.4.6 Before leaving a hot work area unattended mark "hot work" pieces with soapstone or crayon to alert others of the hazards.

7.5 Fumes

7.5.1 Avoid breathing fumes and gases. Always try to keep your head out of the direct path of the fume plume.

7.5.2 Use the proper vapor type respirators, and additional ventilation, as required, when welding, cutting, gouging or burning on coated materials, such as galvanized or heavily painted materials.

7.5.3 Make sure adequate ventilation is available, and used, when welding or cutting in confined areas.

7.6 Asphyxiation

7.6.1 Inert gases, such as argon, helium, nitrogen and carbon dioxide displace air in a confined space as they build up. The flame of an oxy-fuel torch can form poisonous carbon monoxide.

7.6.2 Always be sure there is adequate ventilation when using these inert gases, especially in confined areas.

7.6.3 Never enter a confined space without proper authorization.

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7.7 X-Rays

7.7.1 X-Rays are commonly used for weld inspection. Excessive exposure to X-Rays can pose a hazard to your health. Never cross radiation barriers.

8 Hot Work Requirements

8.1 General Safety Requirements

8.1.1 All emergency descent equipment must be rigged and at the ready. There must be adequate number of emergency descent devices to safely and effectively get all workers to the ground.

8.1.2 Disposable butane pocket lighters are not allowed where any Hot Work is being performed.

8.1.3 Assure welding leads and gas hoses are clear of high traffic areas and are neatly arranged to prevent tripping hazards.

8.1.4 Inspect all leads, ground clamps, welding machines, hoses, gauges, torches, and cylinders each day prior to use.

8.1.5 Treat welding cylinders with care. Keep cylinders secured in an upright position. Replace the protective caps when cylinders are not in use.

8.1.6 Be sure all fittings, couplings, and connections are wrench tight.

8.1.7 Use flashback arrestors on manifold outlets.

8.1.8 Return all empty cylinders to a designated cylinder rack.

8.1.9 Provide adequate ventilation.

8.1.10 Appropriate fire extinguishing equipment must be readily available (25-50 ft.).

8.1.11 Know where the nearest fire extinguisher is located. Use a fire watch when necessary.

8.1.12 All combustible material below welding and burning operations must be removed to a safely location and/or covered with protective approved fire retardant material.

8.1.13 Protect others from welding, cutting or grinding operation. Use approved welding curtains or flash screen in and around active work areas.

8.1.14 A Hot Work Permit is required for any time Hot Work is being performed.

8.1.15 Do not smoke when connecting or disconnecting regulators, torches or hoses.

8.1.16 Anytime an operator is heating, brazing or burning on material where the other side cannot be seen and/or the possibility of fire exists, a fire watch shall be used.

8.2 Confined Space

8.2.1 Torch (welding or cutting) operations requiring supplied gasses must have a positive shut off at some point outside the confined space.

8.2.2 Whenever these operations are suspended for a substantial period of time (greater than one hour) the torch and hose shall also be removed from the confined space.

8.3 Ventilation

8.3.1 When performing **HOT WORK** in a confined or enclosed space, provide mechanical ventilation as needed.

8.3.2 Hot work in any location in the turbines requires a Confined Space Entry Permit. Reclassification of the space is not allowed.

8.3.3 When performing **HOT WORK** on galvanized metal, be especially careful to provide adequate ventilation, smoke eaters, and/or appropriate respirator. (Refer to the applicable VAWT or VCWT Respiratory Protection Program).

8.4 Welding

8.4.1 Electrode holders shall be in good repair and rated for the maximum capacity of equipment used.

8.4.2 All cables and connectors shall be in good repair, tightly attached, fully insulated, and rated for the maximum capacity of the work.

8.4.3 Welding lead shall have a safe current capacity equal to or greater than the specified maximum output of the arc welding or cutting unit, which it services. When a single work lead

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services more than on unit, its safe current carrying capacity shall equal or exceed the total specified maximum output capacities of all the units, which it services.

8.4.4 All electrical equipment (welding machines) and work shall be properly grounded. The welding lead is not a ground lead. It is used only to complete the electrical circuit. A separate connection may be required to ground the work piece. Do not mistake the work lead for a ground.

8.4.5 Pipelines containing gases and/or flammable liquids, or conduits containing electrical circuits shall not be used as a ground.

8.4.6 When electrode holders are to be left unattended, the electrode shall be removed and the holders so placed or protected that they cannot make electrical contact with personnel or conducting objects. Always put stub ends in appropriate containers.

8.4.7 Do not weld while standing in water or if clothing and gloves are wet.

8.4.8 Inspect equipment for loose connections or bare and/or damaged wires. Do not use faulty equipment.

8.4.9 Turn off your welding machine at the end of your shift and/or when machine is not in use for an extended period.

8.5 Arc Radiation

8.5.1 Infrared or ultraviolet radiation from the arc can burn the eyes or skin. Intense light can cause an irritation in the eyes known as “welder flash”, arc-eye” or flash burn. Always view the arc when protected with a shield using protective altered lenses of the appropriate shade. The following are recommended shade numbers:

- SMAW 10 to 14
- GTAW 10 to 12
- GMAW 10 to 12
- FCAW 11 to 14
- Carbon Arc -14

8.5.2 A slightly lighter or darker shade may be required depending on individual needs.

8.5.3 Avoid light, thin Clothing.

8.6 Fire Prevention

8.6.1 Acetone and alcohol are commonly used for cleaning parts to be welded. Be sure to keep these containers and rags a safe distance from **HOT WORK.**

8.6.2 Sparks and/or splatter from welding and/or arc gouging may ignite burnable items in the area. Assure areas are free of trash and debris.

8.6.3 Burnable materials shall either be removed from the area where welding or arc gouging is to take place or materials are protected with approved flame retardant materials.

8.6.4 Sparks and spatter from arc gouging travel considerable distances. Whenever possible, orientate the spark stream to minimize concern for fire and/or damage resulting from the spark stream. Use approved fire retardant shielding and/or fire watch as appropriate.

8.6.5 When welding on decks, walls, or overhead, assure that necessary precautions are taken to prevent fire and/or heat damage to adjacent areas.

8.6.6 Assure that full knowledge of the locations and proper use of fire extinguishing equipment.

8.7 Explosions

8.7.1 Do not weld and/or use arc-gouging equipment in the presence of propane, acetylene or any other flammable materials.

8.7.2 Do not perform any **HOT WORK** in or on any tank, vessel, or container unless it is properly vented.

8.7.3 Do not perform **HOT WORK** in or on any vessel, tank, and/or container that carry or have carried flammable materials, liquids, gases until the container has be properly cleaned and tested for safe **HOT WORK** by a qualified person.

8.7.4 Appropriate ventilation shall be used during **HOT WORK**.

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8.7.5 Never strike an arc on any cylinder.

8.8 Burning and Cutting

Improper use of any oxy-fuel equipment can be extremely dangerous and has the potential to cause personal injury and/or property damage. Oxy-fuel equipment is used extensively in our operations to aid us in performing our work. These operations can be performed safely by following simple precautions.

8.8.1 Do not use leaking and/or defective equipment.

8.8.2 In the event of a cylinder valve leak, immediately stop all **HOT WORK** and notify your supervisor.

8.8.3 Manifold valves that are not operating properly shall be immediately reported to your supervisor.

8.8.4 In the event torches and/or regulators leak, report to your supervisor. Repair shall be made by authorized personal only.

8.8.5 Hose leaks and/or damaged shall be reported immediately.

8.8.6 Compressed gas cylinders must always be stood upright and properly secured. Protective valve caps must be installed when cylinders are not in use.

8.8.7 Cylinder and manifold valves must be closed when not in use. Do not over tighten. If cylinder valve becomes frozen, thaw it at room temperature or use warm water no greater than 125 degree F. Never use open flame or electric heating device of any kind.

8.8.8 Keep Oil and grease away from oxygen regulators, hoses and fittings. Do not store wrenches, dies, cutters or other grease-covered tools in the same compartment with oxygen gauges and/or equipment.

8.8.9 Wear only approved burning goggles.

8.9 Emergency Situations

8.9.1 In case of a flashback and/or ruptured hose, the operator's first duty is to stop the flow of gases. This can be done either directly behind the damaged or burning area (if it can be done safely) or at the cylinder or manifold.

8.9.2 If it can be done safely, the torch and hose should be moved out of confined areas to an open space (preferably outside).

8.9.3 Any equipment that has been involved in a flashback, fire or explosion shall be completely inspected prior to being put back into service.

9 Compressed Gas Cylinders

Serious accidents may result from the misuse, abuse or mishandling of compressed gas cylinders. The three most commonly used compressed gas cylinders found on sites are nitrogen, oxygen and acetylene.
Employees whose work involves compressed gas cylinders are to be trained in the safe methods of handling, storage, and use.

9.1 General Requirements

9.1.1 Cylinders shall be kept away from radiators and all other sources of heat. Do not place cylinders in any location where they could become heated to 125 degree F.

9.1.2 Empty cylinders valves shall have closed and caps in place (where applicable).

9.1.3 Storage of empty cylinders shall be separate from fully charged cylinders.

9.1.4 Valve protection caps, where cylinder is designed to accept a cap, shall always be in place, hand tight except when cylinders are in use or connected for use.

9.1.5 Protection from solar radiant heat shall be provided where cylinders are directly exposed to sunlight.

9.1.6 Compressed gas cylinders shall be secured in an upright position at all times except for short periods while cylinders are actually being hoisted or carried.

9.1.7 A fire extinguisher shall be no closer than 25 feet, but not farther than 50 feet from areas where fuel gases are stored.

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9.1.8 If a storage area is dock height, appropriate guard railing and safe access shall be provided.

9.1.9 A Suitable cylinder truck, cradle, or suitable platform shall be used when moving cylinder. Slings, hooks, or electric magnets shall not be used. Valve protection caps must always be in place during transport.

9.1.10 Cylinders must be kept far enough away from actual welding or cutting operations so sparks, hot slag or flame will not reach them.

9.1.11 Cylinders, when not in use, shall be turned off and the hoses and regulators shall be bled off.

9.1.12 Acetylene in cylinders is dissolved in liquid acetone. Never lay an acetylene cylinder on its side because the acetone liquid can get into the regulator and/or hoses, and cause flashbacks. Occasionally, liquid acetone may be drawn out of the cylinder along with the acetylene gas when a very large gas flow is required. Evidence of this will be erratic "spitting" of the flame. Installing a manifold to use two or more cylinders simultaneously will eliminate this problem.

9.1.13 Acetylene cylinder valves should be opened only ¾ to 1 ½ turns. This will permit adequate flow of gas and restrict flow rates, which could draw acetone out of the cylinders and make isolation easier in the event of an emergency.

9.1.14 All propane and oxygen cylinders should be opened all the way and seated at the full open position to reduce the possibility of valve stem leakage.

9.1.15 Cylinders handled by cranes shall be secured in a specially made rack or material skip box. Never use magnets or slings to handle compressed gas cylinders.

9.1.16 Always refer to oxygen as **OXYGEN** and not as air. Oxygen shall not be used for ventilation purposes, comfort cooling, blowing dust from clothing, or for cleaning work area.

9.1.17 Never set acetylene outlet pressure above 15 PSI as acetylene gas becomes unstable at pressure greater than 15 PSI and may explode.

9.1.18 Isolate cylinders to prevent contact with welding or other electric lines. Do not let cylinders become part of an electrical circuit.

9.2 Cylinder Storage Requirements

9.2.1 Oxygen cylinders in storage shall be separated from fuel or gas cylinders or combustible materials (especially oil or grease) a minimum of 20 feet or by a noncombustible barrier at least 5 feet high having a fire-resistant rating of at least one-half (1/2) hour.

9.2.2 Inside of facilities and/or enclosures, cylinders shall be stored in a well-ventilated, well-protected dry location at least 20 feet from highly combustible materials such as oil or shavings. Cylinders shall be stored in designated locations away from stairs, hallways, etc. Designated spaces shall be located where cylinders are protected from being tipped over and/or damaged by passing or falling objects or subject to tampering by unauthorized persons. Cylinders shall not be stored in unventilated enclosures such as lockers and cupboards.

9.2.3 Inside a building, cylinders except those in actual use or attached for use, shall be limited to a total gas capacity of 2,000 cubic feet to 300 pounds of liquefied petroleum gas.

9.2.4 Warning signs shall be conspicuously placed and shall read, 'Danger- No Smoking, Matches or Open Flames' or other equivalent wording.

9.2.5 Acetylene cylinders shall be stored valve end up.

9.2.6 A chain or other secure fastening shall be used to keep cylinders from being knocked over while in storage.

9.2.7 Empty cylinders shall have their valves closed. Valve protection caps shall always be in place, except when cylinders are in use or connected for use.

9.3 Hose and Hose Connections:

9.3.1 Oxygen hoses must be of a different color from hoses used for fuel gas lines (oxygen-green: fuel-red).

9.3.2 Connections must be cared for so the brass fitting will not leak and will be able to withstand twice the maximum delivery pressure of the regulators provided.

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9.3.3 Standard oxygen equipment has right hand threads; fuel gas equipment has left handed threads. Never force connections.

9.3.4 Inspect hoses for leaks and other defects such as nicks, cuts, and abrasions.

9.3.5 Never use tape to correct a deficiency; get another piece of hose.

9.3.6 Never stand in front of the gauges on the regulator when opening the discharge valve of the tank. Open discharge valve slowly. Sudden pressure may destroy the gauge and blow out glass and parts.

9.3.7 Keep caps and plugs on and in gas outlets to prevent foreign debris and liquid from entering the system and/or damaging the threads.

9.3.8 Frequently (at least daily) inspect all connections seats and fittings. If warped, scarred, or damaged in any way, do not use the part. Repair or replace.

9.3.9 Always remove open-ended oxy-fuel hoses from confined spaces immediately or cap the ends of the hose with approved hose caps.

9.3.10 Before installing regulators on cylinders or manifolds, open the cylinder or manifold valve slightly (standing to one side) and quickly close the valve. This activity known as “blowing out” the valve seat area cleans the seating area of dust, dirt, and debris.

10 Torch Safety

10.1 Precautions

Only personnel who are trained and experienced in torch operations are allowed to perform torch related activities at the turbine or in the shop.

10.1.1 Do not handle torch roughly or use it as a hammer, hook or pry bar.

10.1.2 To minimize leaks, fuel gas control valves on hand torches have soft nylon seats. These valves should be closed only to the point where the flow of gas is stopped. Forcing them beyond this point will cause damage and impair the proper operation of the equipment.

10.1.3 Use only tips that have clear passages and clean seats free from bruises or scars. A bruised or dented tip makes a leaky seat and scores the torch head.

10.1.4 Do not attempt to improve the performance of a tip by drilling, peening, bending or otherwise modifying the original design.

10.1.5 Torch tip cleaning should only be done with special tip cleaners

10.1.6 Always perform safety check on all torch equipment. Blow out the torch and hoses before you attempt to operate the equipment.

10.1.7 When lighting a torch, light it quickly, keeping the torch flame away from you, others, gas equipment and combustibles. Remember not to let too large a volume of gas escape before igniting the torch.

10.1.8 When lighting a torch, open the fuel gas valve on the torch before opening the oxygen valve.

10.1.9 Light torches with striker lighters only. Always use approved spark lighter for igniting oxy-fuel torches. Never use matches or cigarette lighter. Do not try to re-ignite a torch on **HOT WORK** as accumulated gas may cause an explosion.

10.1.10 Do not let the tip of the torch contact work when using an acetylene torch. Flashback or backfires will almost certainly occur. If the flame pops or goes out for any reason, turn off torch valves immediately and investigate the problem.

10.1.11 Prior to lighting your touch, but after all hose and torch connections have been safely made, the regulators shall be opened for a short interval of time to permit complete filling of the hoses. The supply valve shall then be closed and watch the pressure on the gauges for 60 seconds. Any drop in pressure indicates a leak. (Torch valves shall be closed). Do not turn on the supply valve again until the leak has been repaired. This activity is known as your “Torch Safety Check”.

10.1.12 After your “Torch Safety Check” has been performed, go back to the torch, and if it is not already in an open space (preferably outside), carry it to an open area where it will be safe to blow it out. Never blow out a torch or hose in a confined or enclosed space.

10.1.13 Keep tips clean.

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10.1.14 Never attempt to relight a torch from **HOT WORK**, especially in a confined space.

11 Grinding

11.1 Portable and Pedestal/Bench grinders

11.1.1 Always use proper protective equipment.

11.1.2 Use guards whenever they can be used. If you must remove a guard for any reason, get authorization from you supervisor, and replace it as soon as possible.

11.1.3 Use flash screens or other nonflammable barrier to confine flying particles whenever anyone else could become exposed to flying particles.

11.1.4 Inspect grinding wheels before using them. Use only wheels that are rated (RPM) for the machine you are using.

11.1.5 On bench grinders, keep tongue guards no more than 1/4 inch and work rests no more than 1/8 inch away from the grinding wheel.

11.1.6 Do not use or allow any oily or greasy substance to come in contact with compressed gas cylinders, manifold valves, regulators, hoses or torches. Oil or grease in the presence of oxygen may ignite with explosive violence.

11.1.7 Keep the torch flame, sparks, molten metal, and hot slag away from hoses, regulators, and cylinders.

12 APPENDIX: version history

Version No.	Date	Description of Changes
00	2008.11.20	New document
01	2010.01.01	Content and Template updates
02	2014.02.12	1, 2, 3,4, 5, 6, 7, 8, 9, 10, 11 See gray highlighted content
00	2015.02.12	Converted T09 document 0008-8001 to T03. Updated references.

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VESTAS PROPRIETARY NOTICE

RESTRICTED

Hot Work Permit

SITE NAME: _____ LOCATION: _____

DATE: _____ TIME: _____ Service Order # _____

WORK TO BE PERFORMED IN / AT (Describe location / nearest structure):

PERMIT ISSUED TO (NAME): _____

PERMIT EXPIRATION (TIME): _____ DATE: _____

DESCRIBE WORK TO BE DONE:

REQUIRED EQUIPMENT: *(Inspected and operational; "X" all that apply to this permit)*

☐ Glasses/Goggles	☐ Body Protection	☐ Hard Hat	☐ Ventilation	☐ Air Monitoring (Tunnels only)
☐ Shield/Helmet	☐ Gloves	☐ Respirator	☐ Communication	☐ Special Protection/Tools

FIRE WATCH REQUIRED? *Fire Watch: a person stationed at the hot work area who monitors the area for the beginnings of any potential, unwanted fires. A Fire Watch is required in the following situations: in a sprinklered building when the sprinkler system is impaired; when there are combustible materials within 35' of the hot work area; when large amounts of combustible materials are present, even if located 35'+ from the hot work area, but close enough to be ignited by a spark; any time there is a high risk that a fire could start.*
The Fire Watch must have readily available, appropriate fire extinguishing equipment, and be trained in its use and limitations. They shall also be familiar with the procedures for sounding an alarm in the event of a fire. The Fire Watch will watch for fires in all exposed areas and try to extinguish them ONLY when obviously within the capacity of the equipment available - otherwise they will sound the alarm immediately.

☐ NO ☐ YES - IF YES, NAME(s):

PRECAUTIONS CHECKLIST - *Complete prior to any hot work planned for an area not designed for hot work. "X" each box where the statement is true. If any statements are not true, then hot work shall not begin until that issue can be safely resolved.*

- ☐ Fire suppression sprinklers, fire hoses, and/or fire extinguishers are available and operable - employees are trained to use them.
- ☐ Flammable and ignitable materials & debris are moved at least 35' from hot work area OR covered & protected with fire resistant material OR Fire Watch arranged.
- ☐ Smoke/fire detectors/alarms in immediate area of hot work have been temporarily disabled.
- ☐ Building/site occupants have been protected/isolated from hot work area.
- ☐ All cracks or openings in walls, floors, ceilings (including duct work) are covered or plugged.
- ☐ Welders have been protected from electrical hazards. Metal equipment and materials have been adequately grounded.
- ☐ Hot work equipment is operable and in good repair - CGCs have been leak tested - welding machines have been inspected.
- ☐ Drums, barrels and tanks have been cleaned and purged of flammables and toxics - all tanks feeds are closed, and tank is vented.
- ☐ Workers and Fire Watch have been trained in use of equipment and how to sound the alarm.

TIME STARTED: _____ : _____

WHEN WORK IS COMPLETED: *At the completion of the hot work, inspect the work and surrounding areas for the possibility of smoldering or fire, ensure that all hot work equipment has been removed from the area and, if appropriate, re-activate the fire detection equipment. If appropriate, notify the building/facility manager or contact person that the work has been completed. Complete this section and close the permit by signing at the bottom.*

- ☐ Inspected hot work area and all potentially affected surrounding areas for fire, fire damage, or potential for fire.
- ☐ Reactivated smoke/fire detectors/alarms that were disabled to perform the hot work.

I verify that the precautions on this permit have been taken to prevent fire and that the work has been authorized. The creation or discovery of any work induced hazards or other unforeseen, actual, apparent or potential hazards will be assessed, and additional precautions taken, if necessary.

Signature: _____ *Date:* _____

TIME COMPLETED: _____ : _____

SITE MANAGER APPROVAL:

Signature: _____ *Date:* _____

***HOT WORK:** Cutting, welding, brazing, torch soldering, high speed metal grinding, or use of an open flame. Hot work is not permitted: within 50' of explosives, stored cylinders, or stored fuel; unless authorized by a supervisor; in the presence of a potentially explosive atmosphere.*
File completed form with work package (LOTO,JSA,WI, etc.).

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Machine Guarding Vestas System Instruction				Document ID: 0051-5217 INS SUS-SAF-OPC (AME US/CAN) Machine Guarding
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.11.02	Valid until: 2018.11.02	Version: 01

Version history

Version No.	Date	Description of Changes
01	2015.11.02	Updated Sections:7.3.3, 7.3.5.3, 7.3.9, 7.3.10

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1 Purpose

To establish uniform guidelines and ensure all guards or protective devices are on machines, at the danger zones such as those created by point of operation, ingoing nip points, rotating parts, flying chips and sparks.

2 Responsibility

2.1 Senior Management

2.1.1 Ensure effective program development and implementation.

2.1.2 Provide Site/Construction Management with adequate resources and support to carry out program responsibilities and obligations.

2.1.3 Require adherence to all policies, procedures, practices and rules related to the use of machine guarding and rotating equipment.

2.1.4 Oversee and evaluate site supervisor performance.

2.2 Site/Construction/Authorized Supervisor

2.2.1 Ensure all personnel under Vestas supervision adhere to all policies, procedures and rules related to Machine guarding and rotating equipment.

2.2.2 Ensure all personnel under Vestas supervision have received training from a competent person and have adequate knowledge and skills to perform their duties.

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2.2.3 Shall insure that all of the equipment and machinery operators are trained and qualified for the equipment they operate.

2.2.4 Shall conduct safety inspections and determine that machinery and work conditions are compliant with this policy.

2.2.5 Ensure defective machinery, is immediately removed from service, tagged out of order and quarantined.

2.2.6 Ensure COHE Program is implemented to positively secured rotating equipment any time machine guards are removed.

2.2.7 Train and qualify technicians to operate new and existing WTG and facility machinery.

2.3 QSE Representatives(s)

2.3.1 Develop and monitor implementation of the Machine Guarding Program.

2.3.2 Conduct workplace inspections and audits.

2.4 Personnel

2.4.1 All Technicians shall observe the general condition of operating machinery, to ensure that all guards are in place, and to follow safe work practices while operating the machinery.

2.4.2 Knowledgeable in machine guarding and safe operating requirements of WTG's as well as power tools.

2.4.3 Report defective equipment or tool guarding to the Site/Construction/Authorized Supervisor immediately.

2.4.4 The individual authorized operator will ensure that all guarding is in place prior to operation.

2.4.5 Ensure COHE Program is implemented to positively secured rotating equipment any time machine guards are removed.

2.4.6 Equipment, materials and protective devices provided by the Vestas are maintained in good condition

3 References

Document No.	Title
0049-2056	VAWT Code of Safe Practices
0049-0672	VCWT Code of Safe Practices
0000-0509	Vestas Work on Rotating Parts
ANSI Z245.1	American National Standards Institute
ISO 14120	International Standards Institute
29 CFR 1910 Subpart O	Machinery and Machine Guarding
29 CFR 1910.Subpart P	Guarding of Portable Powered Tools

4 Scope

This procedure provides the basic guidance for safe machinery operation and general machinery guarding principles for all Vestas personnel, contractors and visitors.

5 Terms and Abbreviations

Term or Abbreviation	Definition
POO	Point of Operation – Operating zone where the operator places stock, material, or parts, to form, shear, cut, drill or shape.
Power Transmission Device	Equipment used that transfer's electrical power to the machine's mechanical function.
Pinch Point	The point where two mechanical devices or equipment come

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Term or Abbreviation	Definition
	together
COHE	Control of Hazardous Energy
WTG	Wind Turbine Generators
Point of operation guarding	Point of operation is the area on a machine where work is actually performed upon the material being processed.

6 Forms

Document No.	Title

7 Program Elements

Four basic program action elements are to be used to safeguard equipment and promote safe equipment operation; those elements include the following:

7.1 Design a safe job site

7.1.1 Clearances between a moving part of any machine or any material carried by the moving part of the machine and any other machine, structure or thing shall be adequate to ensure that the safety of any worker in the area is not endangered.

7.1.2 An in-running nip hazard or any part of a machine, device or thing that may endanger the safety of any worker shall be equipped with and guarded by a guard or other device that prevents access to the pinch point.

7.1.3 Exposure of blades: when the periphery of the blades of a fan is less than seven (7) feet above the floor or working level, the blades shall be guarded. The guard shall have openings no larger than one-half (1/2) inch.

7.1.4 Prime-movers (flywheel, chains, belts, pulley or shaft) located so that any part is seven (7) feet or less above floor or platform shall be guarded.

7.1.5 Anchoring fixed machinery: Machines designed for a fixed location shall be securely anchored to prevent walking or moving.

7.1.6 A mechanical or electrical power control shall be provided on each machine to make it possible for the operator to cut off the power from each machine without leaving his position at the point of operation.

7.1.7 On applications where injury to the operator might result if motors were to restart after power failures, provision shall be made to prevent machines from automatically restarting upon restoration of power.

7.2 Educate personnel

7.2.1 Technicians must be trained and/or qualified by experience and past training to inspect and operate Vestas equipment.

7.3 Safeguarding equipment

7.3.1 All power transmission devices shall be enclosed by a guard to prevent any direct contact with moving parts.

7.3.2 Appropriate guards or devices shall be provided and used to protect the operator from material kickback, the points of operation danger zones, flying metal chips, splashing liquid and all similar operator hazard potentials.

7.3.3 All rotating shaft ends must present a smooth edge and the end cannot project out more than ½ the diameter of the shaft unless guarded by non-rotating caps or safety sleeves.

7.3.4 Machinery shall be protected from an accidental restart, should an electrical failure occur. Operator will not be subject to a restart hazard potential.

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7.3.5 Abrasive wheels shall be used only on machines provided with safety guards:

7.3.5.1 Work rests on pedestal grinders shall be used to support the work, shall be rigid construction and designed to be adjustable to compensate for wheel wear.

7.3.5.2 Work rests shall be kept adjusted closely to the wheel with a maximum opening of one-eighth (1/8) inch to prevent the work from being jammed between the wheel and the rest, which may cause wheel breakage.

7.3.5.3 If an adjustable tongue guard on the top side of the grinder is used, it shall be kept to within one quarter (1/4) inch to the wheel.

7.3.6 Compressed air shall not be used for cleaning/dusting purposes except where reduced to less than 30psi and only with effective chip guarding and personal protective equipment.

7.3.7 All portable, power-driven circular saws having a blade diameter greater than 2 in. shall be equipped with guards above and below the base plate or shoe.

7.3.7.1 The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts.

7.3.7.2 The lower guard shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work.

7.3.7.3 When the tool is withdrawn from the work, the lower guard shall automatically and instantly return to covering position.

7.3.8 All hand-held powered tools; electric, hydraulic or pneumatic shall be equipped with a constant pressure switch or control that will shut off the power when the pressure is released.

7.3.9 All stationary drill presses must have machine guarding to limit access to the point of operation.

7.3.10 Machines designed for a fixed location shall be securely anchored to prevent walking or moving.

7.3.11 Pneumatic powered tools and hose:

7.3.11.1 A tool retainer or safety clip must be installed to prevent attachments such as chisels on a chipping hammer from being ejected during tool operation.

7.3.11.2 Hose and hose connections used for conducting compressed air to utilization equipment shall be designed for the pressure and service to which they are subjected.

7.3.11.3 Hoses conducting compressed air in excess of 30psi. shall have hose whippets installed.

7.3.11.4 Eye and hearing protection is required and face protection is recommended when working with pneumatic tools.

7.3.11.5 Screens should be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills

7.3.11.6 Hose more than 1/2-inch (12.7 millimeters) in diameter, must have a safety excess flow valve installed at the source of the supply to reduce pressure in case of hose failure.

7.3.11.7 Pneumatic tools that shoot nails, rivets, staples, or similar fasteners and operate at pressures more than 100 pounds per square inch (6,890 kPa), must be equipped with a special device to keep fasteners from being ejected, unless the muzzle is pressed against the work surface.

7.4 Establish and enforce safe work procedures

7.4.1 The following requirements must be met when carrying out work on parts that can rotate:

7.4.1.1 Power must be switched off and the work area verified de-energized before shields/covers can be removed.

7.4.1.2 Shield/covers that have been removed during work must be replaced before turbine start-up.

7.4.1.3 Work must not be carried out on the turbine when the wind speed exceeds the limit values of the mechanical design of the locking system as described in the turbine-specific Safety Regulations for Operators and Technicians document.

7.4.1.4 All personnel must stay clear of rotating parts during tasks that require components to be rotated, for example, during rotation of the drive train when lubricating the bearings.

7.4.1.5 Manual rotation of components is not allowed unless the rotation can be controlled by one hand (unassisted) without the risk of entanglement or crushing.

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7.4.2 Before using a tool, the operator shall inspect it to determine to his satisfaction that:

7.4.2.1 It is clean:

7.4.2.2 All moving parts operate freely; and

7.4.2.3 All guards are in place and properly adjusted.

7.4.3 When a tool develops a defect during use, the operator shall immediately cease to use it and tag the tool out of commission until it is properly repaired.

8 REQUIREMENTS

The following safe work requirements will be followed by authorized Vestas technicians, Contractors, subcontractors and visitors:

8.1 General Requirements

8.1.1 Operating machinery and equipment shall not be left unattended,

8.1.2 Operator will not wear jewelry or loose fitting clothing adjacent to operating machinery,

8.1.3 Operators must wear at a minimum eye protection and ensure that their co-workers, in the immediate area, are similarly protected from flying chips and material,

8.1.4 Maintenance or repair to all machinery will only be accomplished by authorized personnel and then only after the disconnect switch is locked and tagged in the OFF position,

8.1.5 Operators shall insure that point of operation guards and/or devices are in place prior to equipment operation.

9 Training

9.1 Frequency

9.1.1 Initially upon hire;

9.1.2 Annual refresher training;

9.1.3 Retraining shall be provided for all authorized Vestas technicians, Contractors, subcontractors and visitors whenever this is a change in the machine, equipment or processes that present a new hazard; and

9.1.4 Additional retraining shall also be conducted whenever a periodic inspection reveals, or whenever the Site/Construction/Authorized Supervisor has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of the use of guards. History of this Document

10 APPENDIX: version history

Version No.	Date	Description of Changes
00	2011.06.09	New document
01	2012.08.10	Removed Appendix A and B, minor grammatical changes, embedded applicable DMS numbers in document.
00	2015.04.21	Converted T09 document 0043-6026 to T03

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Hazard Communication Program				Document ID: 0049-2063 INS SUS-CHM-HCH (AME US) Hazard Communication
Owner(s): BPO.Del.SUS	Author(s): RIREG/DAYAG	Valid from: 2016.04.15	Valid until: 2019.04.15	Version: 02

Version history

Version No.	Date	Description of Changes
02	2016.04.15	Revised sections: 11.2, 11.3 Workplace labels; see grey highlighted areas

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1 Purpose

The purpose of this Hazard Communication Program is to prevent chemical related illnesses and injuries to our employees and to meet or exceed regulatory requirements.

2 Basis

VAWT has an obligation to protect its personnel from hazards encountered in the work place. This obligation cannot be fulfilled without workers' cooperation. For their own safety, all VAWT personnel must be able to speak and understand English in order to make a concerted effort to follow and understand safety procedures developed by VAWT. To promote awareness of the dangers involved with handling chemicals, VAWT has developed the following written Hazard Communication Program (HCP).

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3 Responsibility

3.1 Senior Management

3.1.1 Ensure effective program development and implementation.

3.1.2 Provide Site/Construction Management with adequate resources and support to carry out program responsibilities and obligations.

3.1.3 Require adherence to all policies, procedures, practices and rules related to site hazards.

3.1.4 Oversee and evaluate site supervisor performance.

3.2 Site/Construction Manager/Authorized Supervisor

3.2.1 Ensure all personnel under Vestas supervision adhere to all policies, procedures and rules related to hazard communication.

3.2.2 Compile a Chemical Inventory List (DMS 0049-0569) of hazardous chemicals and materials for the site. This inventory will be maintained at the front of each work area SDS file book.

3.2.3 Assess the site hazards and provide the required PPE for all Vestas personnel and visitors.

3.2.4 Ensure contractors supply required, approved PPE for their personnel as required by the PPE Matrix (DMS 0049-0691).

3.2.5 Ensure all personnel under Vestas supervision have received training and have adequate knowledge and skills to perform their duties.

3.2.6 Timely reporting of chemicals, hazards or safety related concerns to the Sustainability/QSE Department.

3.2.7 Conduct scheduled and random inspections of chemical storage areas and record results utilizing the Site QSE Inspection Checklist (DMS 0049-0546).

3.2.8 Take immediate action to repair and/or replace defective storage containers.

3.2.9 Verify that PPE (Vestas or personal) is approved for the hazards presented and fully protects the user.

3.3 Sustainability/QSE Department

3.3.1 Develop and monitor implementation of the Hazard Communication Plan.

3.3.2 Determine the appropriate PPE for use in all exposure situations.

3.3.3 Ensure efficient and effective Hazard Communication instruction and training are conducted.

3.3.4 Conduct workplace inspections and audits.

3.3.5 Conduct a program review annually to include Hazard Communication refresher e-learning prior to assignment

3.3.6 Propose and implement improvements to the Hazard Communication Plan.

3.3.7 The QSE Technical Support Specialist is designated as the Hazard Communication Program (HCP) Administrator.

3.3.8 Develop and implement the Site Specific Hazard Communication procedure.

3.4 Technical Training Center

3.4.1 Design and develop Hazard Communication training per the HAZCOM Standard.

3.4.2 Assign annual Hazard Communication refresher e-learning training.

3.4.3 Maintain safety related training records in an LMS system.

3.5 Personnel

3.5.1 Read and comply with all hazard and PPE signage posted.

3.5.2 Properly use, handle and store hazardous chemicals safely.

3.5.3 All personnel must wear personal protective equipment that meets or exceeds requirements of the hazard they are exposed to.

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3.5.4 Properly inspect, and maintain PPE prior to use in accordance with the manufacturer's instruction and training received.

3.5.5 Provide feedback in a timely manner to Site/Construction Management about the effectiveness of PPE.

3.5.6 Report any incident of misuse, symptoms of overexposure, injury or illness while working with PPE.

3.5.7 Ask questions when in doubt.

3.5.8 Implement the emergency response plan in the event of an emergency.

4 References

Document No.	Title
29 CFR 1910.1200	Hazard Communication Standard (HazCom)
EPA 735-B-03-001	US EPA Label Review Manual (3rd Edition, August 2003).
49 U.S.C. 5101	Federal Hazardous Materials Transportation Law
0049-2070	PPE Plan
0005-4934	Blacklist Material Blacklist

5 Scope

This program applies to all VAWT employees, contractors, vendors and all other non-VAWT employees working in or at VAWT facilities. The VAWT Hazard Communication Program along with the Site Specific HAZCOM procedures ensures personnel are informed of hazards they may be exposed to on the job and how to protect themselves.

6 Terms and Abbreviations

Term or Abbreviation	Definition
ACGIH	American Congress of Industrial Hygienist
DG	Dangerous Goods
EPA	Environmental Protection Agency
HAZCOM	Hazard Communication
HCP	Hazard Communication Program
HS	Hazardous Substance
IARC	International Agency for Research on Cancer
IC	Inventory Coordinator
LMS	Learning Management System
NFPA	National Fire Protection Association
NTP	National Toxicology Program
OSHA	Occupational Health and Safety Administration
PICS	Pacific Industrial Contractor Screening
PEL	Permissible Exposure Limit
QSE	Quality Safety and Environmental
SDS	Safety Data Sheet
TLV	Threshold Limit Value
TTC	Technical Training Center

7 Definitions

Hazardous Substances (HS)

Hazardous substances are classified only on the basis of health effects. This means that a substance is hazardous dependent on whether it has an immediate or long-term health effect.

Dangerous Goods (DG)

Dangerous goods are classified on the basis of immediate physical or chemical effects, such as fire, explosion, corrosion and poisoning, which affect people, property, or the environment.

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Chemicals
A substance or mixture of substances that could potentially have a negative impact on humans or environment due to an exposure or release. Examples include oil, grease, glue, paint, gas, liquids, fuels etc. All approved chemicals are visible in VAWT Chemical register maintained on www.3E.com website, any chemical not on the register is not allowed for use within VAWT.

Reportable Incidents
Chemical Spill Incidents as defined by the U.S. Environmental Protection Agency (EPA) and the State Legislation that requires formal notification to the relevant regulatory authority within 24 hours.
Chemical-related Fatalities or Injuries resulting in hospitalization of one or more employees must be reported verbally to OSHA within 8 hours.

3E SDS Storage System
3E Company provides an electronic database, which provides access to SDSs and chemical information. The database is maintained by VAWT QSE.

Vestas Blacklist Material Blacklist (DMS 0005-4934)
Restriction list of all chemicals that are not allowed to be used at any Vestas sites, determined and maintained by Vestas QSE Group.

Safety Data Sheet (SDS)
Provides information about the hazards (health effects) of the substance and how to use, store and transport the product safely. It also helps to identify, assess and control risks associated with the use of the substance in the workplace.

Signal word
Means a word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used in this section are "danger" and "warning." "Danger" is used for the more severe hazards, while "warning" is used for the less severe.

8 Program Requirements

8.1 Employee Rights

OSHA's Hazard Communication Standard gives employees specific rights. These employee rights, and how VAWT will respond to them, will be communicated to all personnel during their initial Site Safety Orientation training session.

8.1.1 Access to Employer's Written Program:

8.1.1.1 Employees can review this program any time in the Vestas Document Management System.

8.1.2 Employees have the right to print any Vestas SDS by accessing 3E's website at WWW.3eonline.com/EeeOnlinePortal/ or make a copy from the local SDS binder.

8.2 Chemical/Material Hazard Assessments

8.2.1 Manufacturers/Importers are responsible for determining the hazards of materials and communicating those hazards to companies that use them.

8.2.2 VAWT assumes that the hazardous potentials of chemicals it receives has been determined and listed accurately on the SDS by the manufacturer or importer.

8.2.3 A QSE representative or designee will review each SDS, when received, to determine if the chemical poses any hazard to VAWT employees and, if so, to determine the necessary control measures that will be used or if it should be added to the Blacklist.

8.3 SDS Maintenance

8.3.1 Information on each chemical is supplied by its manufacturer or importer in the form of a Material Safety Data Sheet. VAWT assumes that this information is accurate and relies on manufacturers to send updated SDSs for materials about which new information has become available.

8.3.2 Site/Construction Manager/Authorized Supervisor or IC/requisitioner will obtain SDSs from suppliers for each hazardous chemical used. If a chemical arrives without an SDS, the IC/ requisitioner can email, phone or send a written request to manufacturer to obtain a copy.

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8.3.3 When received, the IC will ensure that the SDS is completed according to 29 CFR 1910.1200 and add the new SDS to the Chemical Inventory List.

8.3.4 New chemicals for which no SDS is attached to the shipping papers shall be placed in secure storage and labeled ”DO NOT USE” until the SDS is received and reviewed by the QSE Representative or delegated individual.

8.3.5 The Site/Construction Manager/Authorized Supervisor or designee may file SDS in any manner that allows for personnel to readily access the SDS for the chemical desired.

8.3.6 SDS file books must be readily accessible to all personnel during their work shifts and maintained on site with the most up to date copy available.

8.4 Training Requirements

Vestas provides personnel with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new chemical hazard that personnel have not previously been trained about is introduced into their work area.

Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and safety data sheets.

8.4.1 Information; Employees shall be informed of:

8.4.1.1 The requirements of the HCS;

8.4.1.2 Any operations in their work area where hazardous chemicals are present; and,

8.4.1.3 The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and safety data sheets required by this section.

8.4.2 Employee training shall include at least:

8.4.2.1 Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

8.4.2.2 The physical, health, simple asphyxiation, combustible dust, and pyrophoric gas hazards, as well as hazards not otherwise classified, of the chemicals in the work area;

8.4.2.3 The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,

8.4.2.4 The details of the hazard communication program developed by the employer, including:

8.4.2.4.1 An explanation of the labels received on shipped containers and the workplace labeling system used by their employer;

8.4.2.4.2 Safety data sheets, including the order of information and how employees can obtain and use the appropriate hazard information.

8.4.3 Manufacturer/Importer/Distributor label elements must include information on:

8.4.3.1 **Product identifier**: how the hazardous chemical is identified. This can be (but is not limited to) the chemical name, code number or batch number. The manufacturer, importer or distributor can decide the appropriate product identifier. The same product identifier must be both on the label and in Section 1 of the SDS (Identification).

8.4.3.2 **Signal word:** used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. There are only two signal words, “Danger” and “Warning.” Within a specific hazard class, “Danger” is used for the more severe hazards and “Warning” is used for the less severe hazards. There will only be one signal word on the label no matter how many hazards a chemical may have. If one of the hazards warrants a “Danger” signal word and another warrants the signal word “Warning,” then only “Danger” should appear on the label.

8.4.3.3 **Pictogram:** OSHA’s required pictograms must be in the shape of a square set at a point and include a black hazard symbol on a white background with a red frame sufficiently wide enough to be clearly visible. A square red frame set at a point without a hazard symbol is not a pictogram and is not permitted on the label. OSHA has designated eight pictograms under this standard for application to a hazard category.

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8.4.3.4 **Hazard statement(s):** describe the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard. For example: “Causes damage to kidneys through prolonged or repeated exposure when absorbed through the skin.” All of the applicable hazard statements must appear on the label. Hazard statements may be combined where appropriate to reduce redundancies and improve readability. The hazard statements are specific to the hazard classification categories, and chemical users should always see the same statement for the same hazards, no matter what the chemical is or who produces it.

8.4.3.5 **Precautionary statement(s):** means a phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical or improper storage or handling.

8.4.3.6 Name, address and phone number of the chemical manufacturer, distributor, or importer

8.4.4 How an employee might use the labels in the workplace.

8.4.4.1 Explain how information on the label can be used to ensure proper storage of hazardous chemicals.

8.4.4.2 Explain how the information on the label might be used to quickly locate information on first aid when needed by employees or emergency personnel.

8.4.5 General understanding of how the elements work together on a label. For example,

8.4.5.1 Explain that where a chemical has multiple hazards, different pictograms are used to identify the various hazards. The employee should expect to see the appropriate pictogram for the corresponding hazard class.

8.4.5.2 Explain that when there are similar precautionary statements, the one providing the most protective information will be included on the label.

8.5 Training on the format of the SDS must include information on:

8.5.1 Standardized 16-section format, including the type of information found in the various sections

For example, the employee should be instructed that with the new format, Section 8 (Exposure Controls/Personal Protection) will always contain information about exposure limits, engineering controls and ways to protect yourself, including personal protective equipment.

8.5.2 How the information on the label is related to the SDS

For example, explain that the precautionary statements would be the same on the label and on the SDS. Personnel working at site prior to basic safety shall receive Initial training via e-learning prior to exposure to any hazardous chemicals.

8.5.3 Refresher Training

8.5.3.1 Refresher training is required to be provided to all personnel on at least an annual basis and will be provided via e-learning.

8.5.4 Specific Chemical Training

8.5.4.1 Special chemical training describes the hazards and control measures for each specific chemical that will be used by each employee. This training must be provided to the employee prior to the employee’s first exposure to the chemical at a site and documented on the New Material Review form (DMS 0049-0570).

8.5.5 Employee Training for Non-Routine Tasks

8.5.5.1 Personnel performing non-routine tasks that involve working with hazardous chemicals will be trained in the specific hazards associated with those tasks. Site Management will make sure an employee has received proper training prior to beginning the task and documented in the safety training LMS.

9 Contractors

9.1 Requirements

Before contract personnel can begin work for VAWT, these steps must be done:

9.1.1 The contract company must be established vendor in SAP;

9.1.2 The contractor must make available to the VAWT Site Management copies of SDSs for all hazardous chemicals that the contractor will bring to the work site;

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9.1.3 Site Management will make all contractor SDSs available to the VAWT personnel working in the area of the contracted work;

9.1.4 Site management shall arrange for a contractor meeting involving Vestas personnel where chemical hazards will be reviewed and the meeting shall be documented on a New Material Review form; and

9.1.5 All contractors must be able to prove successful completion of Hazard Communication training and receive site specific HAZCOM prior to performing work on-site.

10 Safety Data Sheet

10.1 Information Requirements:

The Hazard Communication Standard (HCS) requires chemical manufacturers, distributors, or importers to provide Safety Data Sheets (SDSs) (formerly known as Material Safety Data Sheets or MSDSs) to communicate hazards of hazardous chemical products. As of June 1, 2015, HCS will require new SDSs to be in a uniform format, and include section numbers, headings, and associated information under headings below:

10.2 SDS Sections

10.2.1 **Section 1, Identification** includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.

10.2.2 **Section 2, Hazard(s) identification** includes all hazards regarding the chemical; required label elements.

10.2.3 **Section 3, Composition/information on ingredients** includes information on chemical ingredients; trade secret claims.

10.2.4 **Section 4, First-aid measures** includes important symptoms/ effects, acute, delayed; required treatment.

10.2.5 **Section 5, Fire-fighting measures** lists suitable extinguishing techniques, equipment; chemical hazards from fire.

10.2.6 **Section 6, Accidental release measures** lists emergency procedures; protective equipment; proper methods of containment and cleanup.

10.2.7 **Section 7, Handling and storage** lists precautions for safe handling and storage, including incompatibilities.

10.2.8 **Section 8, Exposure controls/personal protection** lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).

10.2.9 **Section 9, Physical and chemical properties** lists the chemical's characteristics.

10.2.10 **Section 10, Stability and reactivity** lists' chemical stability and possibility of hazardous reactions.

10.2.11 **Section 11, Toxicological information** includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

10.2.12 **Section 12**, Ecological information*

10.2.13 **Section 13**, Disposal considerations*

10.2.14 **Section 14**, Transport information*

10.2.15 **Section 15**, Regulatory information*

10.2.16 **Section 16, Other information**, includes the date of preparation or last revision.

Note: Since other Agencies regulate this information, OSHA will not be enforcing Sections 12 through 15 (29 CFR 1910.1200(g)(2)).

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11 Labeling

11.1 Manufacturer/Importer Labels

11.1.1 All original containers must have clearly visible and legible manufacturer or importer's labels. The labels shall contain the following information as a minimum:

11.1.1.1 Product Name;

11.1.1.2 Contact information of Manufacturer or Importer;

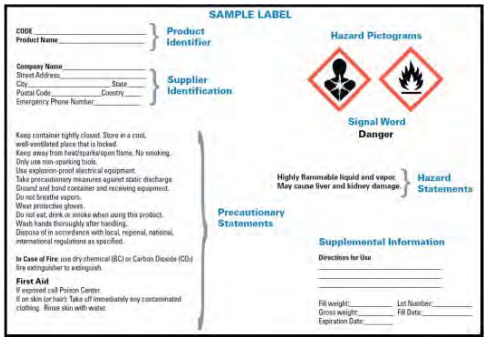
11.1.1.3 Pictogram/Hazard Class Warning;

11.1.1.4 Hazard statement(s)

11.1.1.5 Precautionary Statement(s)

11.1.1.6 Identity or common name of the chemical contained, name and address of its manufacturer or importer and any physical or health hazards it may pose; and

11.1.1.7 If labels are missing or illegible, they should be replaced with workplace labels.



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HCS Pictograms and Hazards		
Health Hazard	**Flame**	**Exclamation Mark**
		
▪ Carcinogen ▪ Mutagenicity ▪ Reproductive Toxicity ▪ Respiratory Sensitizer ▪ Target Organ Toxicity ▪ Aspiration Toxicity	▪ Flammables ▪ Pyrophoric ▪ Self-Heating ▪ Emits Flammable Gas ▪ Self-Reactive ▪ Organic Peroxides	▪ Irritant (skin and eye) ▪ Skin Sensitizer ▪ Acute toxicity (harmful) ▪ Narcotic Effects ▪ Respiratory Tract Irritant ▪ Hazardous to Ozone Layer (Non-Mandatory
Gas Cylinder	**Corrosion**	**Exploding Bomb**
		
▪ Gases Under Pressure	▪ Skin Corrosion/Burns ▪ Eye Damage ▪ Corrosive to Metals	▪ Explosives ▪ Self-Reactive ▪ Organic Peroxides
Flame Over Circle	**Environmental (Non-Mandatory)**	**Skull and Crossbones**
		
▪ Oxidizers	▪ Aquatic Toxicity	▪ Acute toxicity (fatal or toxic)

11.2 Workplace Labels

11.2.1 Each container of hazardous chemicals in the workplace must be labeled, tagged or marked with either:

11.2.2 The information specified for Chemical Manufacturers/Importers above; or

11.2.3 Product identifier and words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

11.2.4 Sites may use signs, placards, process sheets, batch tickets, operating procedures, or other such written materials in lieu of affixing labels to individual stationary process containers, as long as the alternative method identifies the containers to which it is applicable and conveys the information required by this section.

11.2.5 The Site/Construction/Authorized Supervisor shall ensure the written materials are readily accessible to the employees in their work area throughout each work shift.

11.2.5.1 The VAWT HCP utilizes a combination of three systems for labeling containers and marking storage locations:

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11.2.5.1.1 GHS compliant labels supplied by the product's manufacturer, importer or supplier.

11.2.5.1.2 GHS compliant secondary container labels

11.2.5.1.3 Placards compliant to Department of Transportation 49 CFR Part 172, Subpart F

11.2.5.2 Site management will review labels of hazardous chemicals and affirm shipping containers are properly labeled.

11.2.5.3 If site personnel finds a label lacking any necessary information, either an email or a written request for the information will be sent to the supplier and the container will be placed into secure storage until the proper information is received.

11.2.5.4 If labeling is damaged during placement of the container into storage, Site Management will be contacted and the container label shall be replaced with workplace labels.

11.2.5.5 Portable containers, buildings or locations used for chemical storage will be labeled according to the requirements contained in the associated NFPA standard and OSHA HCS requirements.

11.3 Secondary Containers

11.3.1 Containers storing chemicals/materials must be labeled clearly at all times until the contents have been consumed and the containers are ready for disposal.

11.3.2 If the label becomes illegible, the container must be removed and relabeled as per the requirements stated above.

11.3.3 All secondary containers shall be labeled to meet GHS compliance and this document.

Transportation Placard Labels		
		
Flammable Liquid Flammable Gas Flammable Aerosol	**Flammable solid Self-Reactive Substances**	**Pyrophoric (Spontaneously Combustible) Self-Heating Substances**
		
Substances, which in contact with water, emit flammable gases (Dangerous When Wet)	**Oxidizing Gases Oxidizing Liquids Oxidizing Solids**	**Explosive Divisions 1.1, 1.2, 1.3**
		
Explosive Division 1.4	**Explosive Division 1.5**	**Explosive Division 1.6**
		
Compressed Gases	**Acute Toxicity (Poison): Oral, Dermal, Inhalation**	**Corrosive**

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Marine Pollutant	**Organic Peroxides**	

12 Forms

Document No.	Title
0049-0569	Chemical Inventory List
0049-0570	New Material Review
0049-0546	Site HSE Inspection Checklist

13 APPENDIX: version history

Version No.	Date	Description of Changes
00	2015.03.27	Converted T09 document (0027-6859) to T03, Updated Sections:2, 5, 7, 8, 11, 12 see grey highlited areas
01	2015.05.21	Revised Sections 2,3,5,8 see grey highlited areas
02	2016.04.14	Updated workplace labels section see grey highlighted areas

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T03 0049-0569 Ver 02 - Approved - Exported from DMS: 2016-04-15 by RIREG

Owner: BPO.DEL.SUS
Valid from: 2015.03.11

Version:00

Chemical Inventory List

Document ID: 0049-0569
INS SUS-ENV-WST (AME US/CAN)
Chemical Inventory

General Site Information

Site Name:
Address:
Responsible Party:
Date of Last Update:

Hazard/Storage Codes

CGC - Compressed Gas Cylinder
FSC - Flammable Storage Cabinet
SCP - Secondary Containment Pallet
OX - Oxidizer

Manufacturer	Trade Name	Inventory PN or N/A	SDS Date (mm/yr)	Container Size	Hazard/Storage Code	TAB

THE FOLLOWING PRODUCTS HAVE BEEN ADDED TO THE SITE INVENTORY - POST AUDIT

Manufacturer	Trade Name	Inventory PN or N/A	MSDS Date (mm/yr)	Container Size	Hazard/Storage Code	TAB

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Owner: BPO.DEL.SUS
Valid from: 2015.01.26

Version:00

New Chemical Review

Document ID: 0049-2061
INS SUS-ENV-WST (AME US/CAN)
Chemical Review

SITE: _____ LOCATION: _____

DATE: _____ SITE SUPERVISOR: _____

PLEASE REVIEW THE ATTACHED. ONCE REVIEWED, PLEASE SIGN AND DATE NEXT TO YOUR NAME ON THE ROSTER BELOW. WHEN SIGNATURES OF ALL AFFECTED SITE EMPLOYEES ARE COLLECTED, THIS SDS WILL BE FILED, WITH THIS RECORD ATTACHED, IN THE SITE SDS COLLECTION.

MATERIAL SAFETY DATA SHEET FOR:

PRODUCT TRADE NAME/NUMBER: _____

MANUFACTURER NAME: _____

CHECK AS APPLIES: ☐ NEW PRODUCT ☐ REFORMULATION OR UPDATE

SITE EMPLOYEE ROSTER - *List ALL employees who may be exposed to or affected by this product* :

NAME (PRINTED)	SIGNATURE	DATE REVIEWED
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

HAZARDS - The Site/Construction Manager/Supervisor will review this SDS prior to distribution and highlight or otherwise note or call attention to any particular hazards involved in the use, storage, handling and/or shipment of this substance. In addition, the Site/Construction Manager/Supervisor will also ensure that any PPE, spill containment or special emergency response product specifically noted on the SDS shall be readily available prior to introducing the substance for use in the workplace.

When completed (all signatures collected), Original Signed Copy shall be filed electronically or hard copy with the SDS in the site SDS collection and the site Chemical Inventory List updated to include this new product.

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VAWT Waste Management				Document ID: 0049-2050 INS SUS-ENV-WST (AME US) Waste Management
Owner(s): BPO Del. SUS	Author(s): DAYAG	Valid from: 2015-05-18	Valid until: 2018-05-18	Version: 00

Version history

Version No.	Date	Description of Changes
00	2015-05-18	Convert from T09 Document DMS 0008-8005 to T03, consolidated Aerosol Can, Used Antifreeze & Glycol, and Used Oil Management

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1 Purpose

The purpose of this guideline is to provide a framework to develop a Waste Management Procedure to ensure compliance with legislative requirements and implementation of best practices in the management of wastes.

2 Responsibility

2.1 Site/Construction Manager/Authorized Supervisor

2.1.1 Establish, keep, maintain and update the wastes inventory;

2.1.2 Ensure Hazardous waste containers are labelled, compatible with the waste, covered; arranged, not leaking, and stored appropriately;

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2.1.3 Ensure that the Hazardous waste containers are packed and loaded accordingly;

2.1.4 Retain copies any Bill of Lading or Uniform Hazardous Waste Manifests from the licensed waste transporter and treatment storage and disposal facility;

2.1.5 Verify all waste shipments are properly secured before the transporter leaves the site;

2.1.6 Ensure any Bill of Lading or Uniform Hazardous Waste Manifests is properly filled out before the transporter leaves the site;

2.1.7 Inspect the waste storage area on a monthly basis; and

2.1.8 Coordinate for the transportation and disposal of all waste products.

2.2 QSE

2.2.1 Conduct an annual review of the waste minimization program;

2.2.2 Provide the technical expertise and supporting assistance in any off-site clean-up operation;

2.2.3 Ensure that the waste transportation and disposal vendors have the appropriate permits and licenses to operate such an activity;

2.2.4 Audit licensed Hazardous waste treatment, storage and disposal facilities as needed; and

2.2.5 Provide technical assistance as needed.

2.3 Employees

2.3.1 Report any situation violating this procedure;

2.3.2 Wear and use appropriate PPE when required;

2.3.3 Maintain personal cleanliness; and

2.3.4 Adhere to the requirements of this procedure.

3 References

Applicable regulations relating to hazardous and universal waste listed below:

40 CFR 260-272	Resource Conservation and Recovery Act – **Hazardous Waste**
40 CFR 273	Resource Conservation and Recovery Act – **Universal Waste**
40 CFR 279	Resource Conservation and Recovery Act – **Used Oil**
0051-7377	Waste Inventory Form
SUS-ENV-WST	Manage Waste Streams
SUS-CHM-DNG	Manage dangerous goods
SUS-CHM-HCH	Handle Chemicals

4 Forms

Document No.	Title
0051-7377	Waste Inventory Form

5 Scope

This procedure applies to all VAWT employees who generate, handle, or coordinate disposal of waste products.

6 Terms and Abbreviations

Term or Abbreviation	Definition
CESQG	Conditionally Exempt Small Quantity Generator
DOT	Department of Transportation
EPA	Environmental Protection Agency
Kg	Kilogram

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Term or Abbreviation	Definition
LDR	Land Disposal Restriction
LQG	Large Quantity Generator
LQHUW	Large Quantity Handlers of Universal Waste
PPE	Personal Protective Equipment
RCRA	Resource Conservation and Recovery Act
SDS	Safety Data Sheets
SQG	Small Quantity Generator
SQHUW	Small Quantity Handlers of Universal Waste
TCLP	Toxicity Characteristic Leaching Procedure
TSDF	Treatment, Storage and Disposal Facility
VAME	Vestas Americas
VAWT	Vestas American Wind Technology
VCWT	Vestas Canadian Wind Technology

7 Process

7.1 Identification, Collection and Storage of Waste Products

7.1.1 All Operational (Service, Construction and Warehouse) sites shall be reviewed to identify sources of waste. Each waste product shall be identified in a waste inventory. The waste inventory shall identify the source of the waste, the regulatory classification of the waste, determination method, and the disposal source or vendor of the waste.

7.1.2 The waste classifications shall be identified as Hazardous, Universal, Industrial or Non-hazardous. The Waste Inventory shall be reviewed annually by site management to identify any changes to the information contained in the Waste Inventory.

7.2 Hazardous Waste

7.2.1 Hazardous waste is waste that is dangerous or potentially harmful to human health or the environment. Hazardous waste can be liquid, solid, gas, or sludge. They can be discarded commercial products or the by-products of manufacturing processes. A hazardous waste has a characteristic that makes it hazardous. This characteristic may be ignitable (flammable), corrosive, reactive or toxic.

7.2.2 For each identified hazardous waste, a determination shall be made as to whether the waste is a Hazardous waste product by knowledge of the process that generates the waste or by laboratory analysis of the waste. The local environmental regulation shall be used to determine if the waste is classified as a Hazardous waste. Hazardous waste determinations shall be fully documented.

7.2.3 Generator Status

7.2.4 In the US, generators of hazardous waste are categorized by the amount of waste generated:

7.2.4.1 **Conditionally Exempt Small Quantity Generators (CESQG)** generates 100 kg or less per month of hazardous waste or 1 kg or less per month of acutely hazardous waste. CESQGs may not accumulate more than 1,000 kg of hazardous waste at any time.

7.2.4.2 **Small Quantity Generators (SQG)** generates more than 100 kg, but less than 1,000 kg of hazardous waste per month. SQGs may accumulate hazardous waste on site for 180 days without a permit. And the quantity of hazardous on site waste must never exceed 6,000 kg. A SQG must always have at least one employee available to respond to an emergency.

7.2.4.3 **Large Quantity Generators (LQG)** generates 1,000 kg per month or more of hazardous waste or more than 1 kg per month of acutely hazardous waste. LQGs may only accumulate waste on site for 90 days. LQGs must always have at least one employee available to respond to an emergency and have a detailed, written contingency plan for handling emergencies. LQGs must also submit a biennial hazardous waste report.

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7.2.5 Generator Specific Requirements

7.2.5.1 A CESQG does not have specific time limits on storing waste. A CESQG does not require a USEPA Hazardous Waste ID number and does not require a Uniform Hazardous Waste Manifest when shipping hazardous waste. However, a CESQG may only ship its hazardous waste to a state approved or RCRA permitted TSDF. Vestas requires that hazardous waste containers be inspected at least monthly to ensure containers are in good condition and not leaking.

7.2.5.2 A SQG may only store waste for 180 days on site and may not store more than 6000 kg on site at any time. A SQG must register to obtain a USEPA Hazardous Waste ID number and must utilize a Uniform Hazardous Waste Manifest when shipping hazardous waste. A SQG must provide training to any employees handling the hazardous waste and have emergency response procedures established. A SQG must conduct a weekly inspection of its stored hazardous waste containers. And a SQG may only ship its hazardous waste to a state approved or RCRA permitted TSDF.

7.2.5.3 A LQG may only store waste for 90 days on site but do not have a limit to their storage amount. A LQG must register to obtain a USEPA Hazardous Waste ID number and must utilize a Uniform Waste Manifest when shipping hazardous waste. A LQG must provide training to any employees handling the hazardous waste and have a written contingency plan. A LQG must conduct a weekly inspection of its stored hazardous waste containers. And a LQG may only ship its hazardous waste to a state approved or RCRA permitted TSDF.

7.2.6 Hazardous Waste Container Requirements

7.2.6.1 When hazardous waste is actively being generated, it is stored into an accumulation container. The accumulation container must be placed near the point of generation. Each accumulation container must be clearly labeled with the words "Hazardous Waste" and a common name of the waste generated. The accumulation container must be kept closed, except when emptying or filling, to minimize the potential for spillage. Any leaks or spills must be cleaned up immediately. No more than 55 gallons of hazardous waste may be accumulated into a single container.

7.2.6.2 When an accumulation container is filled and the site is considered a SQG or LQG, it must be placed into a storage area within 3 days. The site must now conduct weekly inspections of the stored hazardous waste containers. The waste container must be dated when the container was moved out of accumulation and into storage. The site must remove the hazardous waste within the given time limits based on its generator status (180 days for SQG and 90 days for LQG).

7.3 Common Hazardous Waste Products

7.3.1 Solvents

7.3.1.1 Many used/spent solvents are ignitable. Ignitable solvents may be mixed if there are no other toxic, corrosive, or hazardous characteristics that will create an additional hazard if mixed.

7.3.1.2 All safety requirements regarding the storage of flammable materials should be followed when generating used solvent waste.

7.3.1.3 Each container must be labeled with a generic name of “Spent Solvents” or “Used Solvents” in addition to “Hazardous Waste”.

7.3.1.4 The container must be kept closed except when adding or removing waste.

7.3.1.5 All waste solvent containers or tanks must be stored in an area or device that is equipped with secondary containment.

7.3.1.6 The secondary containment must have at least 110% of the volume capacity of the largest container.

7.3.1.7 Contact the QSE department for additional guidance on whether a specific chemical waste product may be added to a container of mixed hazardous wastes.

7.3.2 Aerosols

7.3.2.1 Any used/spent aerosol container that still contains any liquid or any propellant is considered a hazardous waste and cannot be disposed into the trash.

7.3.2.2 When the aerosol can is completely emptied and the propellant has been fully aspirated, it is no longer considered hazardous however, the liquid or propellant may still be considered hazardous waste.

7.3.2.3 Empty aerosol containers that have been fully depressurized are considered non-hazardous and may be placed into the trash for disposal or into a scrap metal bin for recycling.

7.3.2.4 An aerosol can may be punctured and completely drained using an approved aerosol can deactivation unit.

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7.3.2.5 The aerosol can puncturing system must meet the following requirements:

7.3.2.5.1 Must utilize an activated carbon filtration system that is in good service condition;

7.3.2.5.2 Must utilize a grounding wire to ensure prevention of static electricity buildup;

7.3.2.5.3 Must utilize a non-sparking puncturing tip; and

7.3.2.5.4 Must be able to secure the aerosol can being punctured.

7.3.2.6 Used/spent aerosol containers must not be disposed of in the trash or placed in a metal recycling bin unless the container has been properly punctured and completely drained first.

7.3.2.7 Only approved chemicals shall be drained into the collection container. A list of approved chemicals shall be posted on the aerosol can puncturing system to identify them. Listed hazardous wastes such as perchloroethylene shall be prohibited from being added to the aerosol can collection container. In the US, once a listed hazardous waste is mixed with other hazardous wastes into a single container, the entire contents of that container assumes all of the characteristics of each separate waste.

7.3.2.8 The contents of the aerosol can are considered hazardous waste if it is hazardous, corrosive, reactive or toxic.

7.3.2.9 The aerosol can contents must be reviewed to ensure it is compatible to the contents of the hazardous waste collection container.

7.3.2.10 In particular, no aerosol cans shall be punctured that contains an oxidizer or strong acid. The release of an oxidizer into the accumulation drum at the puncturing station could result in a fire, toxic gas, or an explosion.

7.3.2.11 Aerosols cans containing chlorinated solvents and pesticides should not be punctured and should instead be kept separate.

7.4 Universal Waste

Universal waste is a category of waste products designated as hazardous waste, but contains materials that are very common and easily recyclable. When waste is categorized as universal waste, it has reduced regulatory requirements. However, this only applies to batteries, mercury-containing equipment, pesticides, and used lamps.

7.4.1 Generator Status

7.4.1.1 In the US, generators of universal waste are categorized by the amount generated:

7.4.1.1.1 Small Quantity Handlers of Universal Waste (SQHUW) generate and store no more than 5000 kg of universal waste.

7.4.1.1.2 Large Quantity Handlers of Universal Waste (LQHUW) generate and store more than 5000 kg of universal waste.

7.4.1.1.3 Both categories of generator must provide basic training to employees handling universal waste. And both categories of generator must assure that universal wastes is shipped to and received by an authorized universal waste collection site or destination facility (e.g., a recycling facility for fluorescent light tubes).

7.4.2 Universal Waste Container Requirements:

7.4.2.1 When universal waste is actively being generated, it is stored into an accumulation container or box;

7.4.2.2 Each accumulation container must be clearly labeled with the words "Universal Waste" and a description of the waste generated such as “Used Bulbs” or “Used Batteries - Lithium”;

7.4.2.3 The accumulation container must be kept closed, except when emptying or filling, to minimize the potential for spillage;

7.4.2.4 Any leaks or spills must be cleaned up immediately;

7.4.2.5 Each container must be labeled with the date when the waste is first placed in it;

7.4.2.6 No container of universal waste may be stored onsite for more than 1 year;

7.4.2.7 Many transporters of used batteries require the contacts of each battery to be taped to prevent the short circuiting of potentially charged batteries which may cause a fire; and

7.4.2.8 Sites should contact their authorized universal waste collection site or destination facility for additional details.

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7.5 Industrial Waste

Industrial waste is a generic term to identify waste products that generally do not meet the definition of hazardous waste but cannot be disposed of as non-hazardous waste. Sites must review local regulations to determine if used oil is considered hazardous waste as some states require used oil to be disposed of as hazardous waste.

7.5.1 Industrial waste materials may cause damage to the environment if released. There are no generator categories for used oil and used coolant.

7.5.2 Used Oil

7.5.2.1 Used oil produced from maintenance and operation activities must be controlled and disposed of properly. Any collected oil from a wind turbine must be transported back to the Vestas service office/warehouse to be collected into a storage container that is in good condition, can be closed, and is not leaking.

7.5.2.2 Used oil containers and containment areas must be visually inspected every month for evidence of corrosion, damage, leakage, or other deterioration.

7.5.2.3 Each container must be labeled with the words “USED OIL”. The container must be kept closed except when adding or removing oil. All used oil containers or tanks must be stored in an area that is equipped with secondary containment.

7.5.2.4 The secondary containment must have at least 110% of the volume capacity of the largest container. All Vestas fleet vehicles used in the transportation of oil or coolant must be equipped with a spill kit.

Caution USED Oil cannot be mixed with any other non-oils (particularly coolant). This may result in reclassification to a Hazardous Waste.

7.5.3 Coolant

7.5.3.1 Ethylene glycol and propylene glycols are used as a coolant or heat transfer fluid in closed-loop cooling systems. They are typically used in approximately a 50:50 mixture ratio with water. Despite its widespread use, ethylene glycol is a toxic chemical. Propylene glycol is less toxic and has a bitter taste.

7.5.3.2 Any collected coolant from a wind turbine must be transported back to Vestas office/warehouse and must be collected into a container that is in good condition, can be closed, and is not leaking. When disposing of coolant, it should be treated as a industrial waste.

7.5.3.3 If contaminated with trace amounts of fuel or heavy metals, the used coolant must be a considered a toxic hazardous waste if it exceeds the Toxicity Characteristic Leaching Procedure (TCLP) thresholds set for these constituents.

7.5.3.4 Used coolant containers and containment areas must be visually inspected every month for evidence of corrosion, damage, leakage, or other deterioration.

7.5.3.5 Each container must be labeled with the name of the waste product on it. The container must be kept closed except when adding or removing coolant. All coolant containers or tanks must be stored in an area or device that is equipped with secondary containment.

7.5.3.6 The secondary containment must have at least 110% of the volume capacity of the largest container. All Vestas fleet vehicles used for transporting oil or coolant must be equipped with a spill kit.

7.6 Non-Hazardous Waste

All other wastes which do not pose a hazard to health or the environment and is not regulated by a local or federal regulation shall be considered non-hazardous. These materials can either be recycled, composted, or landfilled. Sites are encouraged to maximize the use of recycling and composting in order to prevent this material to be disposed of in landfills.

7.7 Misc. Waste Products

7.7.1 Debris Contaminated with Waste

7.7.1.1 In most instances, whenever a material becomes contaminated with a hazardous waste or Industrial waste, that material must be considered the same type of waste classification it was contaminated with.

7.7.1.2 When absorbents are used to clean up a hazardous waste, the absorbents become debris contaminated with hazardous waste.

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7.7.1.3 When filters are drained of used oil, it becomes debris contaminated with oil and should be considered an industrial waste (unless the oil is considered to be a hazardous waste).

7.7.1.4 Any container used to store debris contaminated with a waste should be kept separate from the liquid waste it was contaminated with.

7.7.1.5 Used oil filters are not to be disposed in the general garbage even if dry.

Note Some states allow disposal of oil filters in the general garbage if they are properly drained and dry. Verify state and local regulations prior to disposal into general garbage.

7.7.2 Empty Containers

7.7.2.1 Empty containers left over after being filled with a chemical may be regulated unless they are completely “empty.” To the extent possible, sites shall attempt to use suppliers that will take back their bulk empties (e.g., poly or steel drums, etc.).

7.7.2.2 However, a large number of chemical containers end up getting thrown away, scrapped, or recycled. In some cases the residues left in these seemingly “empty” containers may actually cause the container itself to be regulated as a hazardous waste.

7.7.2.3 A container is considered “empty” if all materials have been removed that can be removed using the practices commonly employed to remove materials from that type of container, e.g., pouring, pumping, tilting, and aspirating, and no more than one inch of residue remains on the bottom of the container or inner liner.

7.8 Transportation and Disposal

7.8.1 At the turbine or in the field:

7.8.1.1 Employees shall collect and separate all waste products in individual bags or containers provided. Employees shall segregate waste products in accordance to the waste inventory and prevent the mixing of wastes. Once in the office/warehouse, all waste products must be consolidated into their accumulation containers.

7.8.2 Site management shall coordinate the disposal of all wastes in accordance to local and federal regulation.

7.8.3 Sites shall only use pre-approved and authorized waste disposal contractors.

7.8.4 Hazardous, Universal and Industrial wastes shall only be transported to appropriately permitted TSDFs using approved, licensed transporters.

7.8.5 A site representative shall ensure that any waste products are properly packed and labelled in accordance with the transporter’s requirements and shall supervise the loading of containers into the transporter’s vehicle.

7.8.6 For hazardous waste and used battery shipments, only a DOT-trained site representative may sign and approve the transportation of the waste products.

7.8.7 The site shall keep copies of all shipping papers or manifests for a minimum of three years.

7.8.8 In some states, a site may be required to submit a copy of the Uniform Hazardous Waste Manifest to the state agency regulating hazardous waste.

7.8.9 For SQG and LQG, an exception report must be filed to the state agency if a completed manifest copy from the TSDF is not received within 60 days and 45 days respectively.

7.8.10 Open burning and on-site disposal of Hazardous wastes are strictly prohibited.

7.9 Emergency Plan and Procedures

7.9.1 Emergency procedures for spills, fire and explosion shall be documented in the Emergency Response Plan and be made available to all employees having access to the waste storage areas.

7.9.2 The QSE Department shall provide the technical expertise and supporting assistance in any clean-up operation in the event of any off-site spills or accidental discharge of hazardous waste.

7.10 Waste Minimization

7.10.1 Whenever possible, sites shall identify waste minimization opportunities when technically and financially feasible.

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7.10.2 The QSE Department shall coordinate waste minimization efforts to identify, evaluate and manage opportunities to reduce the quantity or concentration of its waste products.

7.11 Communication

7.11.1 This procedure shall be made available to all employees.

7.12 Training

7.12.1 All employees will receive waste management training informing them of the hazards of waste products and the steps that shall be taken to perform their job duties safely and in accordance to local and federal regulations.

7.13 Evaluation

7.13.1 This procedure will be reviewed at least once every three years.

8 Forms

Document No.	Title
0051-7377	Waste Inventory Form

9 Acknowledge Success

Success or any improvement needed for this procedure will be communicated to employees via posting on the health and safety Board.

10 APPENDIX: version history

Version No.	Date	Description of Changes
00	2006-09-26	First edition - Reformatted & new number 27-Jul-2007
01	2010-01-01	Content and template updates
00	2015-APR-29	Convert from T09 Doc to correct type T03 was 0008-8005 and put in the Content and current L5 template format updates

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T03 0052-2020 Ver 00 - Approved - Exported from DMS: 2016-08-29 by RIREG

Hazardous Material Handling and Storage				Document ID: 0049-2053 INS SUS-CHM-HCH (AME US/Can) HAZMAT Handling and Storage
Owner(s): BPO Del. SUS	Author(s): DAYAG	Valid from: 2016-06-06	Valid until: 2019-06-06	Version: 01

Version history

Version No.	Date	Description of Changes
01	2016-06-06	Revised to include VCWT

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1 Purpose

The purpose of this guideline is to provide a framework to ensure the safety of any person working with or around hazardous material.

2 Responsibility

2.1 Site/Construction Manager/Authorized Supervisor

2.1.1 Ensure hazardous materials are labelled, compatible with nearby chemicals, covered, not leaking, and stored appropriately;

2.1.2 Ensure that the hazardous material containers are properly packaged and handled accordingly;

2.1.3 Retain copies any shipping papers or Uniform Hazardous Waste Manifests from hazardous material shipments;

2.1.4 Ensure any Bill of Lading or Uniform Hazardous Waste Manifests is properly filled out before the transporter leaves the site;

2.2 QSE

2.2.1 Provide the technical expertise and supporting assistance in any off-site clean-up operation;

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2.2.2 Provide technical assistance as needed.

2.3 Personnel

2.3.1 Understand and follow provided hazardous material training

2.3.2 Report any situation violating this procedure;

2.3.3 Wear and use appropriate PPE when required;

2.3.4 Adhere to the requirements of this procedure.

3 References

Applicable regulations relating to hazardous materials and dangerous goods listed below:

49 CFR 171-180	Hazardous Materials Regulation
SUS-CHM-DNG	Manage dangerous goods
SUS-CHM-HCH	Handle Chemicals
SUS-CHM-CRP	Chemical Approval Policy

4 Forms

Document No.	Title
0049-0570	New Material Review

5 Scope

This procedure applies to all VAWT personnel who purchase, handle, transport, or ship hazardous materials.

6 Terms and Abbreviations

Term or Abbreviation	Definition
Hazardous material	A product, waste or combination of substances which because of its quantity, concentration, physical, chemical, toxic, radioactive, or infectious characteristics may reasonably pose a significant, actual, or potential hazard to human health, safety, welfare, or the environment when improperly treated, stored, transported, used, disposed of, or otherwise managed
Hazmat Personnel	A person employed by a Hazmat Employer in a manner that directly affects hazardous materials transportation safety. A Hazmat individual is a person that performs one of these functions: 1.Loads, unloads, or handles hazardous materials, 2.Tests, reconditions, repairs, modifies, marks, or otherwise represents containers, drums, or packaging as qualified for use in the transportation of hazardous materials, 3.Prepares hazardous materials for transportation, 4.Responsible for safety of transporting hazardous materials, or 5.Operates a vehicle used to transport hazardous materials.
HazMat Employer	An organization that uses one or more Personnel to: Transport hazardous materials in commerce, Cause hazardous materials to be transported or shipped in commerce, or represent, mark, certify, sell, offer, recondition, test, repair, or modify containers, drums, or packages as qualified for use in the transportation of hazardous materials.
SDS	Safety Data Sheets
PPE	Personal Protective Equipment
DOT	Department of Transportation
TDG	Transportation of Dangerous Goods

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Term or Abbreviation	Definition
NFPA	National Fire Protection Association
QSE	Quality Safety and Environmental
IATA	International Air Transport Association

7 Process

7.1 Purchase and Receiving of Hazardous Materials

7.1.1 Only approved hazardous materials shall be purchased using the procedures identified in the Vestas Chemical Approval Policy, SUS-CHM-CRP.

7.2 Storage of Hazardous Materials

7.2.1 All hazardous materials shall be stored in accordance to its SDS and chemical characteristics.

7.2.2 Incompatible chemicals shall be separated by at least 20 feet.

7.2.3 Flammable liquid containers not in active use shall be stored inside a flammable storage cabinet.

7.2.4 Flammable storage cabinets shall be constructed and used in accordance to NFPA 30. If local jurisdictions require sites to meet the Uniform Fire Code standard, then flammable storage cabinets shall have self-closing doors.

7.3 On-Site Transportation

7.3.1 Personal vehicles shall not be used for the transportation of hazardous materials.

7.3.2 All hazardous material packages shall be secured so the material does not spill during transport.

7.3.3 Hazardous materials shall be marked with labeling describing the material in the container. Containers must be visually inspected for damage or signs of leakage before handling. If a container is damaged or leaking, the container shall be cleaned and decontaminated in accordance to the SDS. QSE can be contacted to provide technical assistance.

7.3.4 No damaged containers shall be used for transport.

7.3.5 Incompatible chemicals shall be separated during transport by at least 20 feet.

7.3.6 Hazardous materials must be packaged in the original manufacturer's containers or an equivalent.

7.4 Off-Site Transportation

7.4.1 Off –Site transportation of hazardous materials requires full compliance with US DOT Hazardous Material Transportation Regulations. If the quantities carried off site do not meet the "Material of Trade" exceptions, then all the requirements contained in 49 CFR or local regulations must be followed. This includes, but is not limited to, additional training for any persons packaging the material, the vehicle driver, the labeling and placarding of the shipment, and emergency response plans.

7.5 Emergency Plan and Procedures

7.5.1 Emergency procedures for spills, fire and explosion shall be documented in the Emergency Response Plan and be made available to all personnel handling or transporting hazardous materials.

7.5.2 The QSE Department shall provide the technical expertise and supporting assistance in any clean-up operation in the event of any off-site spills or accidental discharge of hazardous materials.

7.6 Communication

7.6.1 This procedure shall be made available to all hazmat personnel.

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7.7 Training

7.7.1 The training will be conducted within an appropriate and timely manner from the date of hire for those personnel whose job functions involve any of the aforementioned hazardous material tasks and once every three years thereafter for hazardous materials entering highway commerce (US DOT) and every two years for packages offered for transportation by air (IATA). Additional training shall be provided for any job change involving the use of hazardous materials.

7.7.2 Personnel may perform job functions prior to the completion of training provided the individual performs those functions under the supervision of properly trained and knowledgeable personnel.

7.7.3 Training program includes the following:

7.7.3.1 General training to provide awareness and familiarization of the requirements of the Hazardous Materials Transportation Program and to enable the individual to recognize and identify hazardous materials consistent with the hazard communication standard

7.7.3.2 Function-specific training applicable to the functions that the individual performs

7.7.3.3 Safety training such as measures to protect personnel from the hazards associated with hazardous materials to which they may be exposed and the methods or procedures for avoiding accidents, such as the proper procedures for handling packages containing hazardous materials.

7.7.3.4 Any additional department-specific training (e.g., pre-trip safety inspection or the use of vehicle controls and equipment, including the operation of emergency equipment).

7.8 Evaluation

7.8.1 This procedure will be reviewed at least once every three years.

8 APPENDIX: version history

Version No.	Date	Description of Changes
00	2010-01-1	First edition
01	2015-05-22	Convert from T09 Doc to correct type T03 was 0008-8006 and put in the Content and current L5 template format updates
00	2015-05-22	Convert T09 Document DMS 0008-8005 to T03.

T03 0052-2039 Ver 01 - Approved - Exported from DMS: 2016-06-06 by RIREG

VESTAS PROPRIETARY NOTICE

Lead and Asbestos Plan Vestas System Instruction				Document ID: 0049-2046 INS SUS-ENV-WST (AME US/Can) Lead and Asbestos Plan
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2016.06.06	Valid until: 2019.06.06	Version: 02

Version history

Version No.	Date	Description of Changes
02	2016.04.28	Added reference to VCWT

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1 Purpose

Maintain a Lead and Asbestos free environment at all Vestas sites.

2 Responsibility

2.1 Site/Construction Manager/Authorized Supervisor

2.1.1 Evaluate all tools, equipment and parts for the possibility of lead or asbestos materials.

2.1.2 Hire an abatement contractor should any lead or asbestos laden materials be identified on a Vestas site.

2.1.3 Ensure site personnel are made aware of potential lead and/or asbestos materials on site during orientation training.

2.2 Personnel

2.2.1 Notify supervision any time lead or asbestos containing tools, equipment or part are identified or suspected.

2.2.2 Quarantine all tools, materials or parts suspected of containing lead or asbestos.

2.3 Sustainability Representatives(s)

2.3.1 Assist in sourcing tools and equipment that do not contain lead, asbestos or any other restricted substances.

3 References

Document No.	Title
0010-7485	VAWT HSE Approved Equipment Management
0049-2050	VAWT Hazardous Waste Management

T03 0049-2046 Ver 02 - Approved - Exported from DMS: 2016-06-06 by RIREG

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Document No.	Title
0008-9803	VCWT Waste Management

4 Scope

This plan applies to all Vestas employees, contractors and visitors working at a Vestas construction or service sites.

5 Terms and Abbreviations

Term or Abbreviation	Definition
VAWT	Vestas American Wind Technology
VCWT	Vestas Canadian Wind Technology

6 Requirements

6.1 Training

6.1.1 Vestas goes to great length to ensure sites are lead and asbestos free but as a precaution personnel shall be trained in to be lead and asbestos awareness and this procedure.

6.2 Suspected Materials

6.2.1 If an employee suspects' asbestos or lead is contained in any material being working with, they are instructed to contain the area, cover and leave the material and the area. Report the material to their supervisor and complete a Preliminary Incident Report.

6.2.2 Supervisor shall contact an abatement contractor, if necessary to remove/abate the material.

6.2.3 At no time are employees, contractor or visitor allowed or expected to handle or abate any materials containing asbestos or lead.

6.2.4 Personnel shall only do work in areas suspected of asbestos or lead containing materials once it has been documented that the area has been abated by a qualified abatement contractor

7 APPENDIX: version history

Version No.	Date	Description of Changes
00	2011.11.22	New document
00	2015.06.09	Converted T09 Document 0025-5349 to T03
01	2016.04.28	Revised sections: 2, 6 see grey highlighted text

T03 0052-2020 Ver 02 - Approved - Exported from DMS: 2016-06-06 by RIREG

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Waste Inventory Form				Document ID: 0051-7377 INS SUS-ENV-WST (AME SU/CAN) Waste Inventory
Owner(s): BPO.Del.SUS	Author(s): DAYAG	Valid from: 2015.05.01	Valid until: 2018.05.01	Version: 00

Site Name: _____ EPA ID#: _____
(if available)

Waste Product	**Waste Category** *(hazardous, universal, regulated, or non-hazardous)*	**Determination Method (if Hazardous)**	**Disposal Vendor**

APPENDIX: version history

Version No.	Date	Description of Changes
00	2015-05-01	New Document

T03 0052-7377 Ver 00 - Approved - Exported from DMS: 2016-06-08 by RIREG

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Extreme Weather Plan				Document ID: 0049-0687 INS SUS-SAF-OPC (AME US & CAN) Extreme Weather
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.02.04		Version: 00

Version history

Version No.	Date	Description of Changes
00	2015.01.28	Converted T09 (0025-8101) to T03 document

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1 Purpose

The purpose of this procedure is to ensure a safe work environment prior to and during the performance of work, to prevent exposure to hazards while working in extreme weather conditions, and to identify hazards and restrict work where necessary to ensure the safety of Vestas employees.

2 Responsibility

2.1 Senior Management

2.1.1 Ensure effective program development and implementation.

2.1.2 Provide Site/Construction Management/Authorize Supervisors with adequate resources and support to carry out program responsibilities and obligations.

2.1.3 Require adherence to all policies, procedures, practices and rules related to site hazards.

2.1.4 Oversee and evaluate site supervisor performance.

2.2 Site/Construction Manager

2.2.1 Recognize environmental and workplace conditions that lead to potential hazards, illnesses or injuries and take measures to mitigate those risks.

(L5 Document Template V02)

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2.2.2 Select and supply proper PPE and clothing for applicable weather conditions.

2.2.3 At the beginning of the work shift, give an overview of the working conditions and weather concerns to the work group.

2.2.4 Ensure all personnel under Vestas supervision adhere to all policies, procedures and rules related to extreme weather conditions.

2.2.5 Allow a period of adjustment to hot weather conditions before embarking on a full work schedule and permit employees to set their own pace and take extra work breaks when needed.

2.2.6 Ensure contractors supply required, approved PPE and equipment for their personnel as required by the PPE Matrix (DMS 0049-0691).

2.2.7 Ensure all personnel under Vestas supervision have received training in this procedure and have adequate knowledge and skills to perform their duties.

2.2.8 Conduct scheduled and random inspections of Pre-Ice Checklist (DMS 0049-0705).

2.2.9 Notify the customer under the terms of the customer contract - explain our safety policy regarding hazards and actions taken to mitigate the risks.

2.2.10 Once conditions have improved and it is determined that it's safe to work, providing clearance for work and notifying the customer.

2.3 QSE Department

2.3.1 Develop and monitor implementation of the Extreme Weather program.

2.3.2 Determine the appropriate PPE for use in all exposure situations.

2.3.3 Ensure efficient and effective Extreme Weather Condition instruction and training are conducted.

2.3.4 Conduct workplace inspections and audits.

2.3.5 Propose and implement improvements to the Extreme Weather Condition procedure.

2.4 Personnel

2.4.1 Read and comply with the Extreme Weather Condition procedure.

2.4.2 Properly access hazardous weather conditions and takes appropriate actions.

2.4.3 Document hazardous conditions and actions on JSA (DMS 0049-0549).

2.4.4 When adverse weather conditions are spotted in the immediate or surrounding area, contact the Site Manager immediately.

2.4.5 Stop work when weather conditions warrant.

2.4.6 All personnel must wear personal protective equipment that meets or exceeds requirements of the hazard they are exposed to.

2.4.7 Provide feedback in a timely manner to Site/Construction Management/Authorize Supervisors about the effectiveness of PPE.

2.4.8 Implement the emergency response plan in the event of an emergency.

2.4.9 Each crew must acknowledge all warnings either by radio or cell phone.

2.4.10 All personnel in the field and towers must be prepared to seek cover on short notice if lightning occurs.

3 References

Document No.	Title
OSHA	OSHA Act 1970 Section 5(a)(1)
OSHA	OSHA 3156 Cold Stress Equation
OSHA	OSHA Tech Manual Directive Number: TED 01-00-015
NOAA	National Oceanic and Atmospheric Administration
US DOL	US Department of Labor
0049-0691	PPE Matrix

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4 Scope

This procedure applies to all VAME employees, contractors and visitors

5 Terms and Abbreviations

Term or Abbreviation	Definition
Heat	The measure of energy in terms of quantity
JSA	Job Safety Analysis
LCTU	Lightning Current Transfer Units
OSHA	Occupational Safety and Health Administration
PTP	Pre Task Plan
NOAA	National Oceanic and Atmospheric Administration
ACGIH	American Conference of Governmental Industrial Hygienists
WBGT	Wet Bulb Globe Temperature

6 Forms

Document No.	Title
0049-2067	Cold Stress Equation
0049-2065	Heat Index Chart
0049-0705	Pre- Work Ice Checklist
0049-2066	WA State Temperature Trigger Chart
0049-0549	Job Hazard Analysis

7 General Requirements

7.1 Localization

7.1.1 For those areas where this Safety Manual differs from the Vestas Group requirements, this manual shall prevail.

7.1.2 In some cases, VAME has implemented a requirement that may exceed a state or provincial requirement. The higher level requirement in the Safety Manual will prevail.

7.1.3 In the event that a state or provincial requirement exceeds a Safety Manual procedure, the higher level requirement will prevail.

8 Instructions for Extreme Weather Conditions

8.1 Cold

8.1.1 In regions relatively unaccustomed to winter weather, near freezing temperatures are considered “extreme cold.” Whenever temperatures drop decidedly below normal and as wind speed increases, heat can leave your body more rapidly. This weather-related condition known as wind chill or exposure can accelerate the onset of hypothermia and lead to serious health problems. Workers should familiarize themselves with the early symptoms of Hypothermia and be prepared to seek shelter and treatment immediately.

8.1.2 The scope of work performed must also be limited dependent upon the specific conditions present. Refer to the Cold Stress Equation (DMS 0049-2067).

8.1.3 Body core temperature can be maintained without overheating (perspiration) by layering clothing which allows adjust to changing temperatures and conditions.

8.1.4 During freezing temperatures with high humidity, ice is likely to accumulate on wind turbine blades and nacelles. This ice can be thrown off blades and/or fall from nacelles (whether the turbines are operating or not) during icing conditions or while the ice is melting. This presents a significant hazard to any personnel working in the area.

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8.1.5 Completion of a Pre-Work Ice Checklist (DMS 0049-0705) and special precautions must be taken prior to performing any work on or near any turbine during these conditions.

8.2 Heat

8.2.1 Age, weight, degree of physical fitness, degree of acclimatization, metabolism, use of alcohol or drugs, clothing, and a variety of medical conditions such as hypertension all affect a person's sensitivity to heat. Prior heat injury predisposes an individual to additional injury.

8.2.2 It is difficult to predict just who will be affected and when, because individual susceptibility varies. Environmental factors include more than the ambient air temperature such as: radiant heat, air movement, conduction, and relative humidity. All affect an individual's response to heat. Refer to the Heat Index Chart (DMS 0049-2065).

8.2.3 Personnel in Washington State shall also utilize the trigger chart refer to the WA State Trigger Chart (DMS 0049-2066).

8.2.4 Heat disorders and health effects

8.2.4.1 Heat Stroke - Occurs when the body's system of temperature regulation cannot cope with ambient conditions and body temperature rises to critical levels.

8.2.4.2 Heat stroke is a medical emergency. Primary signs and symptoms of heat stroke are confusion, irrational behavior, loss of consciousness, convulsions, a lack of sweating (usually), hot, dry skin, and an abnormally high body temperature, e.g., of 41°C (105.8°F).

8.2.4.3 Heat Exhaustion - The signs and symptoms of heat exhaustion are headache, nausea, vertigo, weakness, thirst, and giddiness.

8.2.4.4 This condition responds readily to prompt treatment. Heat exhaustion should not be dismissed lightly; fainting is associated with heat exhaustion. Also, signs and symptoms of heat exhaustion are similar to those of heat stroke.

8.2.4.5 Heat Cramps – Usually caused by performing hard physical labor in hot environments. These muscle cramps have been attributed to an electrolyte imbalance caused by sweating. Cramps can be caused by both too much and too little salt.

8.2.4.6 Heat Collapse ("Fainting") - In heat collapse, the brain does not receive enough oxygen because blood pools in the extremities. As a result, the exposed individual may lose consciousness. This reaction is similar to that of heat exhaustion and does not affect the body's heat balance. However, the onset of heat collapse is rapid and unpredictable. To prevent heat collapse, the worker should gradually become acclimatized to the hot environment.

8.2.4.7 Heat Rashes – Heat rashes are the most common problem in hot work environments. Prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive. Prickly heat occurs in skin that is persistently wetted by sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

8.2.4.8 Heat Fatigue - A lack of acclimatization predisposes an individual to heat fatigue. An acclimatization program and training for work in hot environments is advisable. Signs and symptoms of heat fatigue include impaired performance of tasks that require mental alertness or fine motor skills. There is no treatment for heat fatigue except to remove the heat stress before a more serious heat-related condition develops.

8.2.5 Workers should not be permitted to work when their deep body temperature exceeds 38°C (100.4°F).

8.3 Wet Bulb Globe Temperature Index

Wet Bulb Globe Temperature (WBGT) should be calculated using the appropriate formula in Equation III: 4-2 below. The WBGT for continuous all-day or several hour exposures should be averaged over a 60-minute period. Intermittent exposures should be averaged over a 120-minute period.

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TABLE III: 4-1. ASSESSMENT OF WORK

Body position and movement		*kcal/min**		
Sitting		0.3		
Standing		0.6		
Walking		2.0-3.0		
Walking uphill		add 0.8 for every meter (yard) rise		
Type of work		***Average kcal/min***		***Range kcal/min***
Hand work				
	Light	0.4		0.2-1.2
	Heavy	0.9		
Work: One arm				
	Light	1.0		0.7-2.5
	Heavy	1.7		
Work: Both arms				
	Light	1.5		1.0-3.5
Heavy	2.5			
Work: Whole body				
	Light	3.5		2.5-15.0
	Moderate	5.0		
	Heavy	7.0		
	Very heavy	9.0		
* For a "standard" worker of 70 kg body weight (154 lbs.) and 1.8m^2 body surface (19.4 ft^2).				

Equation III: 4-2. Average Web Bulb Globe Temperature (WBGT)

$$Average_{WBGT} = \frac{(WBGT_1)(t_1)+ (WBGT_2)(t_2)+...+(WBGT_n)(t_n)}{(t_1)+(t_2)+...(t_n)}$$

For indoor and outdoor conditions with no solar load, WBGT is calculated as:

$$WBGT = 0.7NWB + 0.3GT$$

For outdoors with a solar load, WBGT is calculated as:

$$WBGT = 0.7NWB + 0.2GT + 0.1DB$$

where:	**WBGT**	**=**	**Wet Bulb Globe Temperature Index**
	NWB	**=**	**Nature Wet-Bulb Temperature**
	DB	**=**	**Dry-Bulb Temperature**
	GT	**=**	**Globe Temperature**

8.3.1 The exposure limits in Table III: 4-2 below is valid for employees wearing light clothing. They must be adjusted for the insulation from clothing that impedes sweat evaporation and other body cooling mechanisms.

8.3.2 Use Table III: 4-3 below to correct Table III: 4-2 for various kinds of clothing.

8.3.3 Use of Table III: 4-2 requires knowledge of the WBGT and approximate workload. Workload can be estimated using the data in Table III: 4-1 above.

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8.3.4 Heat Stress Meters (Extech HT30) are available through Grainger (Grainger part number 2LVT5. A).

8.4 Measurement

Portable heat stress meters or monitors are used to measure heat conditions. These instruments can calculate both the indoor and outdoor WBGT index according to established ACGIH Threshold Limit Value equations. With this information and information on the type of work being performed, heat stress meters can determine how long a person can safely work or remain in a particular hot environment.

TABLE III: 4-2. PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUE

	---------- Work Load* ----------		
Work/rest regimen	**Light**	**Moderate**	**Heavy**
Continuous work	30.0°C (86°F)	26.7°C (80°F)	25.0°C (77°F)
75% Work, 25% rest, each hour	30.6°C (87°F)	28.0°C (82°F)	25.9°C (78°F)
50% Work, 50% rest, each hour	31.4°C (89°F)	29.4°C (85°F)	27.9°C (82°F)
25% Work, 75% rest, each hour	32.2°C (90°F)	31.1°C (88°F)	30.0°C (86°F)

*Values are in °C and °F, WBGT. These TLV's are based on the assumption that nearly all acclimatized, fully clothed workers with adequate water and salt intake should be able to function effectively under the given working conditions without exceeding a deep body temperature of 38°C (100.4° F). They are also based on the assumption that the WBGT of the resting place is the same or very close to that of the workplace. Where the WBGT of the work area is different from that of the rest area, a time-weighted average should be used (consult the ACGIH *1992-1993 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices* (1992)).

These TLV's apply to physically fit and acclimatized individuals wearing light summer clothing. If heavier clothing that impedes sweat or has a higher insulation value is required, the permissible heat exposure TLV's in Table III: 4-2 must be reduced by the corrections shown in Table III: 4-3.

TABLE III: 4-3. WBGT CORRECTION FACTORS IN °C

	Clothing type	**Clo* value**	**WBGT correction**
	Summer lightweight working clothing	0.6	0
	Cotton coveralls	1.0	-2
	Winter work clothing	1.4	-4
	Water barrier, permeable	1.2	-6

*Clo: Insulation value of clothing. One clo = 5.55 kcal/m^2/hr of heat exchange by radiation and convection for each degree °C difference in temperature between the skin and the adjusted dry bulb temperature.

Note: Deleted from the previous version are trade names and "fully encapsulating suit, gloves, boots and hood" including its clo value of 1.2 and WBGT correction of -10.

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8.5 Heat Stress Best Practices

8.5.1 Utilize engineering controls whenever possible to move and cool the work area (i.e. fans, A/C units, insulating hot surfaces etc.)

8.5.2 Utilize Auxiliary body cooling devices:

8.5.3 Ice vests

8.5.4 Wetting clothes

8.5.5 Water cooled garments

8.5.6 Permit workers to drink water at liberty. In the course of a day's work in the heat, a worker may produce as much as 2 to 3 gallons of sweat. Personnel should not depend on thirst to signal when and how much to drink. Instead, the worker should drink 5 to 7 ounces of fluids every 15 to 20 minutes to replenish the necessary fluids in the body lost due to sweat.

8.5.7 Establish provisions for a work/rest regimen so that exposure time to high temperatures and/or the work rate is decreased; work-rest cycles give the body an opportunity to get rid of excess heat, slow down the production of internal body heat, and provide greater blood flow to the skin.

8.6 Heat Specific Procedures

8.6.1 Heat Stroke – Contact supervisor immediately and call 911

8.6.1.1 Move person to a cool place indoors or under a shady tree. Place feet higher than head to avoid shock.

8.6.2 Heat Exhaustion

8.6.2.1 Move to a cool place indoors or in the shade. Lie down.

8.6.2.2 Loosen clothing.

8.6.2.3 Drink fluids, such as cool or cold water. Add 1/2 teaspoon of salt to 1 quart of water. Sip this, or drink sport drinks, such as Gatorade, etc.

8.6.2.4 Have salty foods, such as saltine crackers, if you tolerate them.

8.6.2.5 Massage and stretch cramped muscles.

8.6.2.6 Remove clothing. Wrap person in cold, wet sheet, sponge with towels or sheets soaked in cold water, or spray person with cool water. Fan the person to promote evaporative cooling.

8.6.2.7 Put ice packs or cold compresses on neck, under armpits, and on the groin area.

8.6.2.8 Do not give fever reducing medicine.

8.7 Electrical Storms (Lightning)

In the event of lightning, the following guidelines are to be followed and enforced by all VAME field employees. During an electrical storm, there is a risk of lightning striking the turbine, which brings about danger of electrical shock to anyone in close proximity to the turbine.

8.7.1 All sites must have a way of monitoring for risk of lightning strikes. Sites located in areas of frequent lightning activity should consider a commercial weather alert service.

8.7.2 Ensure no personnel are permitted to be in or around a turbine during a lightning storm. During an electric storm, there is a risk of serious injury or death as a result of lightning striking a turbine.

8.7.3 Sites with lightning advisory system installed at site (e.g.: LDSS, weather detection radar system, etc.) shall issue a lightning advisory for any lightning strikes within a 30 mile radius. Site manager will alert all technicians/subcontractors of the strike and evacuate the turbines. The advisory shall remain in effect until 30 minutes after the last known strike is reported within the 30 mile radius.

8.7.4 Sites without a lightning advisory system installed at site shall issue a lightning advisory for any lightning strikes within a 60 mile radius. Site manager will alert all technicians/subcontractors of the strike and evacuate the turbines. The advisory shall remain in effect until 30 minutes after the last known strike is reported.

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8.7.5 All personnel in the field and at the towers need to be prepared to seek cover on short notice.

8.7.6 If lightning activity has stopped but there is still severe weather in the area, the site manager has authority to keep the lightning stand down in effect until he/she feels it is safe to resume normal operation.

8.7.7 Hub Entry is restricted if LCTU (Lightning Current Transfer Unit) *"pucks"* are popping. Work in the Nacelle is permitted ONLY if WKI 961248 is followed (only use most current version). Discharge of static electricity includes following precautions:

8.7.7.1 **Do not** touch the lightning conductors on the blade before the blade is discharged.

8.7.7.2 Discharge the blade with grounding cables/jump start cable as described in WKI 961248.

8.7.7.3 Wear appropriate electrical HV gloves when working on installation of grounding straps.

8.8 Tornadoes / Hurricanes

A tornado is defined as a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of one mile wide and 50 miles long.

A hurricane is a type of tropical cyclone, the generic term for a low pressure system that generally forms in the tropics. A typical cyclone is accompanied by thunderstorms, and in the Northern Hemisphere, a counterclockwise circulation of winds near the earth's surface. All Atlantic and Gulf of Mexico coastal areas are subject to hurricanes or tropical storms. Parts of the Southwest United States and the Pacific Coast experience heavy rains and floods each year from hurricanes spawned off Mexico. The Atlantic hurricane season lasts from June to November, with the peak season from mid-August to late October.

8.8.1 **Tornado Watch:** A tornado watch is issued when weather conditions are favorable for the development of severe thunderstorms that are capable of producing tornadoes. If a watch is issued, be prepared to take cover in the event a tornado warning is issued or if a tornado is spotted.

8.8.2 **Tornado warning:** A tornado warning is an alert issued by government weather services to warn an area that a tornado may be imminent. It can be issued after either a tornado or funnel cloud has been spotted, of if there are radar indications that a tornado may be possible. If a tornado warning is issued, seek shelter immediately.

8.8.3 **Hurricane warning**: This is a communication issued by NOAA whenever a hurricane is between 12 and 24 hours from and approaching the U.S. coast and comprises an area approximately 50 miles either side of the expected place where the hurricane will strike coastal areas. This warning also gives the expected time and location where the hurricane will strike the coast, as well as the size, maximum winds, direction, and he speed of travel. The warning may also describe where high water (storm surge), floods or high waves can be expected.

8.8.3.1 For sites that may be affected by hurricanes, a preparedness plan shall be established. All Local, State and Federal rules and regulations shall be followed. During hurricane season, a hurricane-tracking map will be kept in the management and safety areas.

8.8.4 Hurricane Preparedness Team:

8.8.4.1 Shall consist of sufficient numbers to physically complete its task;

8.8.4.2 Shall have employees who are familiar with the Hurricane Preparedness Plan to fill in for essential team members in the event team members are not present;

8.8.4.3 Shall have a designated primary and secondary team manager for the Hurricane Preparedness Team;

8.8.4.4 Shall maintain a detailed list of assets that will be removed from site in the event of evacuation;

8.8.4.5 Shall maintain a list of vehicles and personnel that will be utilized to evacuate assets; and

8.8.4.6 Shall pre-determine the state the turbines will be placed in during a hurricane and evaluate a "safe to return" inspection of the site.

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8.8.5 The Team leaders shall designate appropriate emergency supplies and storage place. The team shall review the current year FEMA Emergency Management Guide for Business & Industry (www.fema.gov/business/guide/index.shtm).

9 APPENDIX: version history

Version No.	Date	Description of Changes
00	2005-Sep-26	First edition - Reformatted & new number 13-Apr-2007
01	2010-Jan-01	Content regarding extreme weather conditions added. Title changed from “Snow and Ice Hazards” to “Extreme Weather Conditions”.
02	2010-July-09	Major revision to include all extreme weather conditions.
03	2010-July-27	General process updates. Tables III: 4-1 and III: 4-3 updated. Section 7.4.5 deleted.
04	2010-Dec-2	Addition of revised Pre-Work Ice Checklist
05	2011-Dec-5	Changed all references to Vestas Americas to VAME, added the WA State Trigger chart, Put appendix documents in DMS
06	2014-Feb-14	Changed Sections 2, 5, 6, 8 Highlighted in grey

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Pre-Work Ice Checklist				Document ID: 0049-0705 INS SUS-SAF-OPC (AME US & Can) Pre-Work Ice Checklist
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.11.30		Version: 01

Use this Checklist when icing conditions are suspected

Site/Location		Date:		Time:	
Turbine No(s):		Technicians:			

		Yes	No
1	Has snow, freezing rain or freezing fog occurred during the last 24 hours?	☐	☐
2	Has the temperature been below 37°F / 3°C during precipitation?	☐	☐
3	Is ice or compacted snow visible on any part of turbine? *Inspect using binoculars	☐	☐
4	Has any ice or compacted snow fallen off the turbine in the last 24 hours?	☐	☐
5	Is there ice or compacted snow formations present in the vicinity of turbine?	☐	☐
6	Is the *current* temperature between -2 and +2 degrees Celsius? (28°F and 34°F)	☐	☐
If **NO** to all of the above questions, proceed with work as usual.			
If **YES** to any questions above, do not approach turbine unless all steps below have been completed:			

1. Entering a turbine area when icing potential exists; **turbine shall be remotely stopped before inspection.**
   a) Stop about 300 meters (approx. 1000 feet) from any running turbine or turbines that may be started. There may be a need to temporarily shut down an entire string of turbines to approach the turbine in question for observation. Do not use E Stop.
   b) Observe with binoculars – looking for signs of ice on the ground, inconsistencies on the blade, ice hanging off the nacelle & radiator area.
   c) If ice is noticed, do not approach the turbine at this time and inform your supervisor of the conditions and begin ice stability checks and mitigation.

NOTE: If the Site Manager or Assistant Site Manager is not available onsite, a verbal notification with the Lead Technician must occur at a minimum.

2. Ice stability checks and risk mitigation shall be completed as follows:
   a) Once turbine has been paused, wait 5 minutes or until yawing is complete. Then begin observation with binoculars from 300 meters (approx. 1000 feet) and look for falling ice.

NOTE: If you do not have visibility of the blades and nacelle, work may not progress.

   b) Yaw turbine **remotely – If Possible**- so the greatest hazard (typically ice on blades) is on the opposite side of tower entrance. Assess ice stability by watching for ice falling from turbine as it yaws and when it stops yawing.
   c) If falling ice is observed, no work may be completed outside the turbine within 90 meter (Approx. 300 feet) of any of the overhead turbine components (nacelle, hub or blades). Inform your supervisor of the conditions.
   d) If no falling ice is observed, proceed to a distance of 90 meters (approx. 300 feet) away and repeat the ice stability observation.

NOTE: Ice on blades, top of nacelle or along tower sections may be difficult to see. Ice condition/stability can change making it possible for ice to begin shedding; temperatures rising above freezing, rain or changes in wind direction. Use of a spotter is encouraged when working near towers during icing conditions even if ice has not been seen.

   e) If ice appears to be stable (not thawing or shedding), initial entrant shall be driven to tower stairs and enter directly into turbine. Vehicle should move away from turbine immediately.

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f) Once door has been opened and “all clear” sign is given by initial entrant, all others shall be driven to tower by a person who will stay with truck and park it at a safe distance prior to entering the tower. While unloading tools/equipment, all participants must be conscious of potential hazards above, and enter the turbine as quickly as possible. All tools and gear shall be staged in truck bed prior to arrival at turbine to minimize the amount of time outside turbine.

g) Stay clear of the areas below the blades as much as possible.

h) Be aware of potential wind drift (especially if the door is downwind of the blades).

i) Suspend use of taglines during icing conditions. If job requires taglines it will have to be postponed until weather improves.

j) Prior to exiting turbine, personnel must attempt to verify ice stability conditions have not changed. This may be accomplished by calling for remote observation by another crew or by observing through nacelle hatch without exiting on to roof or by weather conditions.

k) If turbine has started shedding ice, personnel must remain in the tower until shedding activity has stopped.

Note: If Technician does not believe it is safe to enter the turbine, Stop Work Authority must be utilized by the Technician and work should not proceed at that location. Notify the supervisor and any other work teams on site. It is recommended that photos be taken and included in Hazard Observation if stop work is implemented.

Document the steps taken to minimize risks:

- Turbine yawed remotely and ice appeared stable (no shedding). 300 meters (approx. 1000 feet) ☐
- No falling ice was observed when the turbine was shut down. 300 meters (approx. 1000 feet) ☐
- No falling ice observed when approaching turbine. 90 meters (approx. 300 feet) ☐
- Spotter used when entering turbine. ☐
- Vehicle use to approach turbine. ☐
- Minimize exposure time in the potential impact zone if conditions change and shedding occur. ☐
- No up-tower work outside of the nacelle. ☐
- Spotter used when exiting turbine. ☐
- _____
- _____
- _____

Obtain site managers (or designee) approval on “Clearance for Work” section of this form.

Approval received from (Print):		Signature:	
Date:		Time (AM / PM):	

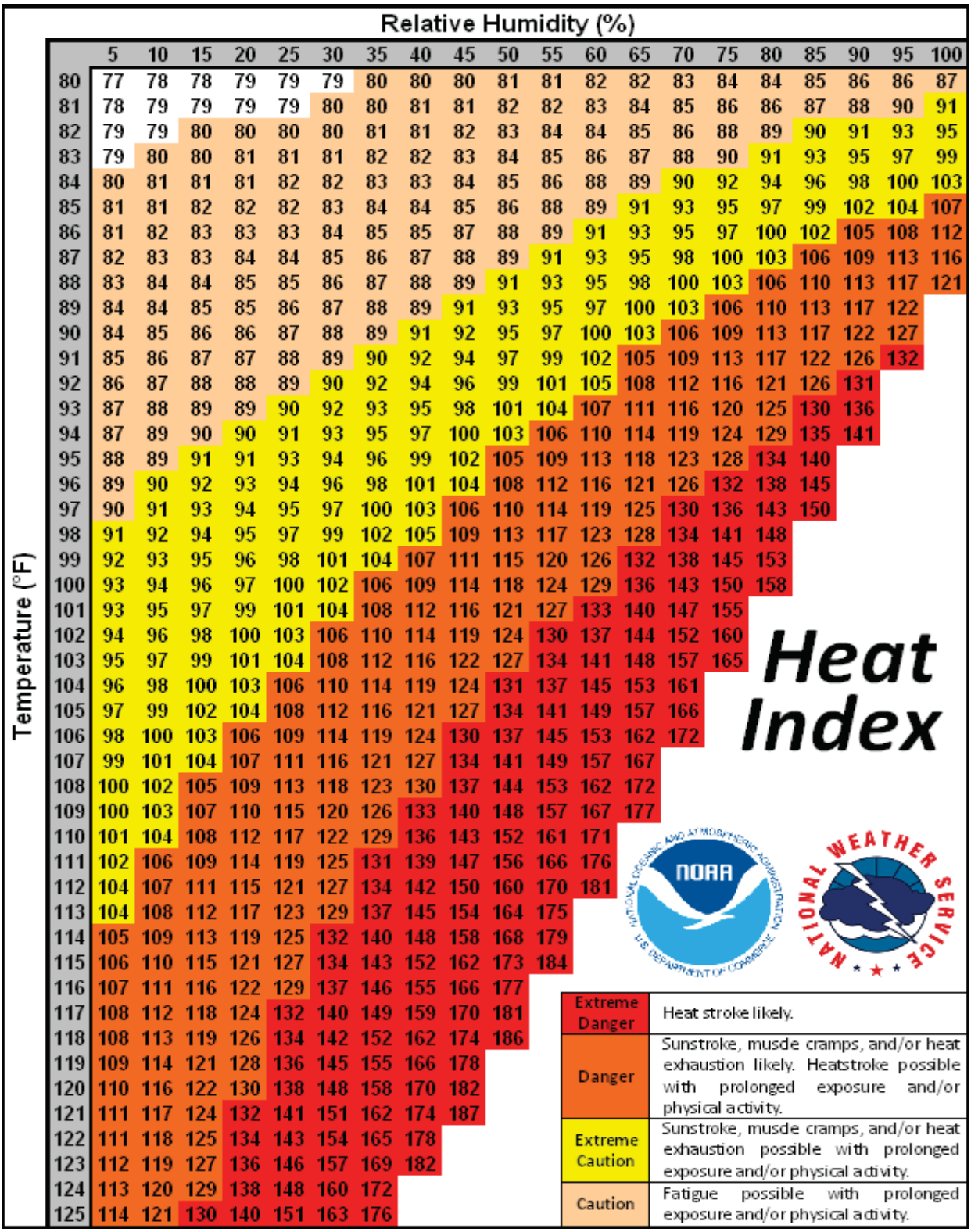
Safety Rep Notified by (Name):		Date / Time (AM / PM):	

3. If STOP WORK authority is used, other teams on site and site manager should be notified. Site manager will notify the owner as required.
   - Photo: examples: Ice on blades, tower door or WTG # and any ice impacts on the ground
   - Text or email photos to site manager/lead technician and attach to Hazard Observation

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Heat Index Chart				Document ID: 0049-2065 INS SUS-SAF-TCP (AME US & CAN)
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.01.26		Version: 00



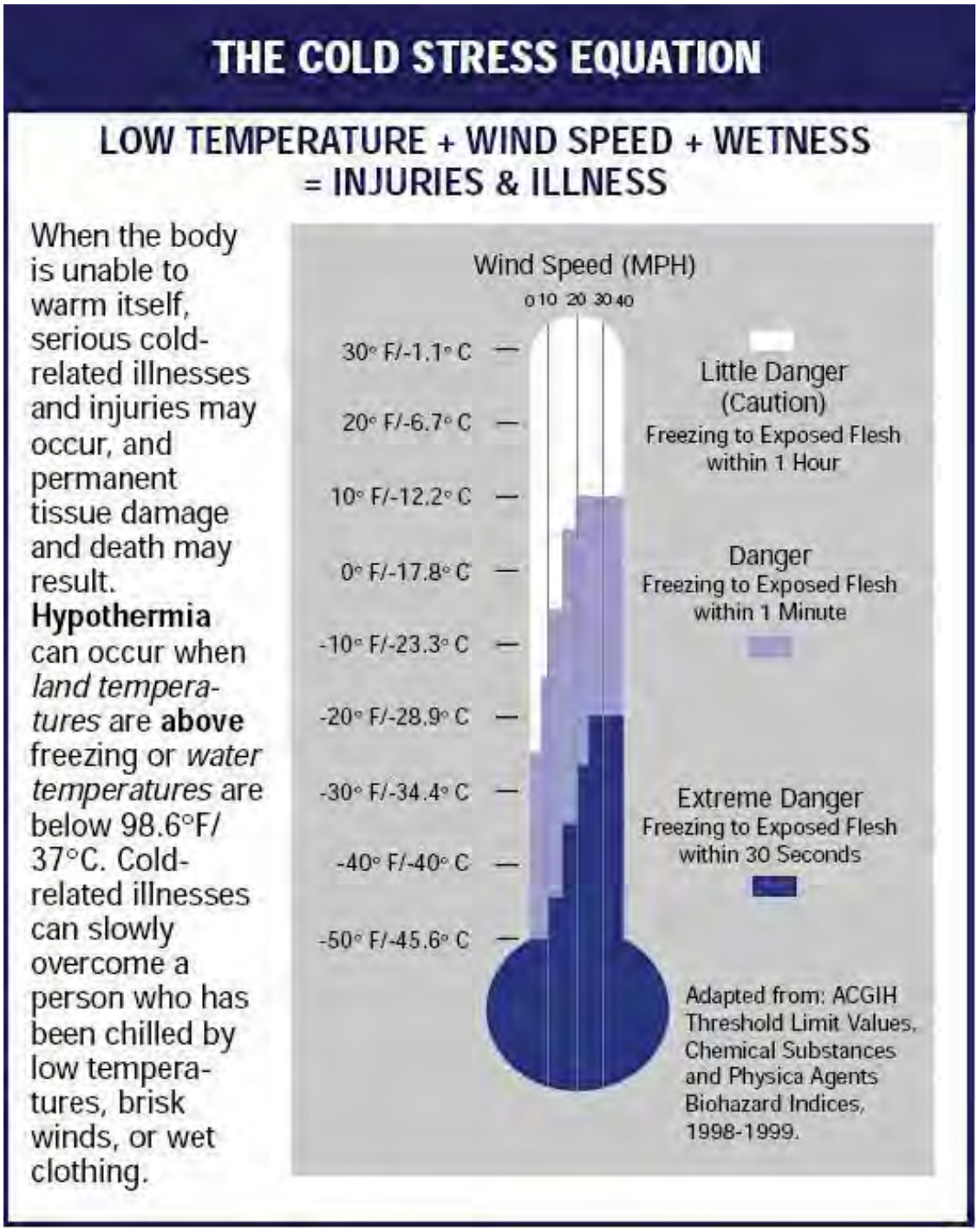
Temperature (°F) \ Relative Humidity (%)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
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81	78	79	79	79	79	80	80	81	81	82	82	83	84	85	86	86	87	88	90	91
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125	114	121	130	140	151	163	176													

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VAME Cold Stress Equations				Document ID: 0049-2067 INS SUS-SAF-OPC (AME US & CAN)
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.01.26		Version: 00



US Department of Labor
Occupational Safety and Health Administration
OSHA 3156 1998

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Outdoor Temperature Trigger Chart (WA State)				Document ID: 0049-2066 INS SUS-SAF-TCP (AME US)
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.01.26		Version: 00

To determine the temperature trigger, select the type of clothing or PPE the employee is wearing and whether the work is being performed in the direct sun or the shade.

Type of clothing	Work in direct sun
Work Clothes	89° F
Double-layer woven clothes (e.g. cotton coveralls on top of summer clothes	77° F
Vapor barrier (e.g.: encapsulating suit or turn-out gear)	52° F

Note: The trigger temperatures in the table are based on a dew point of 50° F and were developed for use by the state of Washington.

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VAWT Emergency Preparedness Instruction				Document ID: 0008-9806 INS SUS-IEM-EMR Emergency Preparedness
Owner(s): MIGLO	Author(s): RIREG	Valid from: 2015.02.20		Version: 04

Version history

Version No.	Date	Description of Changes
00	2007.12.17	New Documnent
01	2010.03.17	Links Updated
02	2011.08.15	"Vestas Americas" changed to "VAME", updated Responsibilities, Regulatory requirements, HSE to Sustainability
03	2014.08.14	Revised Template, add Appendix history
04	2015.02.20	Updated references and DMS numbers, VAME to VAWT

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1 Purpose

The purpose of this document is to ensure that emergency preparedness and response plans and scheduled prevention exercises for all VAWT locations will be prepared, followed, and continually improved.

The emergency preparedness and response plans shall ensure that all VAWT locations are capable of effectively responding to anticipated and unexpected events and/or emergencies involving personal or environmental health and safety issues.

2 Responsibilities

2.1 Senior Management

2.1.1 Allocating resources to implement an effective Emergency Response Program;

2.1.2 Review the Emergency Response Program annually.

2.2 VAWT Site/Construction Managers and Supervisors:

2.2.1 Initial development and implementation of site specific Emergency Response Plan (ERP) utilizing template provided by QSE Department;

2.2.2 Post the ERP in the workplace available to all personnel;

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2.2.3 Annually review and update as necessary the site Emergency Response Plan;

2.2.4 Ensuring that during the site safety orientation (or prior to any exposure) all affected site personnel (customers, employees, visitors, etc.) are trained in their roles and responsibilities under the ERPs, and are aware of and able to follow the plans;

2.2.5 Facilitating or arranging emergency preparedness and response retraining when the employee's responsibilities under the plan change and when the plan is changed;

2.2.6 Ensuring that drills of the ERPs are practiced once every six months, and the results documented to realize and correct any deficiencies or improvements; and

2.2.7 Ensuring professional emergency response services that are designated as part of the ERP are aware and capable of providing the level of response that may be required.

2.2.8 Be involved in the investigation of the emergency

2.3 VAME employees are responsible for:

2.3.1 Knowing and implementing the site ERP;

2.3.2 Actively participating in the drills and improvement events; and

2.3.3 Bringing ERP related concerns or issues to the attention of the site manager.

2.4 QSE Department:

2.4.1 Developing and maintaining this Emergency Preparedness processes and templates;

2.4.2 Providing supplementary information as needed;

2.4.3 Provide assistance to VAWT locations as needed to development and implement site specific emergency response plans (ERP); and

2.4.4 Auditing location for ERP development, implementation, compliance and plan effectiveness.

3 Scope

Vestas – all locations

4 References

Document No.	Title
29 CFR 1910.38	OSHA Emergency Action Plans
29 CFR 1910.165	OSHA Employee alarm systems
0049-0605	VAWT First Aid/CPR procedure
0049-0645	VCWT First Aid/CPR procedure
0049-2057	Site Emergency Response Plan Template
INS-SUS-IEM-IMA	Vestas Incident Management
INS-TPS-PSU-SIP	Manage Serious Incidents
OHSAS 18001 4.4.7	Emergency Preparedness and Response

5 Terms and Abbreviations

Term or Abbreviation	Definition
ERP	Emergency Response Plan
CFR	Code of Federal Regulations
VAWT	Vestas American Wind Technologies

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Term or Abbreviation	Definition
QSE	Quality Safety and Environmental

6 Regulatory Requirements:

6.1 Plan Development

6.1.1 All Emergency Action and contingency plans shall be accomplished in accordance with this process, 29 CFR 1910.38 or any other more restrictive state or local requirements.

6.1.2 An emergency action plan must be in writing, kept in the workplace, and available to employees for review. Plan must include:

6.1.2.1 Procedures for reporting a fire or other emergency;

6.1.2.2 Procedures for emergency evacuation, including type of evacuation and exit route assignments;

6.1.2.3 Procedures to be followed by employees who remain to operate critical plant operations before they evacuate;

6.1.2.4 Procedures to account for all employees after evacuation;

6.1.2.5 Procedures to be followed by employees performing rescue or medical duties; and

6.1.2.6 Names or job title of employees who can be contacted should employees needing more information about the plan or an explanation of their duties under the plan.

6.1.3 Employee Alarm System

6.1.3.1 An employer must have and maintain an employee alarm system. The employee alarm system must use a distinctive signal for each purpose and comply with the requirements in 29 CFR 1910.165.

6.1.4 Training

6.1.4.1 An employer must designate and train employees to assist in a safe and orderly evacuation of other employees.

6.1.5 Review of emergency action plan.

6.1.5.1 An employer must review the emergency action plan with each employee covered by the plan when the plan is developed or the employee is assigned initially to a job.

7 General Requirements

It is required that all VAME locations develop and maintain site specific ERP.

7.1 Localized Emergency Response Plan

Site/Construction manager shall prepares a localized ERP using the Site Emergency Response Plan template DMS 0049-2057.

7.2 ERP Template

7.2.1 The Site ERP shall be forwarded to the Regional QSE Field Specialist for review and approval. When the ERP is approved, the Site Manager will post an electronic copy to the QSE Hub page and post a hard copy in a location available to all personnel.

7.2.2 The site specific ERP shall include practical direction of what to do and who to contact should an incident occur. It must include but is not limited to the following:

7.2.3 Alarm or communication method used to alert personnel;

7.2.4 Site specific rally points;

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7.2.5 Emergency evacuation plans, including type of evacuation and exit route assignments;

7.2.6 First response provider contact names and numbers;

7.2.7 The locations of emergency response equipment;

7.2.8 An emergency contact list including Axiom; and

7.2.9 Maps and/or directions from the site to the: hospital, occupational clinic, emergency shelters, and post incident testing provider facilities.

7.3 Posting

7.3.1 The site/construction manager will post the approved ERP on the site safety bulletin board. Copies should also be near site landline phones, and in all site vehicles.

7.4 Local emergency response organizations

7.4.1 To ensure that the ERPs meet the applicable legislation, the local emergency response services shall be informed of the emergency plans.

7.5 Review ERP with ALL affected personnel

7.5.1 When drills are performed, a thorough review of the ERP shall identify any deficiencies and changes/revisions to be enacted. The results of the drills shall be documented on a Safety Meeting Attendance Record along with updates to be incorporated into the plan.

7.6 ERP changes

7.6.1 The ERP shall be revised as necessary – as the result of regularly scheduled drills and improvement events or when post incident root cause analysis determines that the ERP is deficient.

8 Training

Activity	Need for Training
Initial training – New hires, guests, visitors, subcontractors, customer/owner – are trained to the site specific ERP and their roles and responsibilities.	Awareness level training required initially. Semi-annual drills for all full time site employees thereafter.
Retraining – Site personnel, subcontractors, customer/owner – are trained to the site specific ERP and their roles and responsibilities.	Changes in ERP, changes in personnel assignments and when drills identify deficiencies in the ERP.
All field service personnel must at a minimum be trained in first aid/CPR, emergency rescue/controlled descent and response to environmental incidents.	All field service personnel must be trained and maintain certification in first aid/CPR. All field service personnel must be trained and refresher trained annually in fire prevention and protection.

9 Forms

Document No.	Title
0049-2057	Site Emergency Response Plan Template
0049-0558	Emergency Equipment Inventory and Inspection Form
0049-0557	Emergency Drill Evaluation Form

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Site Emergency Response Plan				Document ID: 0049-2057 INS SUS-SAF-EMR (AME)
BPO.Del.SUS	Author(s): RIREG	2015.01.23		Version: 01

Do not change header

Site Name

Site Office Address

Site Office Longitude and Latitude

Site Office Phone Number

Emergency Contacts

IN AN EMERGENCY, DIAL XXX/XXX-XXXX

Local Non-Emergency Contact Number:

Local Law Enforcement:
Name, Sheriff
Address
Phone Number

Occupational Medical Clinic:
Address
Phone Number

Hospital (Emergency Room):
Address
Phone Number

Fire & Emergency Services:
Address
Phone Number

Helicopter Service:
Name
Address
Phone Number

Ambulance:
Name
Address
Phone Number

Axiom Medical: 877-502-9466

When calling local emergency dispatcher remain calm, speak slowly and clearly. Include the following information in your communication:

- State the facility address or turbine coordinates;
- State the type of emergency (fire, medical, etc.);
- Stay on the telephone until the responding agency releases you, answer all questions; and
- Advise the dispatcher if you need to evacuate the turbine and temporarily clear the area around the turbine.

Attach a copy of a map of directions to the medical care facility(ies), as appropriate.

Critical Contact Information - Customer and Vestas Service Site

Customer O&M Manager:
Name
Office
Cell Phone Number

Site/Construction Manager:
Name
Office
Cell Phone Number

Area/Project Manager:
Name
Office
Cell Phone Number

Vestas Site Office Coordinator:
Name
Office
Cell Phone Number
Email

Vestas Lead Technician:
Name
Office
Cell Phone Number
Email

Reg. HSE Field Spec.:
Name
Office
Cell Phone Number
Email

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VESTAS PROPRIETARY NOTICE

Specific Tower Siting

In this section, please remove example and add all towers' longitude and latitude locations.

Site Name:

B-15: N45 39' 15" W119 29' 13"
B-16: N45 39' 8" W119 29' 5"
B-17: N45 39' 1" W119 28' 5"
B-18: N45 38' 55" W119 28' 51"
B-19: N45 38' 48" W119 28'43"
B-20: N45 38' 41" W119 28' 36"
B-21: N45 38' 34" W119 28' 28"
B-22: N45 38' 28" W119 28' 21"
B-23: N45 38' 21" W119 28' 13"
C-17: N45 39' 30" W119 28' 7"
C-18: N45 39' 24" W119 28' 00"
C-19: N45 39' 17" W119 27' 53"
C-20: N45 39' 11" W119 27' 45"
C-21: N45 39' 4" W119 27' 38"

T-4: N45 40' 29" W119 56' 4"
T-5: N45 40' 33" W119 56' 15"
T-6: N45 40' 39" W119 56' 20"
T-7: N45 40' 44" W119 56' 23"
T-8: N45 40' 49" W119 56' 27"
T-9: N45 40' 56" W119 56' 32"

ERP Rally Points

The Emergency Response Plan (ERP) Rally Points are the places where site employees will gather during an emergency or after a disaster to take roll call, organize rescue and first aid, and support teams. Designate a primary and secondary ERP Rally Point for your site.

On-Site
Location #1:
Location #2:

Off-Site
Location #1:
Location #2:

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On-Site Supervisor
Once individuals are gathered at the ERP Rally Point, take headcount and immediately report to management.

Emergency Routes and Equipment

Attach map of site that clearly shows the ERP Rally Points and building floor plan, indicating emergency escape routes and exits, and locations of fire extinguishers, first aid kits, eyewash stations or showers, etc.

Emergency Response Supplies

Emergency response supplies include first aid/CPR/BBP kits, fire extinguishers, eyewash stations, tower rescue devices, spill cleanup kits, etc. Emergency response supplies are also kept in service vehicles. Complete a monthly inspection of emergency response supplies.

Emergency Notification System

The primary site emergency notifications system is two way radio communications between technicians and site office base station. (add or change as necessary)

Secondary communication is cellular telephones. (add or change as necessary)

Shelters for Severe Weather Events/Earthquakes/Lightning

In the case of severe weather (hurricanes, tornados), lightning, or earthquakes, employees should exit the turbine, and/or if in a location other than a turbine, move to an interior, windowless room on the main or lower floor as quickly as possible – On-site Emergency Shelter Location(s).

If in a turbine and evacuation is not possible, notify the site office, remote trip the main switchgear and take a position in the bottom of the tower. ***See instructions below in the case of lightning.***

If in a location other than a turbine and time does not allow for movement, cover should be taken away from glass and under protective items such as sturdy desks. Hallways and enclosed stairwells are also acceptable shelter areas.

Once individuals have reached the On-site Emergency Shelter Location(s), they should assume a seated position on the floor with their heads down and their hands over their heads or place themselves under a desk. If they are wearing heavy clothing or have access to heavy clothing, they should use these items to cover their upper bodies and heads. Once the disaster area is stabilized, exit from the building and gather at the ERP Rally Point.

Quick Reference

1. If possible, proceed to the nearest On-Site Emergency Shelter Location - assist others if possible.
2. Stay with other people in the area if you cannot get to one of the On-Site Emergency Shelter Locations.
3. Once the disaster area has stabilized, report to ERP Rally Point - DO NOT LEAVE THE ERP Rally Point unless it is unsafe to stay.
4. Check in with On-Site Supervisor or scene management.
5. Wait for further instruction or “All Clear” (clearance to re-enter).

On-site Emergency Shelter Location #1:

On-site Emergency Shelter Location #2:

Lightning
Notify site office of sighting, place the turbine in a safe condition and evacuate to service vehicle, other safe shelter, or site office.

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VESTAS PROPRIETARY NOTICE

Site/Turbine Incidents

In the case of a site (injury, environmental) or turbine incident (fire, over-speed, or debris separation), during an emergency, the top priorities are to:

- Ensure human health and safety;
- Preserve the environment;
- Minimize or prevent property and equipment damage; and
- Secure the area/scene, including establishing a temporary clearance area if appropriate.

Injury or Illness

Notify the site office, stabilize the individual (s) and await help to evacuate.

Environmental

In Case of a spill (release of chemicals to the environment 2 gal/7.5 liters):

1. Stop the spill;
2. Contain the spill;
3. Notify the site office;
4. Clear area, if appropriate;
5. Initiate cleanup procedures; and
6. Properly dispose of liquid and solid waste

Turbine Incidents

Establishing a Temporary Clearance Area

When establishing a temporary clearance area in the event of a wind turbine incident (i.e., fire, runaway or debris separation), rope off or otherwise temporarily clear an area with a minimum radius of 500 meters (1,640 feet) measured from the base of the turbine.

Best judgment and common sense should always be employed when establishing a temporary clearance area. If a turbine incident is identified, but the situation appears to be mitigated, the establishment of a temporary clearance area may not be required.

Fire

In case of fire in or near a turbine:

1. Push the emergency-stop button. If it is physically safe to do so and it will not delay your exit from the turbine, disconnect the turbine at the main high-voltage circuit breaker. Personnel outside the turbine should not approach the turbine to push the emergency-stop button.
2. Immediately exit the turbine, only using fire-fighting equipment to ensure a safe escape route from the wind turbine.
3. Establish a temporary clearance area and move upwind outside the clearance area, or seek shelter, if appropriate.
4. Notify the site office who can contact local emergency responders if assistance is required to extinguish the fire.

Runaway

In case of a runaway:

1. Push the emergency- stop button. If it is physically safe to do so and it will not delay your exit from the turbine, disconnect the turbine at the main high- voltage circuit breaker. Personnel outside the turbine should not approach the turbine to push the emergency- stop button.
2. Immediately exit the turbine, and establish a temporary clearance area, if appropriate.
3. Move upwind outside the clearance area, or seek shelter, if appropriate.
4. Notify site office who can contact local emergency responders if assistance is required to address the situation.

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VESTAS PROPRIETARY NOTICE

Debris Separation

In case of debris separation:

1. Push the emergency-stop button. If it is physically safe to do so and it will not delay your exit from the turbine, disconnect the turbine at the main high-voltage circuit breaker. Personnel outside the turbine should not approach the turbine to push the emergency-stop button.
2. Immediately exit the turbine, and establish a temporary clearance area, if appropriate.
3. Move upwind outside the clearance area, or seek shelter, if appropriate.
4. Notify site office who can contact local emergency responders if assistance is required to address the situation.

NOTE: If debris separation is identified, but the situation appears to be mitigated, following the steps above may not be necessary. Best judgment and common sense should always be employed. Consult with your site manager for guidance.

Other Emergencies

Bomb Threat

1. Keep caller on the line and record call (if allowed by your local laws), if possible.
2. Notify the site office and evacuate the area.
3. Call local law enforcement or emergency dispatch, if appropriate.
4. Notify the customer, if appropriate.

Civil Disturbance

1. Be courteous and do not provoke person or crowd.
2. Notify the site office and evacuate the area, if appropriate.
3. Call local law enforcement or emergency dispatch, if appropriate.
4. Notify the customer.

Emergency Response Team

Emergency Response Team - Trained in CPR/first aid/fire safety, spill response, etc.

Name:	**Title:**
24 Hour Contact Numbers:	

Name:	**Title:**
24 Hour Contact Numbers:	

Name:	**Title:**
24 Hour Contact Numbers:	

Name:	**Title:**
24 Hour Contact Numbers:	

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Evacuation Signal: General Alarm Signal to Evacuate

[insert description of evacuation signal]

Emergency Drills

Semi-annual drills will be practiced and documented on Safety Meeting Attendance Record DMS # 0049-0548 so employees become better prepared for real emergencies and so that any deficiencies in the plan can be identified and corrected.

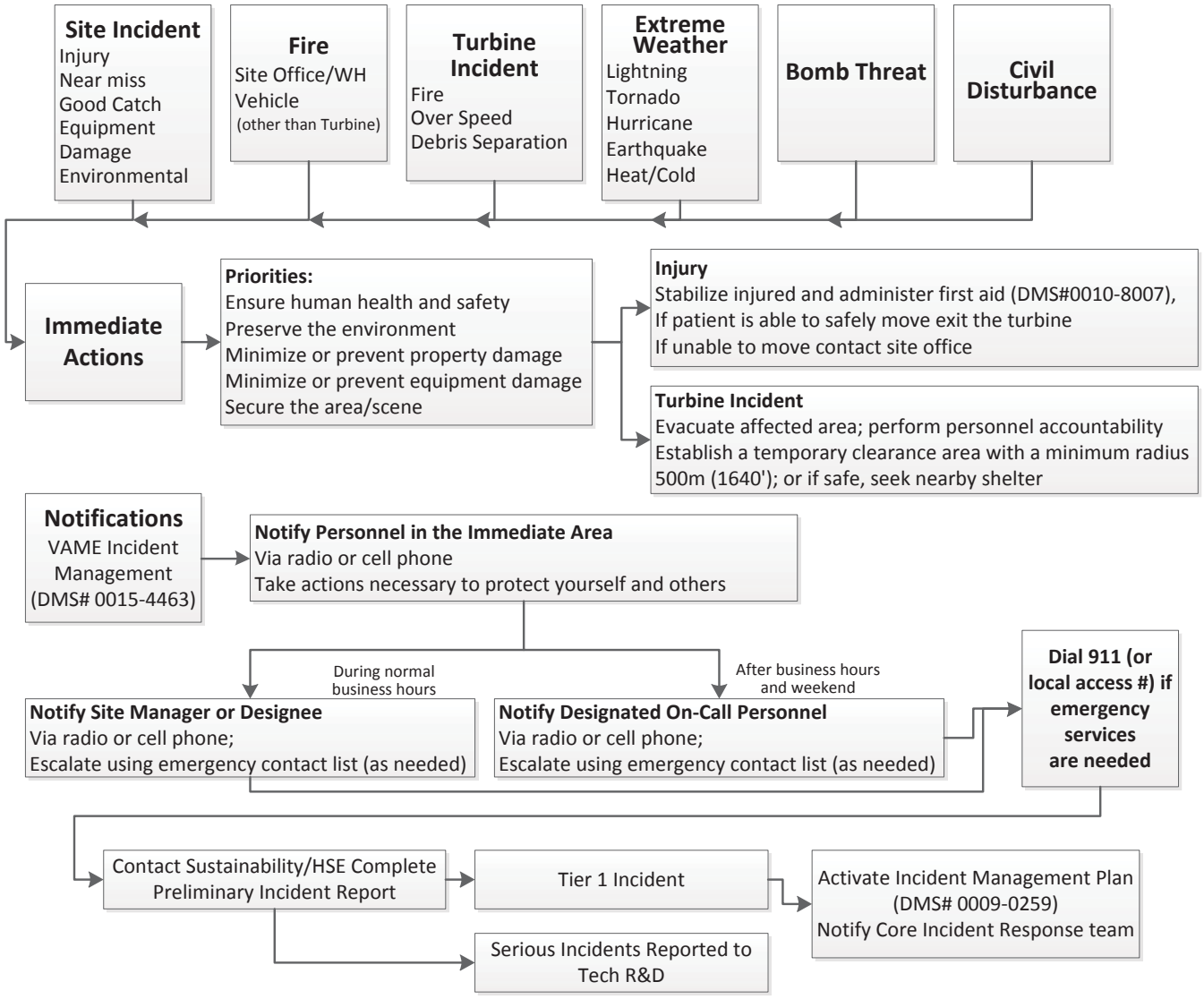
APPENDIX: Site Version History

Version No.	Date	Description of Changes
xx	yyyy.mm.dd	

T03 0052-0029 Ver 02 - Approved - Exported from DMS: 2016-06-05 by RIREG

VESTAS PROPRIETARY NOTICE

Quick Reference Emergency Response Plan



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FIRE Site Office/WH/ Vehicle	**Priorities:** If outside, Stay outside, do not enter Move objects and equipment away from fire (if possible without endangering self) Assemble at ERP rally points	**Priorities:** If inside, Evacuate the area and assemble at ERP rally points
Turbine Incidents	**Priorities:** If outside, Notify office and activate ERP Push Emergency stop, If it is safe to do so, disconnect the turbine at the main switchgear Do not approach the turbine Establish a temporary clearance area Move up wind outside clearance area or seek shelter, if appropriate	**Priorities:** If inside, Push Emergency stop, If it is safe to do so, disconnect the turbine at the main switchgear Evacuate the turbine Establish a temporary clearance area Move up wind outside clearance area or seek shelter, if appropriate
Lightning	**Priorities:** If outside, Stay in your vehicle Move away from tall objects and equipment Don hard hats and shield yourself	**Priorities:** If inside, Stay away form windows Shutdown non-essential equipment and unplug Stay away from running water & plumbing
Tornado	**Priorities:** If outside, Seek shelter below ground Lie flat in a gully or ditch Don hard hats and shield yourself	**Priorities:** If inside, Go to a basement or inside room with no windows Stay away from heavy objects
Hurricane	**Priorities:** Prepare buildings and equipment for high winds and flooding. Secure potential projectiles. Evacuate the area when directed by authorities.	
Earthquake	**Priorities:** If outside, Stay outside Move away from tall objects and equipment Don hard hats and shield yourself	**Priorities:** If inside, Chose shelter with air space, should it collapse Seek cover under desk or table If no cover brace in a corner or door way
Extreme Heat or Cold	**Priorities:** Heat Minimize exposure to direct sunlight Stay hydrated Know the warning signs of over exposure Take more frequent breaks	**Priorities:** Cold Minimize exposure to extreme cold and wind Keep gas tanks between half and full at all times Use Pre-Work Ice Checklist DMS#0008-7909
Bomb Threat	**Priorities:** Keep the caller on the line as long as possible Notify personnel and evacuate	Call local authorities
Civil Disturbance	**Priorities:** Be courteous and do not provoke Notify personnel not to return to Site Office Notify the customer	Call local authorities

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RESTRICTED

Site 24/7
Contact Numbers

Vestas Site/Construction Manager

Name: _____ Cell _____

Site/Project Owner

Name: _____ Cell _____

Regional QSE Field Specialist

Name: _____ Cell _____

Area/Project/Plant Manager

Name: _____ Cell _____

Emergency Coordinator

Name: _____ Cell _____

First Responders

Name: _____ Cell _____

Name: _____ Cell _____

Name: _____ Cell _____

Name: _____ Cell _____

Name: _____ Cell _____

Name: _____ Cell _____

Occupational Med. Clinic: _____ #

Hospital: _____ #

Hospital: _____ #

Ambulance: _____ #

Air Ambulance: _____ #

Fire Dept.: _____ #

Haz Mat Response: _____ #

Police or Sheriffs Dept: _____ #

Site Security: _____ #

Local OHSA: _____ #

Local EPA/DEQ: _____ #

For oil and/or chemical spills assistance: National Response Center 1-800-424-8802

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VESTAS PROPRIETARY NOTICE

EMERGENCY CONTACT LIST

LIFE THREATENING EMERGENCY - DIAL - -9-1-1

SITE EMERGENCY:	Site Address: City & State: Site Phone: Directions:(Example) 7.50 miles west of Mojave, Ca. Take Oak Creek Rd. west of Mojave. One mile past the Los Angeles Aquaduct and turn into the Terra Gen/Vestas driveway on the left.
	PRIMARY CONTACT NAME — 24 HR. CONTACT #
	SECONDARY CONTACT NAME — 24 HR. CONTACT #
(Customer) CONTACTS	(Name) Cell Phone
	(Name) Cell Phone
(Customer) SAFETY	(Name) Cell Phone

The contact numbers listed below are NON EMERGENCY only.

HOSPITALS:	1) (Hospital)
	2) (Hospital)

FOR DRUG TESTS, CALL FIRST TO CONFIRM AVAILABILITY:

OCCUPATIONAL MEDICINE:	
SITE FIRST AIDERS	

Area HSE	
Occupational Health and Safety Administration (OSHA)	
(State) Poison Control Center	
(County) County Health Dept	
DIG - ALERT	
(State) - Highway Reports	
(Local) Fire Dept	
Air Ambulance	
(County) County Sheriff's Dept	
Emergency Radio Station: (example) FM: KFXM 96.7, KKZQ 100.1, KTPI 103.1 AM: KAVL 610, KTPI 1340	

Please Post Conspicuously Near Site Phones - Replace ALL When Updates Are Made

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Emergency Drill Evaluation Form				Document ID: 0049-0557 SUS-CMT-SWM (AME US/CAN) Drill Evaluation Form
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.02.16		Version: 00

Time: Click here to enter text.

Date of Drill: Click here to enter a date.

Location monitored: Click here to enter text.

Time required to rescue / evacuate (minutes): enter text.

Number of occupants rescued / evacuated at this location: enter text.

During Drill:

Did personnel respond immediately? Click here to enter text.

Were plans for the mobility-impaired persons implemented? enter text.

Did occupants evacuate to the designated area? enter text.

Was the Site Emergency Response Plan followed? enter text.

Comments: enter text.

Name of Reviewer enter text.

Vestas receives a rating of:

☐ ***Good*** (no additional training or drills)

☐ ***Fair*** (additional training is required)

☐ ***Poor*** (additional training and another drill is required).

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Emergency Response Equipment Checklist

RESTRICTED

SITE/PROJECT: _____ **Year:** _____

EXTINGUISHERS (N = Month for Annual Professional Inspection): Inspector shall enter initials in box after each monthly inspection

ID#	Location	Style/Model #	Size/SN	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1															
2															
3															
4															
5															
6															
7															
8															

EYEWASH STATIONS Inspector shall enter initials in box after each monthly inspection

ID#	Location	Style/Model #	Size/SN	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1															
2															

FIRST AID KITS Inspector Shall Enter Initials in Box After Each Monthly Inspection

ID#	Location	Style/Model #	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1														
2														
3														
4														
5														
6														

Emergency Response (First Out) Kit: Inspector shall enter initials in box after each monthly inspection

ID#	Location	Style/Model #	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1														
2														
3														

Emergency Exit Signs Inspector shall enter initials in box after each monthly inspection

ID#	Location	Style/Model #	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1														
2														
3														
4														
5														
6														

Emergency Lights Inspector shall enter initials in box after each monthly inspection

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Emergency Response Equipment Checklist

RESTRICTED

ID#	Location	Style/Model #	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1														
2														
3														
4														
5														
6														
7														
8														
9														

Emergency Spill Kits

Inspector shall enter initials in box after each monthly inspection

ID#	Location	Style/Model #	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1														
2														
3														
4														
5														
6														
7														
8														
9														

Comments:

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Field Rescue Response Protocol Vestas System Instruction				Document ID: 0049-0620 INS SUS-SAF-OPC [AME] Field Rescue Response
Owner(s): BPO Del. SUS	Author(s): JATYL	Valid from: 2015.01.16		Version: 00

Version history

Version No.	Date	Description of Changes
00	2015.01.16	Converted to T03 from T09 document. Original 0037-6138

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1 Purpose

This Rescue Response Protocol (“Protocol”) defines:

- the safety and related training requirements when establishing work crews,
- the minimum training and experience requirements for First Responders, and
- rescue response times that will support the work crews in the event of an in-WTG personnel-related incident or injury.

2 Responsibilities

2.1 Regional Service Manager / Construction Management

2.1.1 Fully implement the Protocol at areas under their responsibility.

2.1.2 Assist Site/Construction Manager/Authorized Supervisors in determining best solutions in accordance with this Protocol.

2.1.3 Address any issues relating to implementation to Senior Management.

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2.1.4 Ensure Site/Construction Manager/Authorized Supervisors have adequate resources and support to carry out the Protocol responsibilities and obligations.

2.2 Site/Construction Manager/Authorized Supervisor

2.2.1 Accept full responsibility for implementing this Protocol at locations under their areas of responsibility.

2.2.2 Ensure all personnel working at a Vestas job site adhere to the Protocol.

2.2.3 Ensure all personnel working at a Vestas job site have received training from a qualified source and have adequate knowledge and skills to perform their duties.

2.2.4 Ensure all contractors working at a Vestas job site have received training from a qualified and equivalent source and have adequate knowledge and skills to perform their duties.

2.2.5 Maintain written plans or procedures that, at a minimum, comply with all local, state, provincial and federal laws and regulations that apply to the facility.

2.2.6 Comply with the most stringent requirement established either by local law or by this Protocol.

2.2.7 Update the Emergency Response Plan (ERP) to reflect the Protocol.

2.2.8 Coordinate with customers, local providers, and third party contractors to determine best implementation of this Protocol.

2.2.9 Ensure the Protocol includes accurate information on local EMS with respect to their training level and capabilities.

2.2.10 Obtain written approval from the Regional Service Manager/Construction Management prior to authorizing working alone.

2.2.11 Enforce the requirement for personnel to designate a First Responder and First Responder contact information on the JSA.

2.2.12 Review this Protocol on an annual basis for applicability and accuracy.

2.2.13 Ensure there are effective and functioning means of communication between the site office and all WTG's undergoing service and maintenance as well as between the WTG and to the location of the First Responder.

2.3 Quality, Safety and Environment (QSE)

2.3.1 Develop and monitor implementation of the Protocol.

2.3.2 Conduct workplace inspections and audits to ensure Protocol is appropriate for each location. Ensure inspections/audits include an evaluation of the local EMS capabilities, ensuring consistency with the site's Protocol.

2.3.3 Assist, if possible, Site/Construction Manager/Authorized Supervisors in developing an effective Protocol.

2.4 Personnel at WTG

2.4.1 Comply with the requirements of this Protocol.

2.4.2 Provide input to Site/Construction Manager/Authorized Supervisor's on ways to improve this Protocol and/or how to effectively manage this Protocol.

2.4.3 Commit to the intent of this Protocol. Do not put yourself or others at risk when working in WTGs and have a rescue plan.

2.4.4 Be sure you are trained, competent and able to perform to the level of your responsibility in your site's Protocol.

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2.4.5 Remain alert in a healthy and physically able condition in order to provide rescue/extraction services if called upon.

2.5 Contractor Supervisor

2.5.1 Communicate with the Site/Construction Manager/Authorized Supervisors if employees are unable to perform their duties.

2.5.2 Provide appropriate and effective training and PPE (harnesses, lanyards, etc.) to employees.

2.5.3 Monitor employee's ability to perform the essential functions of the job safely.

3 References

Document No.	Title
Safety Bulletin 018	Controlled Descent Equipment Requirements
0000-0504	Vestas Corporate OH&S Manual Chapter 8 – Personal Safety
0049-6139	Rescue Response Crew Capabilities Matrix
0049-0621	Field Rescue Response Protocol FAQ
0008-6837	VAWT PPE Plan
0049-0702	VCWT PPE Plan
0049-0693	PPE Inspection Record
0049-0549	Job Safety Analysis
0049-0685	Pre-Task Planning
0049-0572	Fall Arrest System Inspection Record
0049-2061	Tower Climbing Practical Test
0049-0678	VCWT Electrical Safety Manual
0049-0995	VAWT Electrical Safety Manual
0049-0580	VAWT Control of Hazardous Energy Program
0049-0677	VCWT Control of Hazardous Energy Program
0049-0584	VAWT Confined Space Entry Program
0049-0626	VCWT Confined Space Entry Program
0049-0679	Ontario Confined Space Alternate Entry Program
0008-9806	Emergency Preparedness
0049-2057	Site Emergency Response Plan Template

4 Scope

This protocol applies to all Vestas employees working at construction and service sites - within the AME scope and any person who will be at a WTG with Vestas employees (customers, sub-contractors, visitors, etc.). This Protocol also applies to all working hours and all off hour WTG related activity including weekends, holiday and on-call.

This Protocol does not address the already established prerequisite that the work crew members (Vestas and other) be assigned tasks that are appropriate matches to their capability (certification) and that they have the supporting PPE, work instructions (or Pre-Task Plan), tools, equipment, JSA, etc., to execute with safety and excellence.

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All or some of the requirements of the First Responder may be fulfilled by local response capability (EMT, ERT, Rescue) but must be documented, validated (e.g. can climb)/tested as part of the site ERP on at least an annual basis.

ONLY VESTAS EMPLOYEES TRAINED TO LEVEL C OR D (AS DESCRIBED FURTHER IN THIS PROTOCOL) OR QUALIFIED, PAID EMERGENCY SERVICES PERSONNEL ARE ELIGIBLE TO SERVE AS FIRST RESPONDERS.

5 Terms and Abbreviations

Term or Abbreviation	Definition
Bundled-3	Training in Trauma at Heights, Rescue from Heights, Confined Space Entry & Rescue. Minimum requirement for Level C – Technical Rescuer
First Responder	(Occupational First Aider): Individual(s) designated to respond to an injury related incident at a WTG.
EMS	Emergency Medical Services
ERP	Emergency Response Plan
JSA	Job Safety Analysis
WTG	Wind Turbine Generator
IC	Inventory Coordinator
OC	Office Coordinator
TBC	Task Based Certification
PTP	Pre-Task Plan
PPE	Personal Protective Equipment. Includes all equipment necessary for the work being performed.
LOTO	Lock Out/Tag Out. Includes all hazardous energies (electrical, mechanical, hydraulic, etc.).
AME	Vestas American Wind Technology, Inc. and Vestas Canadian Wind Technology, Inc.
Climb Test	A locally delivered skills test designed to evaluate a person's ability to safely climb to heights and maneuver around the WTG.
Confined Space	A space that has been evaluated against applicable criteria and determined to be a Confined Space.
Initial Climb	The first climb relating to a work tasks at a specific WTG for tool, part, and equipment hoist/lift.
Working Alone	Working Alone is identified as a single individual working alone at the WTG.
Construction Management	VP, Construction and/or Director, Construction

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Red Zone	An area colored red on the Rescue Response & Crew Capabilities Matrix where the risks and more probable rescue requirements associated with that defined activity category exceed the base safety related training skills of the associated Team Composition. Red Zone areas require either a higher skill mix (Team Composition) to achieve a Green Zone for that same activity category or the addition of personnel capability as defined in the Special Notes section - if applicable.
Green Zone	Green Zone: An area colored green on the Rescue Response & Crew Capabilities Matrix where there is an acceptable match between the Team Composition and the activity category - without consideration for any unique situational or environmental factors that need to be considered using an associated JSA or PTP.
Drop Zone	The area beneath the WTG in which a dropped or falling object can strike a person or equipment below. Wind speed and direction are considered when establishing a drop zone.
Off Hours	Times outside of the normal work day or work week.
Tower Base	WTG entrance and main platform, not including the basement.

6 Procedure

6.1 Response Time

6.1.1 Locations must keep the response times as low as practical based upon the site situational factors and/or conditions. However, in no case shall the rescue response cycle-time be more than 3-hours maximum from the initial support request call to arrival of the First Responder at the base of the tower that requested rescue support. The goal of Vestas is to respond as quickly as reasonably possible to any request for up-tower rescue.

6.1.2 Strategies to meet and/or improve rescue response cycle-times must be included in each site's ERP. Strategies need to include establishing relationships with local emergency personnel and determining how they can support a robust rescue plan (i.e. overcome barriers such as providing them WTG specific rescue equipment to address their budget limitation and/or if budgets allow cover their cost of the third party training).

6.2 First Responder minimum requirements

6.2.1 Vestas employees or paid, qualified emergency services.

6.2.2 Must completed Bundled-3 training, or equivalent.

6.2.3 Must agree and be willing and able to function in this role (e.g. emotional aspects of performing in such situations).

6.2.4 Must have passed one documented practice annual drill in the WTG (or through simulated rescue operations) and maintained overall readiness.

6.2.5 Must have appropriate communication and transportation capabilities/location logistics to provide coverage to all assigned teams given the current and forecasted conditions (weather, roads, snow, ice, etc.) to meet the response time requirement.

6.3 Rescue Response & Crew Capabilities Matrix

6.3.1 A planning tool which provides a framework for assigning work crews to ensure adequate staffing and rescue/extraction capabilities.

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Rescue Response Crew Capability Requirements

This planning tool provides framework for assigning work crews to ensure adequate staffing and rescue/extraction capabilities.

Team Composition	Enter Turbine Drop Zone	Enter Turbine Base	Climb / Enter Non-Confined Spaces	Climb / Confined Space Entry	Observe	Maintenance Tasks	Special Notes
A + A							Not Allowed
A + B							Requires 2 accompanying persons (C or D) in red
A + C							Requires 1 accompanying person (C or D) in red zones
A + D							Requires 1 accompanying person (C or D) in red zones
B + B							Requires 1 accompanying person (C or D) in red zones
B + C							Requires 1 accompanying person (C or D) in red zones
B + D							Requires 1 accompanying person (C or D) in red zones
C + C							None
C + D							None
D + D							None

(Example only. See 0049-0622)

6.3.2 Skill Level definitions (based on safety training requirements)

6.3.2.1 **Level A:** has no formal (or expired) training in rescue/extraction operations. Has completed a Climb Test. May or may not have current CPR/First Aid certifications. This level falls into the category of non-technician, non-climber. Examples: Intern, IC/OC, Press, some sub-contractors, visiting executives, vendors, or some customer personnel (assuming none have had Bundled-3 training).

6.3.2.2 **Level B - Basic Rescuer:** identifies hazards, uses equipment and applies limited rope techniques to perform basic rescue/extraction operations (examples: hi-angle rescue, descent device and rope access courses) not including Vestas Confined Spaces. Qualified in CPR and basic first aid courses. May serve as part of a rescue team with a Level C or D. This level is equivalent to a non-technician, non-climber. Examples: Sustainability staff, Technical Support, some customers, sub-contractors, etc.

6.3.2.3 **Level C - Technical Rescuer:** identifies hazards, uses equipment and applies advanced rope techniques to perform technical rescue/extraction operations and provide injured person stabilization/trauma control including Confined Space entry. A Level C – Technical Rescuer has had training similar to that of a Vestas technician who has completed the Bundled-3 training, including Safe Access and Rescue, advanced first aid/trauma courses, wilderness advanced first aid or similar courses, confined space entry and rescue courses.

6.3.2.4 **Level D - Expert Rescuer:** identifies hazards, uses equipment and applies expert rope techniques to perform complex rescue/extraction operations and provide injured person stabilization/trauma control including Confined Space entry. Supervises on-site rescue teams, manages rescue/extraction operations and performs dynamic risk hazard assessments. A Level D – Expert Rescuer has had training similar to that of an ENSA Instructor or equivalent. Examples: Selected Technical Training Instructors, selected Sustainability staff, SPRAT (Society of Professional Rope Access Technicians) Level II or III or similar training.

6.3.3 Matrix Examples – How to use the matrix

6.3.3.1 Skill Level Combination of A + A

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6.3.3.1.1 Are not allowed unescorted access to the WTG due to skill levels and lack of adequate training in both the WTG and safety/technical training.

6.3.3.2 Skill Level Combination of A + B

6.3.3.2.1 This combination of skill levels can enter the Drop Zone and the base of the WTG without an escort of those with C and D skill sets. To do any tasks in the Red Zones requires 2 additional persons with a C or D skill set.

6.3.3.3 Skill Level Combination of B + B

6.3.3.3.1 This combination of skills can perform work in the Green Zones but to enter the Red Zones requires additional skill sets to augment the team. However, a solid rescue plan shall be in place with a First Responder identified.

6.3.3.4 Skill Level Combination of C + C

6.3.3.4.1 This combination of skills can perform in all Green Zone due to their levels of training. This team combination will not normally require a third person to augment the team. However, a solid rescue plan shall be in place with a First Responder identified.

6.4 Working Alone

6.4.1 Working alone is limited to technician's who are considered a Level C. This is based on the risks and the importance on having sufficient turbine knowledge.

6.4.2 Examples of Working Alone include:

6.4.2.1 Enter WTG Drop Zone (e.g. visual blade inspection)

6.4.2.2 Enter WTG base

6.4.2.3 Software upload/change Parameters – tower base

6.4.2.4 Tower base serial number verification and photo's

6.4.2.5 Tower base visual inspections

6.4.2.6 Operating tower base circuit breakers with an arc flash hazard level of zero

Note: The examples provided do not require approval from the Regional Service Manager / Construction Management. Activities outside of these examples require higher level approval.

6.4.3 The PTP that allows an individual to work alone must ensure that the work being performed does not introduce hazardous work conditions that cannot be controlled with specific attention around the task, communication, risks and mitigation. PTPs that cover working alone either with a task listed in paragraph 6.4 with non-standard risks or another activity not listed in paragraph 6.4 must be approved in writing by the Regional Manager/ Construction Management.

6.4.3.1 Non-standard risks may include, and are not limited to:

6.4.3.1.1 Visiting turbines in which there are reports of things falling from the turbine

6.4.3.1.2 Entering turbine base with unknown electrical conditions

6.4.3.1.3 Performing visual blade inspections during icing conditions

6.4.3.1.4 Visiting turbines that have been vandalized.

6.4.4 When considering working alone external factors such as weather and road conditions should be factored in as these will impact rescue response times.

6.4.5 Working alone requires: (See also 0000-0504)

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6.4.5.1 A well-defined communication plan with First Responder support including an approved PTP.

6.4.5.2 That someone with trauma and stabilization training must be within 10 minutes response of this work location.

6.4.5.3 Verification that two-way radios and/or cell phones are functioning before leaving the O&M facility. Check battery levels.

6.4.5.4 Verification of communication and any back-up approach (e.g. alternate radio channel) upon arrival at work location.

6.4.5.5 Initiation of closed-loop communication prior to entering the turbine, performing the work task, upon exiting the WTG, upon completion of travel back to the base location (O&M, home, other).

6.4.5.6 That communication must occur at least every 15 minutes, and could be more frequent, during each task phase. If there is no communication after 15 minutes the Emergency Response Plan must be activated.

6.4.6 Examples of communication methods:

- "Base: Technician A arriving at WTG C14 09:30. Verify communication."
- "Technician A: Base acknowledges your arrival at C14 09:30."
- "Base: Technician A preparing to enter WTG C14 09:45. Verify"
- "Technician A: Base acknowledges preparing to enter WTG C14 09:45.
- "Base: Technician A has entered WTG C14 10:00. Verify"
- "Technician A: Base acknowledges your entrance into WTG C14 10:10."
- “Base: Technician A 15 minute reporting. All clear. Acknowledge”
- “Technician A: Base acknowledges all clear report.”
- “Base: Technician A in WTG C14 complete with task and preparing to put WTG back in operational mode. Acknowledge.”
- “Technician A: Base acknowledges task completion and preparation to put WTG back in operational mode. Acknowledge.”
- “Base: WTG C14 is in operational mode and preparing to exit turbine. Acknowledge.”
- “Technician A: Base acknowledges WTG C14 operational and you are preparing to exit.”
- “Base: Technician A has secured WTG door, and mobilized.”
- “Technician A: Base acknowledges secured WTG and mobilized.”

6.5 Driving alone

6.5.1 Driving alone to the turbine to deliver parts is not considered working alone however special precautions should be considered to ensure the safety of the lone driver. Factors to consider:

6.5.1.1 Road and weather conditions

6.5.1.2 Travel distance

6.5.1.3 Remote areas (wildlife, communication abilities)

6.5.1.4 Vehicle condition and maintenance (fuel, water, tires)

6.6 Initial Climb

6.6.1 The initial climber should be appropriately certified / experienced for this activity as well as the most logical choice based on team’s initial tasks and not simply an assignment based upon seniority or Vestas / Non-Vestas personnel. The selection of the initial climber should not be based on a time in service process but rather the logical person who has the correct competency to climb and lower the hoist chain or perform other initial lift.

6.6.2 Selection criteria for the initial climber:

6.6.2.1 Task based certification to task

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6.6.2.2 Trained in internal crane operation

6.6.2.3 Rigging experience of the worker on the ground

6.6.3 The initial climber is the worker who makes the initial ascent for the purpose of lowering internal crane chain or other material handling equipment and performing associated material lifts.

6.6.4 Initial Climb work restrictions:

6.6.4.1 The initial climber shall not perform any work activities during the process of hoisting and lowering of internal crane or other material handling equipment.

6.6.4.2 The initial climber must have communications with the team member on the ground.

6.6.4.3 The selection of the initial climber will be repeated at each WTG if more than one WTG is visited during the work period.

7 APPENDIX: version history

Version No.	Date	Description of Changes
00	2013.04.23	First edition
01	2013.05.15	• All revisions are highlighted in grey • Replaced Crew Capability Matrix with updated version • Reduced ERP activation when working alone from 20 to 15 minutes • Added Working Alone requires Regional Manager / Construction Project Managers approval • Reduced Working Alone scope to match Corporate Safety Manual, Chapter 8
02	2013.06.04	• Updated Working Alone communications examples • Standardized “down tower” and “tower base” terminology • Modified Red and Green Zone definitions • Modified Working Alone to be more descriptive and requires an approved PTP instead of JSA • Added Driving Alone • Added requirement for local management to enforce designation of the First Responder on the JSA
03	2013.06.12	• Modified sections 6.3.3.3.1 and 6.4.6
04	2013.06.26	• Added responsibility to Site Manager section.
05	2014.06.03	• Defined specific entities who can serve as a First Responder. • Corrected minor grammatical errors.

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Rescue Response Crew Capability Requirements

This planning tool provides framework for assigning work crews to ensure adequate staffing and rescue/extraction capabilities.

Team Composition	Enter Turbine Drop Zone	Enter Turbine Base	Climb / Enter Non-Confined Spaces	Climb / Confined Space Entry	Observe	Maintenance Tasks	Special Notes
A + A							Not Allowed
A + B							Requires 2 accompanying persons (C or D) in red zones
A + C							Requires 1 accompanying person (C or D) in red zones
A + D							Requires 1 accompanying person (C or D) in red zones
B + B							Requires 1 accompanying person (C or D) in red zones
B + C							Requires 1 accompanying person (C or D) in red zones
B + D							Requires 1 accompanying person (C or D) in red zones
C + C							None
C + D							None
D + D							None

◊ Skill Levels are based on safety training levels

◊ Technicians must be TBC certified to perform the assigned tasks

◊ Consult SB 018 Controlled Descent Equipment Requirements for information regarding the number of descent devices needed based on team size

◊ To observe a task the observer must not enter into the limited approach boundary and must be equipped with PPE appropriate for the task

Level A: Has no formal (or expired) training in rescue/extraction operations. Has completed Climb Test. May or may not have current CPR/First Aid certifications. This level falls into the category of Non-technician, non-climber. Examples: Intern, IC/OC, Press, Loan Labor, some Sub-Contractors, visiting executives, vendors, some customer personnel.

Level B: Basic Rescuer: identifies hazards, uses equipment and applies limited techniques to perform basic rescue/extraction operations (examples: Hi-angle rescue, descent device and Rope access courses) not including Vestas confined spaces. Qualified in CPR and basic first aid courses. May serve as part of a rescue team with a Level C or D. This level is equivalent to a Non-technician, non-climber. Examples: Sustainability staff, Technical Support, some customers, sub-contractors, Loan Labor, etc.

Level C: Technical Rescuer: identifies hazards, uses equipment and applies advanced techniques to perform technical rescue/extraction operations, injured person stabilization/trauma control including confined space entry. (Safe Access and Rescue, advanced first aid/trauma courses, wilderness survival courses, confined space entry and rescue courses). A Level C has had training similar to that of a Vestas technician who has completed the Bundled "3" training.

Level D: Expert Rescue: identifies hazards, uses equipment and applies advanced rope techniques to perform complex rescue/extraction operations, injured person stabilization/trauma control including confined space entry. Supervises on-site rescue teams, manages rescue/extraction operations and performs dynamic risk hazard assessments. A Level D has had training similar to that of an ENSA Instructor or equivalent. Examples: Selected Technical Training Instructors, Sustainability staff, SPRAT (Society of Professional Rope Access Technicians) Level II or III or similar training.

Level C and D require documented annual practice, either on equipment or a simulated scenario, that closely resembles real rescue/extraction conditions.

Owner: BPO.DEL.SUS
Valid from: 2015.03.25

Version:00

Document ID: 0049-0622
INS SUS-CMT-MRP (AME US/CAN)
Rescue Response Matrix

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Working alone

This tool provides framework for when working alone is authorized and the restrictions for working alone.

Enter Turbine Drop Zone	Enter Turbine Base	Climb / Enter Non-Confined Spaces	Climb / Confined Space Entry	Operate Tower Base Breakers - Class 0	Software Upload/Change Parameters - Tower Base	Pre-Ice Work Check List	Use Internal Crane to hoist materials	Verify Tower Base Serial Numbers and take photo's	Perform Tower Base General Cleaning	Perform Electrical Work

◊ Working alone is limited to technician's who are considered a Level C

◊ Working alone requires a well-defined communication plan. (Initial climbing to lower the internal Crane chain is not considered working alone provided that is the only task being performed)
◊ Verify two-way radios and/or cell phones are functioning before leaving the O&M. Check battery levels.
◊ Verify communication are functioning upon arrival at location.
◊ Verify communication prior to entering and exiting the turbine.
◊ Communication must occur every 15 minutes. If there is no communication after 15 minutes the Emergency Response Plan must be activated.
◊ Examples of communication methods:
>> "Base. Technician A arriving at turbine C14 09:30. Verify communication."
>> "Technician A, Base acknowledges your arrival at C14 09:30."
>> "Base. Technician A preparing to enter turbine C14 09:45. Verify"
>> "Technician A, Base acknowledges preparing to enter turbine C14 09:45.
>> "Base. Technician A has entered turbine C14 10:000. Verify"
>> "Techncian A, Base acknowledges your entry turbine C14 10:10."
>> "Base: Technician A 15 minute reporting. All clear. Acknowledge"
>> "Base: Technician A in WTG C14 complete with task and preparing to put WTG back in operational mode. Acknowledge."
>> "Technician A: Base acknowledges task completion and preparation to put WTG back in operational mode. Acknowledge."
>> "Base: WTG C14 is in operational mode and preparing to exit turbine. Acknowledge."
>> "Technician A: Base acknowledges WTG C14 operational and you are preparing to exit."
>> "Base: Technician A has secured WTG door, and mobilized."
>> "Technician A: Base acknowledges secured WTG and mobilized."

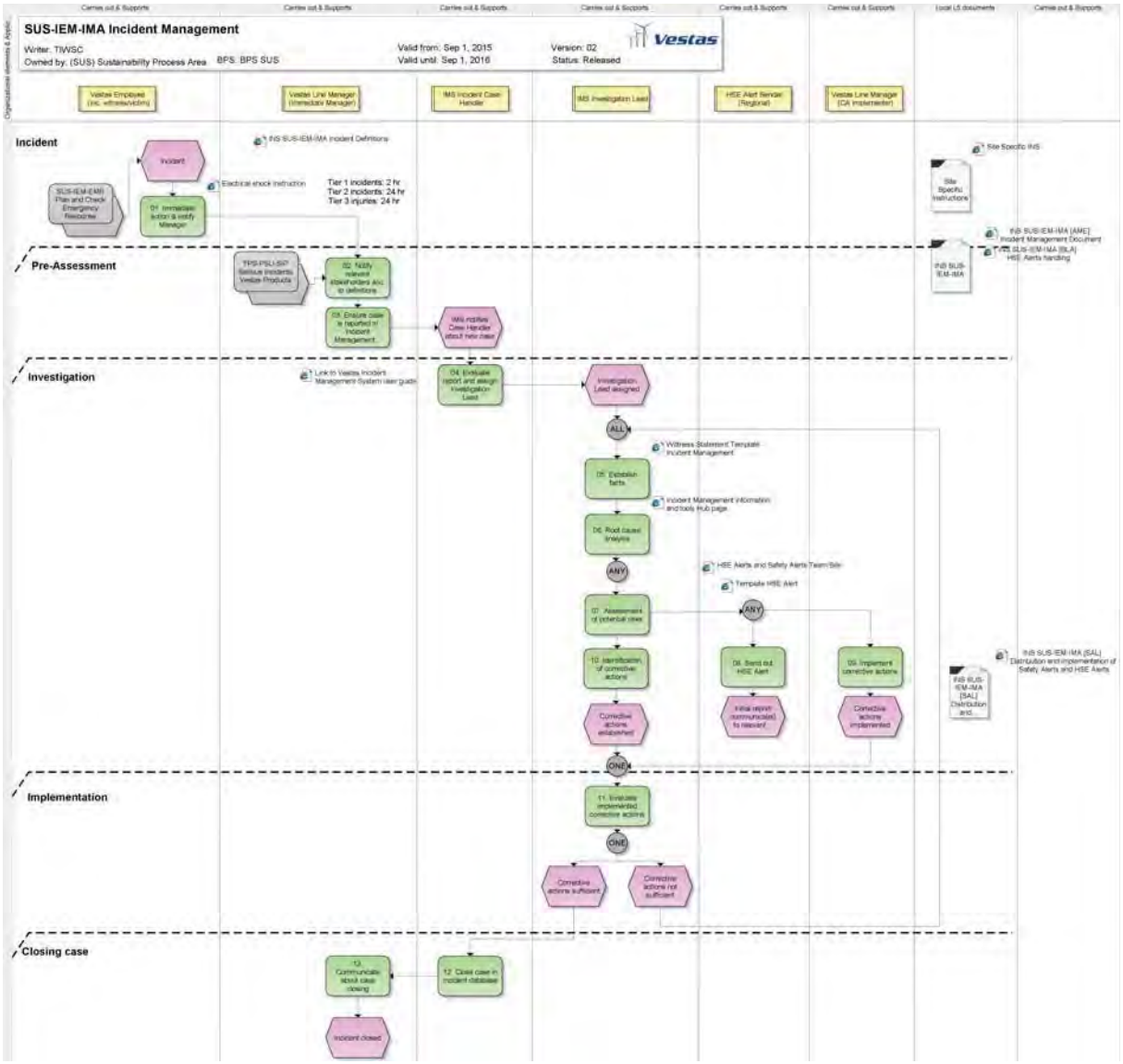
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SUS-IEM-IMA Incident Management

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Model



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Process Information

Writer: TIWSC		Valid from: Sep 1, 2015	Version: 02
Owned and Approved by: (SUS) Sustainability Process Area	BPS Initials: TIWSC		Status / Phase: Released

Process name:
SUS-IEM-IMA Incident Management

Purpose:
The purpose of this procedure is to ensure that all incidents according to definitions are being managed. Please see attached document "INS SUS-IEM-IMA Incident Definitions"

Description:
This process defines the minimum requirements for immediate action, investigation, and reporting corrective action, follow-up and training associated with health, safety and environmental incidents. If found expedient more strict requirements can be applied.

Scope:
All incidents must be managed.

Definition & abbreviations:
Please see attached document: INS SUS-IEM-IMA Incident Definitions

Interested parties:
All Vestas employees and external workers supervised with day-to-day working directions by Vestas.

Documentation:
Incidents are documented and managed in the Incident Management System.
Archive time 20 years.

Training:
Employees who are involved in incident management will require specific training according to their role in the process. All persons covered by the scope of this standard, as a minimum, shall be informed of their reporting responsibilities.
Specific training:
* Incident Management Process training
* Training in the use of Incident Management System
* Training in the use of relevant root cause analysis tools (TapRooT®; ABC; Fishbone or 5Why)

ISO standard reference:

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ISO14001/OHSAS18001, 4.5.3

Linked documents:

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Activities in the process (ordered alphabetically)

01. Immediate action & notify Manager

Any person, who is involved in or witnesses an incident, shall initiate the Local Emergency Response Plan (ERP) if required and contact immediate manager/supervisor. It is mandatory that all incidents are reported immediately.
The immediate manager/supervisor automatically becomes owner of the incident.

- responsible role: Vestas Employee (Inc. witness/victim)

Linked documents:

Electrical shock instruction

http://dms.vestas.net/dmsview?type=T03&no=0049-3509&part=000&file=*.pdf

02. Notify relevant stakeholders acc. to definitions

To ensure handling of the incident the Immediate Manager/Supervisor is accountable for ensuring that relevant stakeholders are notified, refer to local instruction.

For Tier 1 incidents the Accountable Vice President must seek to ensure communication within 2 hours to relevant stakeholders:
* The accountable Senior Vice President of the Segment or SBU
* General Manager of the location or site
* HSE/QSE Support
* In case of Serious Incidents to Vestas Products and products for which Vestas is contractually responsible for service and maintenance, TSS is to be involved through 'TPS-PSU-SIP Serious Incidents Vestas Products'
* Additionally, for Turbine sites:
 * Key Account Customers: Key Account Manager
 * Construction/service sites: Project Manager/Customer Service Manager

For Tier 2 incidents the Immediate Manager/Supervisor is accountable for ensuring the notification of the General Manager/Operational Manager and the HSE/QSE Support Support within 24 Hours.

For Tier 3 incidents, no special information is required to be distributed individually.
A report should be filled in the Incident Management System and the relevant stakeholders will be informed automatically through the system and different reports.

- responsible role: Vestas Line Manager (Immediate Manager)

Linked documents:

INS SUS-IEM-IMA Incident Definitions

http://dms.vestas.net/dmsview?type=T03&no=0041-0451&part=000&file=*.pdf

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03. Ensure case is reported in Incident Management System

It is a mandatory requirement that all incidents are reported in the Incident Management System. Depending on local legal requirements, incidents must also be reported to local authorities and insurance.

Language requirement: It is mandatory that all serious incidents according to definition and all total recordable injuries (lost time injuries, restricted work injuries, medical treatment injuries) and tier 1 and 2 environmental accidents must be reported in English incl. description of incident and description of corrective actions. The reporting language of other incidents is optional.

Please refer to the Incident Management System instruction.

- responsible role: Vestas Line Manager (Immediate Manager)
- creates State/Event: IMS notifies Case Handler about new case

Linked documents:

Link to Vestas Incident Management System user guide

http://dms.vestas.net/dmsview?type=T03&no=0045-0615&part=000&file=*.pdf

04. Evaluate report and assign Investigation Lead

The Case Handler of the incident is to follow up and evaluate the information reported related to the case and assign the Investigation Lead.

In most cases the Case Handler will also be the Investigation Lead.

- responsible role: IMS Incident Case Handler
- creates State/Event: Investigation Lead assigned

05. Establish facts

The appointed Investigation Lead is responsible for establishing the investigation team with representatives from all relevant stakeholders and HSE/QSE Support if needed. The lead also is responsible for ensuring progress of the investigation.
The Investigation Lead is accountable for ensuring that all relevant facts are established as quickly as possible.

Based on the facts the Investigation Lead is accountable for ensuring that the severity of the incident is re-assessed (Tier 1; Tier 2 and Tier 3, where Tier 1 is the most severe incident).

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- responsible role: IMS Investigation Lead

Linked documents:

Wittness Statement Template - Incident Management

http://dms.vestas.net/dmsview?type=T03&no=0040-9417&part=000&file=*.doc

06. Root cause analysis

It is mandatory to document the performed investigations for all Tier 1 and Tier 2 incidents. Documentation of Tier 3 investigations is optional, but recommendable.

Based on the tier level of the incident, different requirements are set for what investigation method to use:

Tier 1:
The use of TapRooT® or ABC is mandatory.

Tier 2:
The use of TapRooT® or ABC is mandatory for Tier 2 cases with the significant potential of being a Tier 1 case.
For other Tier 2 cases the choice of investigation methodology is optional. .

Tier 3:
For Tier 3 cases the choice of approved investigation methodology is optional TapRooT®; ABC; Fishbone or 5Why.

- responsible role: IMS Investigation Lead

Linked documents:

Incident Management information and tools Hub page

http://thehub.vestas.net/Supportingdomains/QualitySafetyandPeopleCulture/SafetyEnvironment/HealthandSafety/Incident%20Management/Incident_Management_System/Pages/default.aspx

07. Assessment of potential risks

Based on the events and (potential) damages of the incident an assessment of the potential risk is mandatory to perform in accordance with SUS-ASM-HRA Identify Hazards and assess risks.

Review existing risk assessment for the task and update if required, based on the incident.

If a risk assessment of the work does not exist it must be performed.

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- responsible role: IMS Investigation Lead

08. Send out HSE Alert

It is mandatory requirement to distribute HSE Alerts for Tier 1 incidents and Tier 2 incidents with a significant potential for becoming a Tier 1. It is recommended to distribute HSE Alerts for Tier 2 incidents without a significant potential for becoming a Tier 1.

The HSE Alert is sent out by Global QSE to relevant stakeholders in cases where special attention is required.

Creation and distribution
The HSE Alert template can be generated through the Incident Management System. All HSE Alerts must undergo a legal review prior to being shared with external Stakeholders. If the incident is related to a Vestas product the HSE Alert must also be review by TSS. If other investigations are running in parallel (e.g. Third party investigations) Global QSE must seek to cooperate and share facts found.

The HSE Alert is distributed to relevant units/segments/regions or globally by responsible level of Global QSE of where the information is relevant. The HSE Alert will be submitted to the next level of QSE who cascades information in own units/segments/regions where relevant.
- For instruction relevant for Sales, see attached “INS SUS-IEM-IMA [SAL] Distribution and implementation of Safety Alerts and HSE Alerts”

- responsible role: HSE Alert Sender (Regional)
- creates State/Event: Initial report communicated to relevant parties

Linked documents:

Template HSE Alert

http://dms.vestas.net/dmsview?type=T03&no=0041-5335&part=000&file=*.doc

HSE Alerts and Safety Alerts Team Site

http://teamsitesemea.vestas.net/sites/globalhsealert/default.aspx

09. Implement corrective actions

Line management in respective areas is accountable for the implementation of corrective actions within agreed deadline.

- responsible role: Vestas Line Manager (CA Implementer)
- creates State/Event: Corrective actions implemented

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10. Identification of corrective actions

Based on the result of the root cause analysis and the potential risk assessment, the Investigation Lead is responsible for ensuring that corrective actions are identified and approved for each root cause.
For tier 1 and 2 incidents it is mandatory to identify and implement corrective actions.
For re-assessed tier 3 incidents it is optional to identify and implement corrective actions.

Corrective actions must be identified, following the hierarchy of effectiveness where feasible, and must be reasonably adequate to match the risk level according to SUS-ASM-HRA Identify Hazards and assess.

- responsible role: IMS Investigation Lead
- creates State/Event: Corrective actions established

11. Evaluate implemented corrective actions

For Tier 1 cases and Tier 2 cases with the significant potential of being a Tier 1 case the Investigation Lead is accountable for evaluating the implemented corrective actions to ensure that the risk has been eliminated or reduced sufficiently.
The Investigation Lead shall seek to close the Tier 1 case no more than 30 days after implementation or the next visit to the Turbine after implementation.
Evaluating the implemented corrective actions of Tier 2 and Tier 3 cases is recommended.

- responsible role: IMS Investigation Lead

12. Close case in incident database

The case is closed by the assigned Incident database case handler.
The incident can be closed when all corrective actions have been closed. If a corrective action involves the injured person (e.g. for training), the case can be closed when the person is back at the job and has been trained. If it is an external training or official training through Vestas LMS system, the case can be closed when the person is signed up for the training.

- responsible role: IMS Incident Case Handler

13. Communicate about case closing

The immediate manager is accountable for ensuring that all relevant parties are informed that the case has been closed.

- responsible role: Vestas Line Manager (Immediate Manager)
- creates State/Event: Incident closed

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SUS-IEM-EMR Plan and Check Emergency Response

- responsible role: Vestas Employee (Inc. witness/victim)
- creates State/Event: Incident

TPS-PSU-SIP Serious Incidents Vestas Products

- responsible role: Vestas Line Manager (Immediate Manager)
- creates State/Event: Customer Information needed

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Output model information

Process Documentation

Name	Link 1	Link 2
INS SUS-IEM-IMA	http://dms.vestas.net/dmsview?type=T03&no=0048-4209&part=000&file=*.pdf	http://dms.vestas.net/dmsview?type=T03&no=0044-7089&part=000&file=*.pdf
INS SUS-IEM-IMA [SAL] Distribution and implementation of Safety Alerts and HSE Alerts	http://dms.vestas.net/dmsview?type=T03&no=0042-4719&part=000&file=*.pdf	
Site Specific Instructions		

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Incident Management & Business Recovery Plan (AME)				Document ID: 0044-7089 INS SUS-IEM-IMA(AME US/CAN) Incident Management
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2016.02.19		Version: 08

Version history

Version No.	Date	Description of Changes
08	2016.03.16	Revised: Contact personnel, Phone numbers

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1 Purpose

The purpose of this end-user-procedure (EUP) is to outline the procedure for responding to any event which may endanger employees, customers, the public health or safety; create significant financial, economic or legal threat; or adversely affect Vestas operations or credibility. All Vestas management and employees shall be familiar with their responsibilities outlined in this plan. This plan and its provisions are in addition to those safety and emergency response plans already in place at each of the Company's sites. They are designed to complement each other, and together serve as the basis for the comprehensive Business Continuity Management Plan of the company.

The goal of this Incident Management and Business Recovery Plan is to effectively establish the system and structure for making effective decisions in the event of a serious incident so the Incident Response Team can focus on the content of the situation and return to normal operations in the most efficient and effective manner depending upon the incident.

Implementation of the Incident Management and Business Recovery Plan will involve the formulation of a Core Incident Response Team that will interface with and coordinate activities with the On-Site Core Incident Response Teams as needed. This Incident Management and Business Recovery Plan focuses only on serious incidents as defined below, or as determined by Senior Management.

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2 Responsibility

2.1 Senior Management

The ultimate responsibility for resolution of incidents in the best interest of Vestas resides with the President. The primary mechanism for fulfilling that responsibility is establishment and execution of the Vestas Incident Management and Business Recovery Plan.

2.2 QSE Department

The primary coordination of this plan is the responsibility of the QSE Department. Incident management is a continual process and will be viewed as an on-going high priority for Vestas management and employees. These guidelines will be reviewed on a regular basis and updated as needed. Questions regarding this plan can be directed to: VP or Director, QSE.

3 Scope

Vestas-American Wind Technology, Inc. and Vestas-Canadian Wind Technology, Inc – All locations

4 References

Document No.	Title
0009-0253	Investigation Policy
0010-8758	Legal Hold Policy
SUS-IEM-IMA	Incident Management
MAR-SCM-ICC	Incident and Crisis Communication
0053-6026	Surveillance Center Questionnaire and Instructions
Surveillance Center	Phone Number: 503-327-2040

5 Serious Incident Definition

5.1 A situation is potentially a serious incident if any of the following statements are true:

5.1.1 The health or safety of any person is, or may be, seriously affected.

5.1.2 There is a significant likelihood that legal consequences will result.

5.1.3 There is a significant likelihood that Vestas' ability to operate will be at risk.

5.1.4 There is a significant likelihood that liability may be assigned equaling or exceeding $100,000 (USD).

5.1.5 There is a significant likelihood that Vestas' public image, brand, credibility or reputation will be at risk.

5.1.6 There is a significant likelihood that negative media coverage could occur.

5.1.7 There is an incident at a customer or supplier/vendor location that could impede Vestas' ability to continue to conduct business or operate.

6 Terms and Abbreviations

Term or Abbreviation	Definition
QSE	Quality, Safety and Environmental
VAWT	Vestas-American Wind Technologies
VCWT	Vestas-Canadian Wind Technologies
VAME	VAWT and VCWT
TSS	Technical Support Services
VP	Vice President
USD	U.S. Dollars
Senior VP	Senior Vice President
CFO	Chief Financial Officer
EAP	Emergency Assistance Program

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7 Identifying Potential Serious Incident

7.1 Activation criteria

The following criteria can be used to determine when to activate the Incident Management and Business Recovery Plan. These criteria are examples and are not intended to be all inclusive.

7.1.1 People: Fatality, serious injury, hospitalization, kidnapping, terrorism (including bomb threats), etc.

7.1.2 Serious injury could include: life threatening, paralysis, head injury such as skull fracture, lack of consciousness, serious burn.

7.1.3 Environment damage: damage to soil, air, water or protected species involving emergency services and/or regulatory involvement due to chemical spill, large oil leak, etc.

7.1.4 Process extended: production stoppage (extending more than 1 day) due to strikes, fire, serious malfunction, sourcing issue, power outage, IT disruption, etc.

7.1.5 Asset partial or total site disruption: (extending more than 1 day) due to: fire, tornado, earthquake, etc. Wind turbine fire or runaway condition that cannot be immediately addressed on site.

7.1.6 Other emergency services: (e.g., police, fire department, hazardous material units) services that results from a serious incident.

7.1.7 Potential legal issues: strikes, unannounced regulatory audits, and other legal compliance issues, or pending lawsuit.

7.1.8 Negative publicity: from the media or regulatory authorities.

7.2 Incident Severity Reference Chart

The HSE Incident Severity chart can be used as a reference to the activation criteria for the Incident Management and Business Recovery Plan, in addition to the activation criteria above.

Refer to the Incident Management Procedure SUS-IEM-IMA:
http://teamsitesame.vestas.net/sites/21007/VAME%20HSE%20Forms/Tier-Frequency%20Definitions.xlsx

8 Incident Response Team

8.1 The Incident Response Team

The Incident Response Team is comprised of the Core Incident Response Team and the On-Site Core Incident Response Team. The Incident Response Team will be supported by additional departments (Support Members), as required.

8.2 Core Incident Response Team:

- VP or Director, QSE (Incident Coordinator)
- President
- Chief Financial Officer
- Communications Representative, Communication, Brand and Public Affairs
- VP & General Counsel, or his/her designee
- Senior Specialist, Risk Management & Insurance
- Others as determined necessary

8.3 Support Members:

- VP, Construction
- Regional Heads of Service
- Head of Regional Operations & Support, TSS
- VP, Sales or Country Manager
- Director, Finance
- Director, Transport
- IT Support
- Head of HR, North America
- Director, Service Renewal & Account Management

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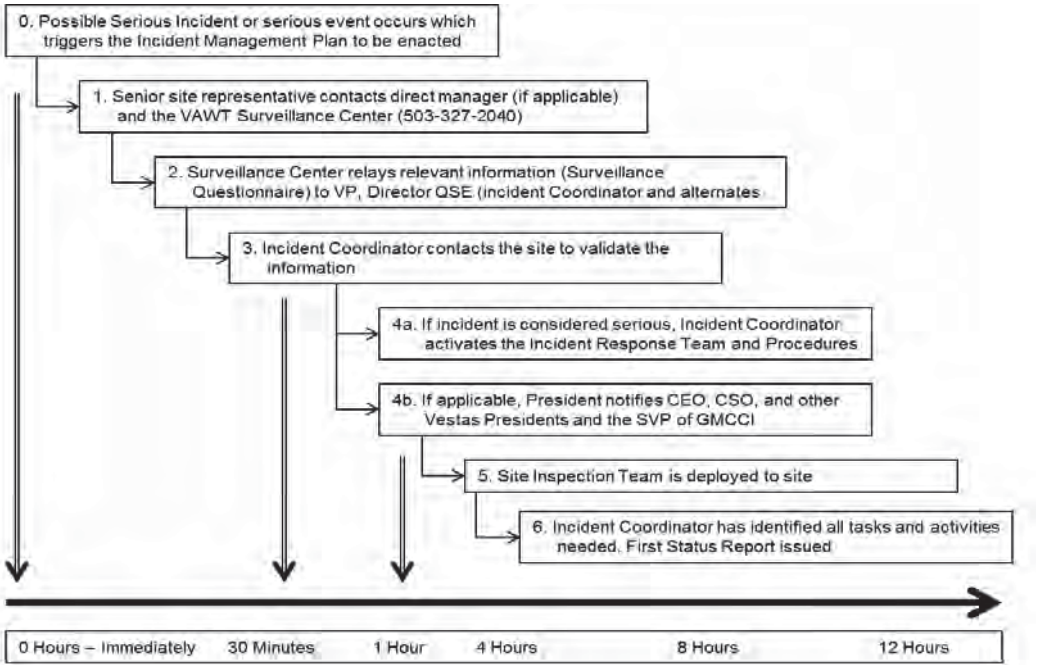
8.4 On-Site Core Incident Response Team:

- Plant Managers, Service
- Site/Construction Manager
- Site Supervisor
- Commissioning Supervisor/Lead Technician
- Office Coordinator (Local Incident Secretary)

9 Serious Incident Notification Procedure

This section outlines the internal and external communications that are necessary to respond effectively to a Serious Incident. The flow chart diagrams the chain of command among company personnel and serves as an overview of the sequence of events within the first 48 to 72 hours of a Serious Incident. It is important to note that each situation will be different, and therefore, out of necessity, this network must be flexible.

9.1 Initial Flowchart for Incident Management and Business Recovery Plan



10 Duties and Responsibilities

10.1 Surveillance Center

10.1.1 Upon notification by a site representative about a potential Serious Incident, obtain as much information as possible as outlined in the Surveillance Center Questionnaire and Instructions (DMS 0053-6026).

10.1.2 Communicate the information obtained from the site via email to the Incident Coordinator and alternates. Place a phone call to the Incident Coordinator and/or alternates to confirm their receipt of the communication.

10.1.3 Assist the Incident Coordinator as needed in arranging communication until the Incident Response Team is activated.

10.2 Core Incident Response Team

10.2.1 As Core Incident Response Team members are not equipped to be available 24x7, back-ups will be contacted if a Core Incident Response Team member cannot be reached.

10.2.2 Make themselves available 24 hours a day during the management of a Serious Incident to support the management and response (once the member has been contacted, they will support the active incident response as needed).

10.2.3 Implements Incident Management and Business Recovery Plan.

10.2.4 Directed by Incident Coordinator.

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10.2.5 Sets up virtual or off-site “Incident Response Center” if necessary.

10.2.6 Establishes protocols and logistics to interface with On-Site Core Incident Response Team.

10.2.7 Determines who will interface with regulatory agencies, media, service providers, employees, customers and other interested relevant parties.

10.2.8 May add additional personnel as determined necessary.

10.2.9 President

Alternate: Sr. VP, CFO

10.2.9.1 Provides strategic direction to Core Incident Response Team through the Incident Coordinator.

10.2.9.2 Approves major strategic decisions made by the Core Incident Response Team.

10.2.9.3 Communicates with president(s) of Customers.

10.2.9.4 Keeps Board of Directors informed during incident.

10.2.9.5 Serves as Company spokesperson when appropriate.

10.2.10 Vice President or Director, QSE (Incident Coordinator)

Alternate: Director or Manager, VAME QSE

10.2.10.1 Assesses situation – authorizes team to assemble as necessary.

10.2.10.2 Communicates with President – provides updates.

10.2.10.3 Leads Incident Response Team.

10.2.10.4 Manages Incident Response Team meetings.

10.2.10.5 Reviews incident management documents.

10.2.10.6 Ensures all Incident Response Team members, resources, offices, and sites are kept informed and/or provided support as needed.

10.2.10.7 Follows steps outlined in Incident Management Plan.

10.2.10.8 Regularly recaps situation, information known to moment.

10.2.10.9 Available at all times.

10.2.11 Chief Financial Officer

Alternate: Regional Heads of Service

10.2.11.1 Customer and supplier communication as needed.

10.2.11.2 Travels to incident location (alternate VP Construction and/or VP Service, Regional Heads of Service).

10.2.12 Vice President, General Counsel

Alternate: Legal Senior Specialist

10.2.12.1 Provides advice and counsel on pertinent legal issues for Core Incident Response Team, President and Board of Directors.

10.2.12.2 Assess legal ramifications of the incident.

10.2.12.3 Determine if outside counsel will be engaged.

10.2.13 Work with local, state and federal governments (regulatory).

10.2.13.1 Determine if Legal Investigation Policy should go in to affect (DMS 0009-0253) to preserve confidentiality and protect such investigations from disclosure by the attorney-client privilege and/or work product doctrine.

10.2.13.2 Determine if Legal Hold Policy should go into effect (DMS 0010-8758) to ensure relevant company records (paper and electronic) are preserved in the event of disputes, litigation, reasonably anticipated litigation or requests by third parties or governmental agencies.

10.2.14 Manager - Communication, Brand and Public Affairs

Alternate: Incident & Crisis Info. Handler

10.2.14.1 Coordinates media inquiries.

10.2.14.2 Manages media relations.

10.2.14.3 Monitors media activities.

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10.2.14.4 Sets up media center, if appropriate.
10.2.14.5 Advises Incident Coordinator on appropriate spokesperson.
10.2.14.6 Prepares company spokesperson.
10.2.14.7 Drafts media information, including preliminary statement and Q&As.
10.2.14.8 Releases statements to media.
10.2.14.9 Manages PR consultant, if used.
10.2.14.10 Liaison with local, state, and federal governmental representatives (non-regulatory).
10.2.14.11 Handles public inquiries.
10.2.14.12 Coordinates internal communications.
10.2.14.13 Compiles summary of events relating to incident.
10.2.14.14 Develops position statements for peer companies, industry organizations and other interest groups.
10.2.14.15 Supports communication activities with customer if required and/or appropriate.
10.2.15 Head of HR, North America (not part of the Core Team. Duties/responsibilities in the event HR is called upon in the event the IM Plan is activated)
Alternate: HR Business Partner(s)
10.2.15.1 Contacts employees and families, as appropriate.
10.2.15.2 Coordinates employee information distribution.
10.2.15.3 Manages personnel files and records, as necessary.
10.2.15.4 Handles employee concerns and questions.
10.2.15.5 Coordinates benefit services.
10.2.15.6 Coordinates EAP.
10.2.16 Senior Specialist, Risk Management and Insurance
10.2.16.1 Provide insurance advice on pertinent insurance issues to Core Incident Reponses Team.
10.2.16.2 Assess insurance ramifications of the incident.
10.2.16.3 Determine whether notification to insurance carrier(s) is appropriate and then notifies appropriate insurance carrier(s) of incident.

10.3 On-Site Incident Management Team:

10.3.1 Are available 24 hours a day during incident to manage response.
10.3.2 Is responsible for securing the safety of personnel, the environment and company assets.
10.3.3 Follows Incident Management Plan and the direction of the Team Coordinator and On-Site Manager.
10.3.4 Interfaces with local media, regulatory agencies, emergency service providers, customer representatives and other interested relevant parties, only as directed by Incident Coordinator.
10.3.5 Each On-Site Incident Team Member will be responsible for maintaining and updating an Incident Log throughout the duration of the incident.
10.3.6 On-Site Manager (Construction Manager, Service Site Manager, Authorized Supervisor)
Alternate: Assistant Site Manager
10.3.6.1 Determines Incident Severity Ranking.
10.3.6.2 Is responsible for securing the safety of personnel, the environment and company assets.
10.3.6.3 Initial incident contact.
10.3.6.4 Confers initial assessment with Incident Team Coordinator.
10.3.6.5 On-Site incident manager.
10.3.6.6 Coordinates emergency personnel, law enforcement.
10.3.6.7 Coordinates security.
10.3.6.8 Updates Incident Coordinator.
10.3.6.9 Reviews and updates Incident Management Plan.

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10.3.6.10 In conjunction with the Legal Department, ensures completion and submittal of all reports or other communications required by applicable laws and regulations.

10.3.6.11 Communicates with customer.

10.3.6.12 Communicates with media, if necessary, as instructed by Communication, Brand and Public Affairs and/or Core Incident Response Team

10.3.7 Office/Inventory Coordinator or Equivalent

As directed by Local Incident Response Team:

10.3.7.1 Maintains list of team members including contact information

10.3.7.2 Maintains a log of all major developments, activities and decisions during the incident (Incident Log).

10.3.7.3 Conduct a post-incident/crisis review to identify lessons learned and opportunities for improvement.

11 Core Incident Response Team

11.1 Initial Actions

11.1.1 Respond to Incident Coordinator's action to initiate the Incident Management Plan.

11.1.2 Assemble in a conference room designated by the Incident Coordinator if physically present in Portland, OR.

11.1.3 Attend conference call if not physically present in Portland, OR.

11.1.4 Review developments of the incident as described by the Incident Coordinator.

11.1.5 Know who to contact in your area of discipline or expertise.

11.1.6 Assist and provide guidance to Incident Coordinator and Site Incident Response Team.

11.1.7 Be available for follow-up calls and/or meetings.

11.1.8 Update Incident Coordinator and other Incident Response Team members as the situation continues or changes.

11.2 For Site-Related Incidents:

11.2.1 Obtain as much information about the incident as outlined in Surveillance Center Questionnaire and Instruction (DMS 0053-6026).

11.2.2 Contact the Surveillance Center in Portland, OR (503-327-2040) and relay the information.

11.2.3 Record all pertinent information in Incident Log.

11.2.4 Assemble the On-Site Core Incident Response Team.

11.2.5 Be prepared to receive call or communication from Incident Coordinator.

11.2.6 Work with and coordinate response and recovery efforts with Incident Response Team as needed.

11.3 Initial Actions for Incident Coordinator:

11.3.1 Receive and acknowledge receipt of the initial briefing from the Surveillance Center

11.3.2 Contact the responsible party at the site that made the call into the Surveillance Center

11.3.3 If conditions warrant activating the Incident Management Plan contact the Core Incident Response Team members and applicable Support Members.

11.3.4 Meet with and chair meeting of the Incident Response Team.

11.3.5 Lead the Incident Response Team to:

11.3.5.1 Review verified information known at the moment.

11.3.5.2 Review rumors (if any) about the incident.

11.3.5.3 Determine the likely implications of the situation.

11.3.5.4 Agree on what initial actions should be taken, by whom, when and how, what internal and external resources are needed.

11.3.5.5 Decide and advise the Service or Construction Manager on either:

11.3.5.5.1 What action to take, or

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11.3.5.5.2 At what point should approval be obtained for any further actions(s).

11.3.6 Determine if incident needs on-site management from Incident Response Team.

11.3.7 Determine, if possible, who else knows about the incident (including the media).

11.3.8 Determine what communications, and to whom, should be undertaken, when and how.

11.3.9 Define how members of the Incident Response Team can be involved via telephone, e-mail or fax to be kept informed and for their input.

11.3.10 Set time and place of next briefing session.

11.4 Initial Actions for Communication, Brand and Public Affairs Department:

11.4.1 Contact Incident Response Team for initial briefing.

11.4.2 Contact Head of Communication, Brand and Public Affairs for initial briefing.

11.4.3 Handle initial media and public inquiries.

11.4.4 Communicate with Incident Response Team members and begin preparing a summary of events related to the incident.

11.4.5 Consult with public relations firm, if necessary, to develop strategy for preparation of information release and response.

11.4.6 Prepare drafts of (if not prepared prior to incident):

11.4.6.1 Position statement detailing the company response to the incident Q&A's

11.4.6.2 News Release, if appropriate.

11.4.7 Distribute the draft position statement, Q&A, and news release to:

11.4.7.1 Incident Response Team

11.4.7.2 On-Site Core Incident Response Team

11.4.8 Finalize company position statement, Q&A, and news release.

11.4.9 Finalize release strategy and issue documents to appropriate employees and media.

11.4.10 Prepare company spokesperson(s).

11.4.11 Develop strategy for liaison with local, state and federal governments (non-regulatory).

11.4.12 Prepare detailed information summaries for communication.

11.4.13 Report all media, government and public contacts to Incident Coordinator.

11.4.14 Support customer communications as required.

11.5 On-Site Service or Construction Manager

11.5.1 Secure safety of all employees.

11.5.1.1 In all cases, employee safety is the first priority.

11.5.1.2 Evacuate employees from affected area as necessary.

11.5.1.3 Call for appropriate incident support (fire, police, medical).

11.5.2 Coordinate on-site emergency operations.

11.5.3 Maintain regular communication with Incident Coordinator.

11.5.4 Develop strategy to respond to event and prevent further harm or deterioration.

11.5.5 Gain control of the situation.

11.5.5.1 Isolate hazard.

11.5.6 Care for the injured.

11.5.6.1 Administer first aid by certified personnel.

11.5.6.2 Do not move injured unless in imminent danger.

11.5.6.3 In the event of fatal injury, do not move body.

11.5.7 Communication

11.5.7.1 Notify immediate supervisor.

11.5.7.2 Do not discuss with outside sources.

11.5.8 Consult with VP, General Counsel and then conduct initial investigation.

11.5.8.1 Secure affected area.

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11.5.8.2 Photograph and document all information as soon as practical.

11.5.8.3 Identify and interview employees involved, with participation by VP, General Counsel.

11.5.9 Address employee morale.

11.5.9.1 Inform employees about incident .

11.5.9.2 Restore situation to normal before work is resumed.

12 Communications – General Stakeholders

12.1 All VAWT and VCWT Employees – Key Messages

A significant incident involving [insert specifics] occurred at [insert specifics] [Determine level of detail regarding incident that needs to be shared with employees and insert here]. We have activated our Incident Management Plan in response, and we are undertaking all of the necessary steps to determine the cause of this incident, working closely with our customers, appropriate regulatory agencies and [others if needed] on this matter. The following Vestas team members have been dispatched to the incident location: [insert specifics here]. We will provide regular updates regarding this matter as the situation warrants.

12.1.1 Communication Method: Email

12.1.2 Communication Owner: Communication, Brand and Public Affairs

12.2 Vestas Group – Sample Messaging

(To be used only if there is no other guidance provided by Group Communication, Brand and Public Affairs)

Vestas-American Wind Technologies/Vestas-Canadian Technologies experienced a significant incident involving [insert specifics] occurred at [insert specifics] [Determine level of detail regarding incident that needs to be shared with Group and insert here]. At the direction of the President, the Incident Management Plan has been activated. We are undertaking all of the necessary steps to determine the cause of the incident and to work closely with our customer, appropriate regulatory agencies and [others if needed] on this matter. The following Vestas team members have been dispatched to the incident location: [insert specifics here].

We will be in close contact with appropriate Group staff, including [list here] with regular updates regarding this situation. At this point, Group can help us with this situation by providing [list specifics here, if known].

- Communication Method: Serious Incident Report or email
- Communication Owner: VP or Director, QSE

12.3 Customer (Incident Site) – Key Messages

Vestas has activated its Incident Management Plan to respond quickly and appropriately regarding an incident at [insert specifics here]. We will have staff on the ground at the site [list expected time of arrival]. Our focus is on securing the safety of employees and equipment at the site. We are working closely with local first responders. Here is what we know so far [communicate details regarding injuries, equipment status, etc.].

Our Incident Response Team includes staff trained to work with the appropriate regulatory agencies and the media, should the need arise.

As soon as the incident team arrives and has the opportunity to further assess the situation, we would like to meet with appropriate members of your team to coordinate next steps regarding this incident.

- Communication Method: Phone call to key customer point of contact; email if not reached by phone.
- Communication Owner: VP, Construction for Project-related events; Regional Head of Service for Service-related events.

12.4 All Other Customers – Key Messages

Vestas has experienced an incident involving [insert specifics here] at [insert location here]. We have activated a response team to the site to determine the facts around the incident and to work with our customer there to take appropriate steps. If you have questions about this incident, please contact us.

- Communication Method: Phone call or e-mail, depending on the customer particulars

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- Communication Owner: Communication, Brand and Public Affairs will contact appropriate owners depending upon the situation OSHA / governmental / regulatory agencies – Key Messages

12.5 OSHA / Governmental / Regulatory Agencies – Key Messages

Vestas is notifying [insert agency here] of an incident involving [insert specifics], which occurred at [insert specifics] [Determine level of detail regarding incident that needs to be shared with regulatory agency and insert here]. At the direction of the President of Vestas-American Wind Technology, Inc. and Vestas-Canadian Wind Technology, Inc., we have activated our incident response plan. We are undertaking all of the necessary steps to determine the cause of the incident and to work closely with our customer, appropriate regulatory agencies and [others if needed] on this matter. A response team has been dispatched to the incident location and will arrive there [insert specifics here]. We will provide regular updates regarding this matter as the situation develops.

- Communication Method: Phone call and/or e-mail
- Communication Owner: Communication, Brand and Public Affairs and/or VP or Director, QSE depending upon the agency involved.

13 Incident Management Center

13.1 Physical Location

If a serious incident occurs during normal working hours (local time at headquarters) a conference room designated by the Incident Coordinator will be communicated via email/phone/text to On-Site Core Incident Response Team members.

- Live Meeting will be used to conference in On-Site Core Incident Response Team members not in Portland, with call-in information sent via email.

13.2 Virtual Location

As serious incidents occur at all times, it is highly likely that the Core Incident Response Team will be called to meet in a virtual setting outside of normal business hours.

- Live Meeting will be used to conference Core Incident Response Team members when incidents occur outside of normal business hours, with call-in information sent via email or text.

14 Business Recovery

Once the incident transitions from the Core Incident Response team (typically 48-72 hours) to the On-Site Core Incident Management team the process begins to focus on Business Recovery. The following is a guideline for the On-Site Core Incident Management team.

- Incident Manager is the Site Manager / Project Manager / Construction Manager (determined at the time of handover) and has overall Incident Management responsibility.
- Incident Manager will establish and run communication / execution meetings. Notes from meetings will be distributed to greater audience depending on the incident.
- Regional Heads of Service/ Construction Directors support the site and provide resources to the site.
- Operations Account Management is responsible for key messaging to the customer. As well, Account Management owns communication to the rest of the customer base whether platform, region or global specificity is required.
- TTS, QSE, etc., are support roles for the Incident Manager.
- TTS to provide specific incident information to Incident Response Team who then define who is to receive the information.

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15 Core Incident Team Members (and Alternates) and Emergency Phone Numbers

Name	Title	Mobile Phone	Office Phone	Home/ Alternate Phone	Email
Chris Brown	President	503-927-4486	503-327-2115		chbrw@vestas.com
Lars Villadsen	VP, NA Finance	503-367-5004	503-265-6865		lavil@vestas.com
David Panting	Director, QSE	503-953-3430	503-327-7615		dapan@vestas.com
Chris Nolan	Manager, QSE (IC alternate)	503-708-3155		262-939-3503	chnan@vestas.com
Peter Wells	VP of Service	541-531-5778	503-327-7914		ptwel@vestas.com
Matt Coleman	Sr. Director Service – Western Region	503-568-9153	503-327-7547		macom@vestas.com
Shaun Melander	Sr. Director Service – Eastern Region	503 830 4126	503-688-4374	647-302-9393	shmel@vestas.com
Joel LeBlanc	Director SVC	503-333-3058	503-327-7662		joleb@vestas.com
Jay Nusbaum	VP & General Counsel	503-367-3065	503-327-2355	503-230-8385	jonus@vestas.com
Jim Filiault	Sr., Specialist Legal (Legal Team alternate)	503-928-2069	503-327-2353	503-209-9638	jafil@vestas.com
Chante Condit-Pottol	Specialist, Communication	503-708-6668	503-265-6971		chcpo@vestas.com
Jon Chase	VP, Public Affairs Gov't Relations (Com alternate)	202-441-0995	202-955-0093	301-656-2625	joche@vestas.com
Helle Bay	Head of HR, North America	503-720-6184	503-327-2004		hebay@vestas.com

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16 North America QSE Contact Information

Group, Location	Name	Title	Mobile Phone	Office Phone	Email
Towers, Pueblo	Ryan Emond	HSE Manager	303-513-2143	303-655-5475	ryemo@vestas.com
Nacelles, Brighton	Ryan Emond	HSE Manager	303- 513-2143	303- 655-5475	ryemo@vestas.com
Blades, Brighton & Windsor	Ryan Emond	HSE Manager	303- 513-2143	303- 655-5475	ryemo@vestas.com
VAME, Portland	David Panting	Director, QSE	503-953-3430	503-327-7615	dapan@vestas.com
VAME, Portland	Chris Nolan	Manager, QSE	503- 708-3155		chnan@vestas.com
VAME Portland	Richard Regnier	Specialist, QSE	503-367-2261	503-327-7729	rireg@vestas.com
VAME, Portland	Jim Tyler	Specialist, QSE	360-632-7476	503-265-2209	jatyl@vestas.com

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17 Post Incident Activities

17.1 After the incident has concluded:

17.1.1 Ensure all follow-up investigations have occurred

17.1.2 Incident Response Team should convene to:

- Ensure root cause has been identified and corrective actions identified with owners assigned to drive corrective action closure.
- Assist in identifying/obtaining additional resources required to implement corrective actions.
- Update Incident Management and Business Recovery Plan to incorporate lesson's learned from the incident follow-up.

18 APPENDIX: version history

Version No.	Date	Description of Changes
00	2014.05.22	New Document
01	2015.04.24	Revised personnel and phone numbers
02	2015.05.06	Converted from T09 to T03, old document number 0009-0259. Version changed from 12 to 02 due to conversion from T09 to T03.
03	2015.07.14	Revised: Contact personnel, Phone numbers, references
04	2015.09.14	Revised: Contact personnel, Phone numbers, references
05	2015.09.14	DMS Approval issue
06	2015.09.14	Revised: Contact personnel, Phone numbers, Table of Contents
07	2016.02.16	Revised: Contact personnel, Phone numbers, Table of Contents

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VAWT First Aid/CPR/ Medical Emergencies Vestas System Instruction				Document ID: 0049-0605 INS SUS-COM-EXC (AME US) First Aid
Owner(s): MIGLO	Author(s): RIREG	Valid from: 2015.03.24		Version: 00

Version history

Version No.	Date	Description of Changes
00	2015.03.24	Converted T09 Document (0010-8007) to T03, Revised sections: 2, 3, 6, 7, 8. Changed VAME to VAWT

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1 Purpose

VAWT requires a First Aid procedure that is both site specific and non-site specific to address VAWT emergency response procedures. It is imperative that technicians and subcontractors are trained in First Aid, CPR and exposure to Bloodborne Pathogens to protect others as well as themselves should an incident occur requiring medical attention.

2 Responsibility

2.1 Manager

2.1.1 Develop an Emergency Response Plan

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2.1.2 Ensure all site personnel and contractors are trained in First Aid/CPR and Bloodborne Pathogens and certifications are current.

2.1.3 Provide necessary first aid equipment and supplies.

2.1.4 Provide transportation to medical facilities.

2.1.5 Ensure an injured worker transportation plan is completed and reviewed with all affected workers and is posted on the Safety Board.

2.1.6 For remote locations: ensure prior arrangements have been made with the providers of air evacuation services (helicopter or fixed wing), and

2.1.7 Air evacuation providers are aware of the specific work locations or designated transfer points.

2.1.8 Implement the Return to Work Plan (0049-2051) should an employee require attention at a medical facility.

2.1.9 Ensure a current Hepatitis B Form is on file for each site employee.

2.2 Employees

2.2.1 Administer First Aid/CPR to any site personnel, contractors or visitors should the need arise.

2.2.2 Inspect and replenish the first aid kits as needed.

2.2.3 Report all incidents requiring first aid or medical attention to the Site/Construction Manager/Authorized Supervisor immediately.

2.2.4 Sign a Hepatitis B Declination/Consent Form indicating their choice to be vaccinated or not.

2.3 Subcontractors: US

2.3.1 The Subcontractor will designate in writing the name of at least one employee (for every ten employees currently trained and certified in CPR/First Aid, through an approved program.

2.3.2 Training will be conducted and certified through, American Red Cross, or other recognized programs.

2.3.3 Proof of current training will be provided to Vestas American Wind Technology, Inc., (VAWT) upon request.

2.3.4 For each additional ten employees, another employee will be designated in writing.

2.3.5 Refer to VAWT Subcontractor Safety Plan requirements (DMS 0049-0608).

2.4 Traveling Companion

2.4.1 If another employee is required to assist the injured employee to help them seek outside medical help, they will act in good faith and attend to the needs of the injured employee.

2.4.2 The travelling companion will follow this procedure as indicated in the section covering Transportation of Injured Worker.

3 References

Document No.	Title
OSHA 1910.151	Medical Services and First Aid
OSHA 1910.269	Electric Power Generation and Distribution
OSHA 1910.146	Permit Required Confined Space
OSHA 1910.1030	Bloodborne Pathogens
0042-3182	Incident Management Procedure
0049-2057	Site Emergency Response Plan
0049-2051	Return to Work Plan

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4 Scope

VAWT – All locations

5 Terms and Abbreviations

Term or abbreviation	Definition
AED	Automatic External Defibrillator
Airborne Pathogens	Infection causing micro-organisms spread by droplets expelled into the air by coughing or sneezing. These pathogens include but are not limited to Tuberculosis (TB), German Measles (Rubella) and Influenza.
Blood	Blood means human blood, human blood components, and products made from human blood.
Bloodborne Pathogens	Pathogenic microorganisms that present in human blood and can cause disease in humans. Pathogens include: but are not limited to, Hepatitis B Virus (HBV), Hepatitis C (HBC) and Human Immunodeficiency Virus (HIV).
CM	Case Manager
Contaminated	The presence of, or, the reasonably anticipated presence of, blood or other potentially infectious materials on an item or surface.
CPR	Cardiopulmonary Resuscitation
Decontamination	Use of physical or chemical means to remove or destroy bloodborne pathogens on a surface or item to a point where they are no longer capable of transmitting infectious particles. The surface or item is rendered safe for handling, use or disposal.
QSE	Quality, Safety and Environmental
Universal Precautions	Practice of specific of hygiene and control methods (such as use of gloves, masks and other devices) to prevent unintentional contact with blood or bodily fluids of another person.

6 Forms

Document No.	Title
0049-0607	Hepatitis B Declination/Consent Form
0049-2057	Site Emergency Response Template

7 General Requirements

7.1 Localization

7.1.1 In some cases, VAWT has implemented a requirement that may exceed a state or provincial requirement. The more stringent requirement in the Safety Manual will prevail.

7.1.2 In the event that a state or provincial requirement exceeds a Safety Manual procedure, the more stringent requirement will prevail.

7.2 Emergency Response

7.2.1 VAWT worksites shall implement the Site Emergency Response Plan (DMS# 0049-2057) that is both specific to the site and includes general Vestas emergency response procedures. It describes the major categories of an emergency, which are:

7.2.1.1 Accidents, including automobile accidents that result in or could result in a serious injury or loss of life

7.2.1.2 Major fire, or incidents where damage has occurred or threatens Company and / or public property

7.2.1.3 Spill of chemicals

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7.2.2 The Site Emergency Response Plan contains telephone numbers of appropriate state or provincial regulatory agencies for VAWT personnel to contact in times of emergency.

7.2.3 This Safety Manual contains some general rules when dealing with emergencies; however, no list of rules can possibly cover every contingency. Use your training and refer to the Vestas Emergency Preparedness Plan when dealing with any emergency for further assistance and direction.

7.2.4 Do not risk your safety or the safety of others at any time.

7.3 First Aid Kits and Supplies

7.3.1 Vestas shall provide first aid supplies and facilities as required under the various state Workers' Compensation Acts and regulations.

7.3.2 The first aid kit requirements vary depending on the size and type of job and the number of workers.

7.3.3 Detailed requirements, including the contents of kits, may be available in the various states and local legislation.

7.3.4 A copy of this procedure/exposure plan will be available in each truck and at the field office for immediate and unrestricted access by workers.

7.3.5 First aid kits will be available at all work locations. For remote locations, additional kits may be stored in operators' vehicles. First aid kits in remote locations will be upgraded to recognize the severity of potential injuries on the worksite and the possibility of delay in arrival of medical assistance or transport.

7.3.6 First Aid kits should not contain any prescription or non-prescription drugs. The inclusion of symptom-relief medication(s) is beyond the scope of the state legislation. The routine inclusion of over-the-counter medication(s) in first aid kits is not recommended as there is no established benefit and there is a potential for adverse reactions if used without proper direction (i.e. anaphylactic shock for persons allergic to Aspirin). If an employer determines that it is necessary to provide over-the-counter medication(s) in a first aid kit, a physician should be asked to prepare a policy and procedure to cover their use.

7.3.7 Eyewash stations shall be available at all locations where corrosive chemicals and other controlled products are handled, stored, or transported. They will be checked at least monthly and their condition documented. If necessary, portable eyewash stations may be transported in workers' trucks to remote locations.

7.3.8 Bloodborne Pathogen kits shall be available at all First Aid stations and contain hand washing and decontamination materials such as antiseptic solutions/towelettes.

7.4 First Aid and CPR Training Requirements

7.4.1 All VAWT field personnel are to maintain current certification in Standard First Aid and basic CPR. This will provide sufficient understanding to treat most minor injuries.

7.4.2 Contractors working for VAWT should have a significant percentage of their personnel trained in Standard First Aid and CPR. The required number of trained first aid responders and related equipment on a project site is determined prior to job commencement.

7.5 Bloodborne/Airborne Pathogens Exposure

7.5.1 This exposure plan is established to protect occupationally exposed employees from hazards of bloodborne/airborne pathogens, in particular Hepatitis B, Hepatitis C Virus, HIV, and TB.

7.5.2 VAWT QSE shall be responsible for the establishment, implementation, and maintenance of all aspects of this procedure. These procedures will be reviewed and updated at least annually and whenever necessary to reflect new or modified tasks and procedures which affect occupational exposure and to reflect new or revised employee positions with occupational exposure.

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7.5.3 Due to the potential exposure to bloodborne pathogens while performing daily maintenance tasks VAWT field personnel are provided with training in Universal Protections and Bloodborne Pathogens. This training may be included in the First Aid and CPR training or it may be completed as a separate topic.

7.5.4 All VAWT field personnel must complete VAWT Hepatitis B Vaccine Declination/Consent Form DMS 0049-0607, this form will be maintained in the employees records

7.5.5 Any employee who is exposed to the blood of an injured worker will:

7.5.5.1 Wear proper PPE in the execution of emergency procedures;

7.5.5.2 Immediately notify their supervisor of the exposure;

7.5.5.3 Thoroughly wash and decontaminate affected surfaces and equipment that may have come in contact with blood or other infectious materials utilizing antiseptic solutions/towelettes provided in the Bloodborne Pathogen kit; and

7.5.5.4 Request a Hepatitis shot from a local medical provider. An employee is not required (may refuse) to receive the Hepatitis shot. If the shot is provided, the cost is covered by VAWT

7.5.6 The exposure will be noted on the Incident Report Form and submit to the Safety Department (per the Incident Management Procedure).

7.5.7 All medical exposure records shall be maintained for the length of the employee's employment plus 30 years.

8 Instructions

8.1 Aiding an injured worker

8.1.1 Immediately activate the Emergency Response Plan.

8.1.2 Your job is to administer first aid and keep your patient as comfortable as possible while waiting further help and transportation to a medical treatment facility.

8.1.3 If the patient is bleeding protect yourself and don proper PPE prior to administering first aid.

8.1.4 If the patient is able to safely move with your assistance (without causing themselves additional injury) to a location where they can be attended by medical personnel, use your best judgement in doing so.

8.1.5 If this is not possible, have the patient stay where they are. Provide comfort and first aid until additional help arrives.

8.1.6 Unconscious patients: unless the patient is in danger of sustaining additional injury, do not move them. Assess their condition and provide first aid and/or CPR as needed based on whether or not they are breathing.

8.1.7 If you discover an injured person who will likely die without your assistance, you are duty bound to assist to the best of your ability.

8.2 Contacting Assistance

8.2.1 When contacting 911, Axiom, a hospital, or other medical provider from the site Emergency Response Plan, they will want the following information. The order in which you provide the information is important. By providing your name and contact number first, they can get back to you if contact is lost, or additional information is required:

8.2.1.1 Contact name;

8.2.1.2 Contact number, alternate number and/or radio frequency;

8.2.1.3 Location, physical description, longitude/latitude, directions to location;

8.2.1.4 Number of patients requiring transport;

8.2.1.5 Age of patient(s);

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8.2.1.6 Condition and types of injury;

8.2.1.7 Treatment already provided;

8.2.1.8 Type of first aid/medical aid available on site;

8.2.1.9 Type of transport requested; and

8.2.1.10 Location of transfer point.

8.3 Emergency Situation

8.3.1 Call 911

8.3.2 Follow the Transport of an Injured Worker section of this procedure for transporting an injured worker.

8.3.3 Call the Axiom Call Center (877) 502-9466

8.3.4 Basic information gathered and case is assigned to a CM (Case Manager),

8.3.5 CM speaks with medical facility (while employee is in route to the medical facility) and provides initial medical information on case to health care provider,

8.3.6 CM provides the “normal job duties” of the employee to the health care provider so that light duty (if available) can be considered rather than prescribing days away from work,

8.4 Non-Emergency Situation

8.4.1 If the injury is not an emergency, contact Axiom before transporting the employee to a medical facility,

8.4.2 Call the Axiom Call Center (877) 502-9466

8.4.3 Basic information gathered and case is assigned to a CM (Case Manager),

8.4.4 CM calls injured employee within 5-10 minutes,

8.4.5 CM discusses incident and injury with the employee,

8.4.6 CM (in consultation with employee) determines if employee requires evaluation at a medical facility,

8.5 If a visit to a medical facility is indicated:

8.5.1 CM directs employee to appropriate medical facility,

8.5.2 CM will speak with medical facility (while employee is in route to the medical facility) and provides initial medical information on case to health care provider,

8.5.3 CM provides the “normal job duties” of the employee to the health care provider so that light duty (if available) can be considered rather than prescribing days away from work,

8.5.4 CM provides a direct number to employee and supervisor to call with any questions, problems or changes,

8.5.5 The employee must return all documentation indicating duty status, or a complete medical release to return to regular duty form per the Vestas Return to Work Procedure (0049-2051)

8.5.6 If a medical facility visit is not indicated,

8.5.7 CM will provide First Aid recommendations and monitor employee’s condition,

8.5.8 Employee and person calling in case (i.e., supervisor) must be in agreement with the CM’s First Aid recommendations,

8.5.9 If not, employee will be sent to medical facility for evaluation,

8.6 Automatic External Defibrillators (AED) Procedures,

8.6.1 When cardiac arrest is suspected:

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8.6.1.1 Call 911

8.6.1.2 Administer AED

8.6.1.3 Transport individual as soon as possible.

8.7 Transportation of an injured worker

8.7.1 A Vestas supervisor has the authority to make any arrangements necessary regarding treatment and transportation to sustain life in extenuating circumstances.

8.7.2 Unless the injury is very minor, it is recommended that injured employee be transported by medical transport.

8.7.3 In no case should employees drive themselves to a medical facility – they must be accompanied (driven) by a traveling companion.

8.7.4 Leave the decision as to when and how to transport in the hands of the first aid attendant who administers treatment. The attendant or more senior medical practitioners, decision to transport takes precedence over any decision to the contrary by non-medical personnel.

8.7.5 The mode of transportation will be by ambulance in most emergency situations. However, in some circumstances, it may be necessary to transport the victim to the nearest medical aid facility by air.

8.7.6 In either event, call the nearest medical aid station and provide all of the necessary details. If the medical aid facility has access to the air ambulance services for both fixed wing and rotary aircraft, advise them according to your needs.

8.8 After the injured worker has been transported

8.8.1 For all work related incidents complete the Incident Report Form (Credit 360) and submit to the QSE Department (per the Incident Management Procedure).

8.8.2 Notify all contacts on the on the Emergency Response Plan, based on the nature of the incident.

9 APPENDIX: version history

Version No.	Date	Description of Changes
00	2010.05.14	New Document
01	2011.07.27	Updated Links to Preliminary Incident report, Incident Management Procedure, removed Appendix A form, referenced Appendix B form
02	2011.08.15	Added Axiom notification, updated References, Bloodborne Pathogen section and added the Emergency First Aid Log & Hep B shot form
03	2013.12.17	Added requirement for this procedure to be in each truck., removed Subcontractor Canada section, Section: 7 Modified Sections: 3.4, 7.3, 7.5, 8.7, 8.8 HDR & Footer
04	2014.08.0	Updated rev. and template, Modified Sections 3.4, 7.3, 7.5, 8.7, 8.8, 9

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FIRST AID STATION: _____

In Case of Accident, Injury, or Illness

NOTIFY YOUR SUPERVISOR IMMEDIATELY and PERFORM THE FOLLOWING:

1. Determine the severity of injury or illness and the appropriate response.

   Major medical issues (such as altered level of consciousness, severe bleeding, chest pains, seizures, and loss of breathing) require immediate medical intervention:

   - Calling 911 for paramedics and ambulance.
   - Stabilize the individual and contact Axiom (877) 502-9466.

   Minor medical issues (such as sprains, strains, and minor cuts with controllable bleeding) require timely attention and treatment:

   - Contact Axiom (877) 502-9466; follow their directions for treatment.
   - Arrange for non-ambulance transport to treatment facility if required.

   First Aid issues (such as cuts, splinters, and minor burns) The First Aid Provider shall treat the injury and complete First Aid Log below.

2. Supervisor investigates and completes Preliminary Incident Report

Monday – Friday. 7:00 am to 7:00 pm (Occupational Clinic) Address & phone No.	**All Other Times** (Emergency Room) Address & Phone

Emergency First Aid Providers

Responder	Location/Shift	Direct Dial	Cell

First Aid Treatment Log

Name of Injured	Date	Type of Injury	1st Aid Provider	Supplies Used

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HEPATITIS B VACCINE Declination/Consent Form				Document ID: 0049-0607 INS SUS-COM-EXC (AME US/CAN) Hepatitis B Form
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.03.24		Version: 00

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring Hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with Hepatitis B vaccine, at no charge to myself.

☐ However, I have declined the Hepatitis B vaccination at this time.

- I understand that by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease.
- If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccination series at no charge to me.

☐ Yes, I wish to be vaccinated against Hepatitis B.

- I have been informed regarding Hepatitis B and the Hepatitis B vaccine.
- I have been notified of my susceptibility to Hepatitis B and have been made aware of the consequences to myself, other co-workers, and family, as well as of the fact that my employer strongly urges me to obtain a Hepatitis B vaccination.
- I have had a chance to ask questions which were answered to my satisfaction.

☐ I have already received the Hepatitis B vaccine. Please review my status.

Check the applicable box above, complete the information below and return the completed form to your manager for his signature.

Name: _____

Last 4 digits of Social Security # _____

Site/Department: _____

Employee Signature: _____

Date (*mm/dd/yyyy*): _____

Manager Signature: _____

Date of First Dose: _____

Date of Second Dose: _____

Date of Third Dose: _____

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Owner: BPO.DEL.SUS
Valid from: 2015.05.21
Version:01

Witness Statement

Document ID: 0049-0550
INS SUS-SAF-OPC (AME US/CAN)
Witness Statement

I. Witness Information

Name and Address		Employer:	
		Employee ID:	Hire Date:
		Immediate Supervisor:	
		Job Title:	
Home Contact Phone:		Work Contact Phone:	

II. Incident Information

Date	Time	AM / PM	Worksite

Describe what you were doing at the time the incident occurred:

Describe what attracted your attention to the incident:

Describe what you saw and heard in chronological order:

Events Before

Incident Event

Events After

I certify that this statement is true and accurate to the best of my recollection.

Employee Signature _____ Date _____

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Rev. No.	Date
0	2010.03.01
1	2010.03.01
2	2013.08.19
0	2015.03.06
1	2015.05.21

T03 0052-0520 Ver 01 - Approved - Exported from DMS: 2016-06-03 by RIREG

Return to Work Plan				Document ID: 0049-2051 INS SUS-SAF-IEM-IMA (AME US) Return To Work
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.01.28		Version: 00

Version history

Version No.	Date	Description of Changes
00	2015.01.28	Converted T09 (0025-8101) to T03 document Change all DMS #s for references

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1 Purpose

The purpose of this procedure is to ensure that Vestas is committed to providing a healthy and safe work environment by implementing a Return to Work ("RTW") program for employees who have sustained a workplace injury or illness.

2 Responsibility

2.1 Senior Management

2.1.1 Allocating resources to implement an effective RTW program;

2.1.2 Provide guidance to Site/Construction Managers concerning an employee's return to work.

2.2 Site/Construction Manager

2.2.1 Identify light duty tasks that can be performed on a daily basis.

2.2.2 Completed a Physical Demand Summary and ensure the attending physician receives it prior to examination.

2.2.3 Provide temporary placement for employees with work restrictions.

2.2.4 Ensure that the injured employee maintains frequent contact with their Physician or Case Manager (CM) that has been assigned to them by Axiom;

2.2.5 Ensure that the work performed does not exceed the employee's restrictions and that no difficulties are encountered.

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2.3 Employees

2.3.1 Remain in the RTW Policy until released to full duty work by a Physician.

2.3.2 Participate in the modified duty program as indicated by their Physician or CM;

2.3.3 Shall maintain regular contact with their Physician or CM and have his/her condition re-evaluated at least every thirty days with an updated Physical Demand Summary (DMS 0049-2064) following every appointment.

2.3.4 Shall provide his supervisor with an updated restricted duty status or a complete medical release to return to regular duty

2.4 QSE Representatives(s)

2.4.1 Work in conjunction with the Site Manager to ensure tasks assigned to the employee do not exasperate the injury.

2.5 Health Care Professionals

2.5.1 Provide health, medical and functional abilities information as required;

2.5.2 Complete the forms as requested;

2.5.3 Act as a resource.

2.6 Axiom Case Managers

2.6.1 Process claims on a timely basis;

2.6.2 Maintain frequent contact with the injured employee;

2.6.3 Act as a resource.

3 References

Document No.	Title
SUS-IEM-IMA	Incident Management
0049-0605	First Aid Procedure
0049-2064	Physical Demand Summary
0049-2052	Light Duty Activities

4 Scope

This policy applies to all domestic locations or subsidiaries of VAME.

5 Terms and Abbreviations

Term or Abbreviation	Definition
CM	Case Manager (Axiom)
Modified Duties	Modified duties are the modification of an employee's position to allow for the employee to carry out the work assigned within their capabilities. Vestas recognizes that the temporarily disabled employee can and should be performing meaningful and productive employment.
RTW	Return To Work Policy

6 Process

6.1 Physical Demand Summary

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6.1.1 When an employee is injured a Physical Demand Summary (DMS 0049-2064) shall be completed and given to the attending physician upon examination.

6.1.2 If the employee is unable to perform his/her regular job functions he/she will be placed on "light duty". Their temporary light duty job functions will fill a distinct need. Light Duty restrictions shall be documented on a Light Duty Activities Form (DMS 0049-2052) and meet the following criteria:

6.1.2.1 Employee will conduct a meaningful (needed) work task.

6.1.2.2 The restricted light duty assignment will comply exactly with the physician's instructions and the employee is prohibited from exceeding those instructions.

6.1.2.3 If possible, employees on light duty will be encouraged to return to their assigned work location but perform less strenuous tasks that are clearly within the scope of the medical restrictions.

6.1.3 The employee's first line supervisor will be the coordinator for all injuries that do not require significant modification of the work place in order for the employee to return to work.

6.1.4 For all injuries in which it is impossible for the employee to return to their original duty location or where significant modifications need to be accomplished in order for the employee to return to work; the Site/Construction Manager/Authorized Supervisor in conjunction with the QSE Regional Specialist shall determine the employee's work activities.

6.1.5 If work tasks are questionable, respective to meeting the physician's instructions, the Site/Construction Manager shall error on the side of conservatism. The employees' full recovery shall not be compromised.

6.1.6 Employees that are working in a "light duty" status will be counseled weekly. Counseling will ensure that their injuries are not aggravated by the light duty and the guidelines put forth by the doctor are met.

6.1.7 The employee shall remain in the RTW until released for unrestricted work by his Physician. The employee's condition will be re-evaluated by their Physician at least every thirty days. The employee shall provide his supervisor with an updated Physical Demand Summary (DMS 0049-2064) and a completed Light Duty Activities (DMS 0049-2052), if applicable.

6.1.8 This RTW is set up for temporary placement only. This policy will not be used for placement of permanently disabled employees.

6.2 Release to Full Duty

6.2.1 The employee must receive a medical release to return to full duty from a physician prior to regular duties.

7 APPENDIX: version history

Version No.	Date	Description of Changes
00	2011.06.09	New document
01	2012.08.10	Removed Appendix A and B, minor grammatical changes, embedded applicable DMS numbers in document.

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T03 0049-2064 Ver 00 - Approved - Exported from DMS: 2016-06-03 by RIREG

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Release to Return to Work

Document ID: 0049-0552
INS SUS-IEM-IMA (AME US)
Release to Return to work

Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.01.28		Version: 00

Return form to:	Date
Name of worker:	Claim number:

Please complete the following information and return to us at the address indicated above.

1. Is the worker medically stationary? ☐ Yes ☐ No Next scheduled appointment date _____

2. Worker is released to:
   - ☐ full duty without limitations Date _____ (Do not complete lines 3 through 11. Sign below.)
   - ☐ modified duty from (date) _____ through (date) _____ (Specify limitations below.)
   - ☐ modified hours — specify _____ from (date) _____ through (date) _____

	Hours: No limitations	1	2	3	4	5	6	7	8
3. In an eight-hour workday, worker can stand/walk a total of	☐	☐	☐	☐	☐	☐	☐	☐	☐
4. At one time, worker can stand/walk	☐	☐	☐	☐	☐	☐	☐	☐	☐
5. In an eight-hour workday, worker can sit a total of	☐	☐	☐	☐	☐	☐	☐	☐	☐
6. At one time, worker can sit	☐	☐	☐	☐	☐	☐	☐	☐	☐

7. The worker is released to return to work in the following range for lifting, carrying, pushing/pulling:

Pounds	**<10**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**	**>100**
Occasionally	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Frequently	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

8. Worker can use hands for repetitive:

	Right	**Left**	
a. Fine manipulation	☐ Yes ☐ No	☐ Yes ☐ No	Dominant hand
b. Pushing and pulling	☐ Yes ☐ No	☐ Yes ☐ No	☐ Right ☐ Left
c. Simple grasping	☐ Yes ☐ No	☐ Yes ☐ No	
d. Keyboarding	☐ Yes ☐ No	☐ Yes ☐ No	

9. Worker can use feet for repetitive raising and pushing (as in operating foot controls): ☐ Yes ☐ No

10. Worker is able to:

	Continuous 67-100% of the day	**Frequently 34-66% of the day**	**Occasionally 6-33% of the day**	**Intermittently 1-5% of the day**	**Not at all**
a. Stoop/bend	☐	☐	☐	☐	☐
b. Crouch	☐	☐	☐	☐	☐
c. Crawl	☐	☐	☐	☐	☐
d. Kneel	☐	☐	☐	☐	☐
e. Twist	☐	☐	☐	☐	☐
f. Climb	☐	☐	☐	☐	☐
g. Balance	☐	☐	☐	☐	☐
h. Reach	☐	☐	☐	☐	☐
i. Push/pull	☐	☐	☐	☐	☐

11. Other functional limitations or modifications necessary in worker's employment:

Additional comments may be written on back of form.

Signature of physician	Physician's typed name	Date

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Physical Demand Summary

Document ID: 0049-2064
INS SUS-IEM-IMA (AME US & CAN)
Physical Demand

Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.05.21		Version: 01

Employee Name				
Position Title			Today's Date	
Duration of Restrictions	Start Date:		Stop Date	
(Anticipated) Return to Full Duty Date				

Activities	Never	Occasional	Frequently	Constant
Lift/Carry				
10lbs or less				
11-20lbs				
21-50lbs				
Push/Pull:				
12lbs or less				
13-25lbs				
26-50lbs				
Physical Exertion:				
Bend				
Squat/Kneel				
Twist/Turn				
Climb Ladder				
Climb Tower				
Crawl				
Overhead Work				
Reach Outward				
Handling/Hand Manipulation				
Stand/Walk/Sit				
Driving Vehicle:				
Automatic				
Stick				
Sedentary Work:				
Type/Keyboard				
Deskwork/Paperwork				

Key: **N** = Never; 0% of time, **O** = Occasional; 1-33% of time, **F** = Frequently; 34-66% of time, **C** = Constant; 67-100% of time

Physician Signature: _____ Date: _____

Phone Number: _____

Physician's Notes:_____

_____

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Light Duty Activities				Document ID: 0049-2052 INS SUS-IEM-IMA (AME US & CAN) Light Duty Activities
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.05.21		Version: 02

Attending Physician,

Vestas can, and will, provide temporary placement for employees with work restrictions through our Return to Work Policy (RTW). This policy allows an employee to be as productive as possible when temporarily placed on work restrictions from an injury or illness.

Please highlight any and all activities the following employee is allowed given his restrictions.

Employee Name:		Date:	
Department:		Position:	
Supervisor:		Vestas Site:	

Activities within Pushing/Pulling Restrictions		
12 lbs. or Less	**13-25 lbs.**	**26-50 lbs.**
Sweeping/Mopping	Shop Work	Cleaning up Pallets
General shop/Warehouse cleaning	Inventory Counts	Packing inventory for shipping
Chemical Inventory Updates (MSDS)	Packing Service Kits	Organization of shop items
Site Inspections	Inventory Replenishment	Calibration of torque wrenches
Cleaning Service Trucks	Maintain tagline during lift	
General paperwork/filing	Cabinet work at base of tower	
Running parts to turbine	Switch gear operation	
Down tower software uploads		

Activities within Lifting/Carrying Restrictions		
10 lbs. or less	**11-20 lbs.**	**21-50 lbs.**
Monthly inspections (no climbing)	Pick trash up around perimeter	Unload items from incoming trucks
Sweeping warehouse/office areas	Empty garbage cans/recycling	Organizing components
Wiping down oil containment areas	Running cardboard daily	Building service kits
Cleaning/Washing service trucks	Assist crews getting gear to truck	Ground support during major component change-outs
Clean/wash parts to be reused	Warehouse inventory	
Housekeeping/Dusting	Running parts to turbines	Running forklift to unload freight
Fill paper in copier/fax machine	Secondary container labeling	
Ground support for crane work	Other:	

Sedentary/Desk Work Activities		
Input contractor time	Label/Organize files	Turbine filing & E-filing
Schedule updates	Scan/file records	Webinar/Online training
Qualification book changes	Generate monthly reports	SAP Data Entry
Copying	Log oil sample analysis	Various administrative duties
Driving	Air Travel	Maximum Duration /Hrs.

Please explain any travel restrictions using the back of this form.

Physician's:_____/_____
Signature Print

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VAWT Personal Protective Equipment Plan Vestas System Instruction				Document ID: 0049-2070 INS SUS-SAF-OPC (AME US) Personal Protective Equipment
Owner(s): BPO Del. SUS	Author(s): RIREG	Valid from: 2016.05.17		Version: 02

Version history

Version No.	Date	Description of Changes
02	2016.05.17	Revised Sections: 3.0, 7.1, 9.2, Changes highlighted in grey

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1 Purpose

Personal protective equipment (PPE) is required to reduce personnel exposure to hazards when engineering and administrative controls are not feasible or effective in reducing exposure to acceptable levels.

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2 Responsibilities

2.1 Senior Management

2.1.1 Ensure effective program development and implementation;

2.1.2 Provide Site/Construction Management with adequate resources and support to carry out program responsibilities and obligations;

2.1.3 Require adherence to all policies, procedures, practices and rules related to the use and care of PPE; and

2.1.4 Oversee and evaluate site supervisor performance.

2.1.5 Recognize Site/Construction Management and Personnel for performance improvement.

2.2 Site/Construction Management

2.2.1 Ensure all personnel under Vestas supervision adhere to all policies, procedures and rules related to the use, care and storage of PPE;

2.2.2 Assess the site hazards and provide required signage and PPE for all Vestas personnel and visitors at no cost;

2.2.3 Ensure contractors supply required, approved PPE for their personnel as required by the site hazard assessment;

2.2.4 Ensure all personnel under Vestas supervision have received training from a competent person and have adequate knowledge and skills to perform their duties using required PPE;

2.2.5 Reporting defective PPE or PPE related concerns to QSE Department;

2.2.6 Conduct scheduled and random inspections of PPE to make sure all PPE is in good condition using the PPE Inspection Record (DMS# 0049-0693);

2.2.7 Take immediate action to repair and/or replace PPE or defective storage containers;

2.2.8 Verify that PPE (Vestas or personal) is approved for the hazards presented and fully protects the user; and

2.2.9 Make sure the use of PPE does not itself endanger the user.

2.3 QSE Department

2.3.1 Develop and monitor implementation of the PPE Program;

2.3.2 Select and assist in procuring appropriate PPE;

2.3.3 Ensure efficient and effective PPE instruction and training are conducted;

2.3.4 Conduct workplace inspections and audits;

2.3.5 Conduct a program review annually; and

2.3.6 Propose and implement improvements to the PPE Program.

2.4 Personnel

2.4.1 Must observe posted signage and wear PPE that meets or exceeds protection required for the hazard exposed too;

2.4.2 Properly use and maintain PPE in accordance with the manufacturer’s instruction and training received;

2.4.3 Inspect PPE for defects before and after each use;

2.4.4 Complete annual PPE Inspection Record (DMS# 0049-0693);

2.4.5 Report any defects or other conditions that might render PPE or storage containers ineffective via an Equipment Defect Record (DMS# 0049-0694);

2.4.6 Provide feedback in a timely manner to Site/Construction Management about the effectiveness of PPE;

2.4.7 Replace PPE that is unable to perform the function for which it is designed;

2.4.8 Properly clean and store PPE;

2.4.9 When acting as an escort ensure visitor has required PPE for the hazards exposed too;

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2.4.10 Remind coworkers to properly use and wear PPE;

2.4.11 Report: incidents of misuse, symptoms of overexposure, injury or illness while working with PPE; and

2.4.12 Refuse to perform tasks if approved PPE is not provided.

3 References

Document No.	Title
29CFR1910.132	Personal Protective Equipment (General Requirements)
OSHA 1910 Subpart I	Personal Protective Equipment
0049-0678	VAWT Electrical Safety Program
0049-0695	VAWT Hearing Conservation Plan
0049-0696	VAWT Respiratory Protection Program
0049-0691	PPE Matrix
0049-0571	VAWT Fall Protection Plan
ANSI Z41	Standard for Foot Protection
ASNI Z87	Standard for Eye Protection
ANSI Z89	Standard for Head Protection
0001-0410	PPE Info Sheets

4 Scope

This plan applies to all VAWT personnel, subcontractors, visitors and others who use and/or supervise the use of company and employee-owned PPE while performing work procedures.

5 Terms and Abbreviations

Term or Abbreviation	Definition
ANSI	American National Standards Institute
Competent person	A person who is capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as in their application and use with related equipment.
NFPA	National Fire Protection Association
PFAS	Personal Fall Arrest System
PPE	Personal Protective Equipment
QSE	Quality, Safety and Environmental
Qualified Person	One who has received training in and has demonstrated skills and knowledge in the construction and operation of fall protection equipment and installations and the hazards involved
TTC	Technical Training Center
USD	U.S. Dollar

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6 Forms

Document No.	Title
0049-0694	Equipment Defect Record
0049-0693	PPE Inspection Record
0049-0572	Fall Arrest System Inspection Record
0049-0559	Descent Device Inspection
0049-0692	PPE Hazard Assessment Certification Form

7 Worksite Hazard Assessment

7.1 Hazard Assessments

7.1.1 A PPE hazard assessment has been completed to determine hazards present, or are likely to be present at site and in the turbine which necessitate the use of personal protective equipment. This assessment is documented in the PPE Matrix (DMS# 0049-0691) and PPE Info Sheets (DMS 0001-0410).

7.1.2 Site/Construction Manager Shall complete a PPE Hazard Assessment Certification Form (DMS# 0049-0692) for any new hazards introduced to site and is responsible for updating the PPE Matrix and certifying the appropriate PPE is issued for the tasks.

7.1.3 All personnel are required to evaluate the hazards to which they are exposed.

7.1.4 Personnel shall eliminate the hazard whenever possible.

7.1.5 When hazards cannot be engineered or administratively eliminated personnel shall wear appropriate PPE for exposure to the potential hazard.

8 Procurement

8.1 Selection & Purchase

8.1.1 The QSE Department has:

8.1.1.1 Evaluated and selected PPE that is compliant with applicable national standards and conforms to consensus standards.

8.1.1.2 An update list of approved safety supplies is maintained on the QSE Hub page.

8.1.2 Personnel authorized to order PPE shall:

8.1.2.1 Complete the on-line Grainger PPE Order Form and complete the transaction using a Vestas P-card for payment.

8.1.2.2 Notify the QSE Department if substitutes or other items not on the List of Approved Safety Supplies are needed.

8.2 Non-Standard PPE Reimbursement Policy

8.2.1 Safety footwear:

8.2.1.1 Safety footwear must comply with the requirements below.

8.2.1.2 Personnel shall be reimbursed for safety footwear when approved by the Site/Construction/ Authorized Supervisor.

8.2.2 Prescription Safety Glasses:

8.2.2.1 Must comply with safety glasses requirements below; and

8.2.2.2 Personnel shall be reimbursed biennium, or whenever prescriptions change, for safety eyewear used at work.

9 Issuing PPE

9.1 Initial Issue

9.1.1 Each new employee will be issued a gear bag containing a standard set of PPE items prior to the start of work at no cost to the employee. All PPE equipment requiring inspection shall be documented on the appropriate form.

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9.2 Required Equipment

9.2.1 Safety Helmets:

9.2.1.1 All head protection must meet the ANSI Z89.1 standard;

9.2.1.2 In shop and warehouse areas where designated, when task specific hazards i.e. overhead hazards, cranes, and forklift operation (25 ft. radius);

9.2.1.3 Required at all times in the turbine; Type 1 or 2 helmet with a chinstrap to climb;

9.2.1.4 Areas where a hardhat must be removed due to access constraint shall be noted on the JSA. The area shall be inspected prior to work for overhead obstructions; and

9.2.1.5 Whenever outside the administration building except: at the start and end of the work day.

9.2.2 Hand PPE:

9.2.2.1 Task specific protection is required to be worn at all times. (i.e. leather for climbing or working with sharp or rough edges, Nitrile for work with chemicals).

9.2.3 Safety Footwear with ankle support:

9.2.3.1 All footwear must meet ANSI Z41 standard.

9.2.3.2 Required at all times except: at the start and end of the work day.

9.2.4 High Visibility Vests:

9.2.4.1 Vests shall meet ANSI D6.1-1-1971 and are required when working around mobile equipment and required on all construction sites.

9.2.5 Eye and Face Protection**:**

9.2.5.1 Employee shall wear appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

9.2.5.2 All safety glasses must meet ANSI Z87.1-2010 standard.

9.2.5.3 Safety glasses are required in the shop/warehouse at all times.

9.2.5.4 Required at all times outside admin area except: while riding in work trucks or at the start and end of the work day.

9.2.5.5 Splash proof safety goggles are required whenever working around chemicals, fluids, corrosives in warehouse, in towers when working around pressurized systems or when breaking lines for the first time on newly de-pressurized systems.

9.2.5.6 Face shields are required in addition to safety glasses when there is a face hazard from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

9.2.5.7 Protection against radiant energy—(1) Selection of shade numbers for welding filter. Table E-1 in the ANSI Z87.1 standard shall be used as a guide for the selection of the proper shade numbers of filter lenses or plates used in welding. Shades more dense than those listed may be used to suit the individual's needs.

9.2.6 Personal Fall Arrest Systems (PFAS):

9.2.6.1 Issue and inspection of PFAS equipment shall be documented using the Personal Fall Arrest System Inspection Record (DMS# 0049-0693). Refer to the VAWT Fall Protection Plan (DMS# 0049-0571) for more information regarding PFAS Equipment.

9.2.7 Hearing Protection:

9.2.7.1 Hearing protection shall be issued and inspected at initial issue and as required during the normal course of work. Refer to the VAWT Hearing Conservation Program (DMS# 0049-0695) section of this manual for additional information regarding hearing protection.

9.2.8 Respiratory Protection:

9.2.8.1 Respirators shall be issued and inspected initially and as required prior to and after use. Refer to the VAWT Respiratory Protection Program (DMS# 0049-0696) for more information regarding respiratory protection.

9.2.9 Arc Rated Clothing

9.2.9.1 Personnel standing or working in the base of the turbine while the electrical cabinets are energized are required to wear the appropriate Class 0 PPE per NFPA 70E.

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9.2.9.2 All personnel working in areas where electrical hazards are present shall use protective equipment that is designed and constructed for the specific part of the body to be protected and for the work to be performed.

9.2.9.3 Personnel must adhere to the arc flash labels posted where installed. If the Arc Flash Hazard Analysis (AFHA) is not complete and no labels are posted personnel are required to refer to the Electrical Safety Program (DMS# 0049-0995) for additional PPE requirements.

9.2.10 Additional PPE

9.2.10.1 Additional PPE may be required; examples are High Voltage PPE and face shields. This list of additional PPE is not all-inclusive.

10 Inspection, Maintenance & Storage

10.1 Initial Inspection

10.1.1 Personnel will inspect PPE during initial issue to ensure all items listed in the Tech PPE gear bag are present and verify PPE is in good condition. The inspection shall be documented using the PPE Inspection Record (DMS# 0049-0693).

10.2 Daily Inspections

10.2.1 Personnel required to use PPE will inspect the PPE issued to them and employee-owned to ensure proper fit, function, cleanliness and integrity, and to detect any defects or other unsuitable conditions at the following times:

10.2.1.1 At the beginning of the shift prior to the start of work.

10.2.1.2 During the work shift as necessary.

10.2.1.3 At the end of each work shift prior to PPE storage.

10.3 Annual PPE Inspections

10.3.1 Site/Construction Management/Authorized Supervisor, or designee, shall inspect all PPE, including employee-owned PPE not specifically issued to individuals (e.g., extra fall protection equipment used for visitors) annually and document the inspection using the PPE Inspection Record.

10.3.2 Site/Construction Management/Authorized Supervisor may also schedule quarterly, monthly or random PPE inspections as deemed appropriate.

10.3.3 All PPE Inspection records shall be maintained on site for at least one year.

10.4 Arc Rated Clothing Inspection

10.4.1 The clothing should not be wet, unduly soiled with grease or oils or have any other chemical applied to them that would diminish the arc-rating qualities.

10.4.2 Check for tears, loose stitching or anywhere the fabric has worn thin.

10.4.3 Verify that the Velcro and / or zippers work properly.

10.4.4 Check the face shield for scratches, deformities, cracks, etc. Any scratch deep enough to catch your thumbnail on warrant shield replacement.

10.4.5 Verify the hard hat can be secured in the hood.

10.4.6 Hard hat inspection is the same as other hard hats.

10.5 Equipment Storage

10.5.1 Site/Construction Management/Authorized Supervisor will ensure PPE is stored appropriately.

10.5.2 Personnel shall use only approved containers and areas for storing PPE.

10.5.3 Lockers, storage bags, and other containers used only by an individual employee shall have the employee's full name affixed to the container.

10.5.4 PPE storage containers shall not be used for other purposes.

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10.6 Disposition of Equipment

10.6.1 All damaged PPE that is not repairable to an original state by an approved repair procedure must be immediately destroyed and disposed of to prevent the possibility of further use.

10.6.2 Dispose of all PPE that is beyond its useful life as if it were damaged.

10.6.3 Document the disposition of defective fall protection and emergency descent equipment by completing an Equipment Defect Record (DMS# 0049-0694). File the original for one year.

11 Program Evaluation

11.1 Evaluation

11.1.1 The QSE Department shall conduct surveys, interviews, inspections, and process audits on a regular basis to monitor, measure, and record the performance of the PPE Program.

12 Training Requirements

12.1 Initial Training

12.1.1 All Personnel whose job tasks or exposures require the use of PPE shall receive initial PPE training from a competent trainer prior to their first exposure to tasks requiring the use of PPE.

12.1.2 The Technical Training Center (TTC) will provide training for all new hire personnel during Basic Safety training that will include:

12.1.2.1 Why the PPE is necessary;

12.1.2.2 When the PPE is necessary;

12.1.2.3 What PPE is necessary;

12.1.2.4 How to properly don, doff, adjust, and wear PPE;

12.1.2.5 The limitations of the PPE; and

12.1.2.6 The proper: care, maintenance, storage, useful life and disposal of PPE.

12.1.3 The TTC will document completion of PPE training in the Learning Management System (LMS).

12.1.4 Site/Construction Management/Authorized Supervisor shall provide or arrange for hands-on training by a competent person on the specific PPE issued at site. At a minimum, this training will include the following:

12.1.4.1 Why the PPE is necessary;

12.1.4.2 When the PPE is necessary;

12.1.4.3 What PPE is necessary;

12.1.4.4 How to properly don, doff, adjust, and wear PPE;

12.1.4.5 The limitations of the PPE; and

12.1.4.6 Proper care, maintenance, storage, useful life and disposal of the PPE.

12.2 Retraining

12.2.1 The TTC will assign PPE Overview annually via the e-learning system.

12.2.2 Site/Construction Management/Authorized Supervisor shall ensure retraining is conducted when the following situations occur:

12.2.2.1 Changes in the worksite or types of PPE required render previous training obsolete.

12.2.2.2 Employee performance in the use, care, or storage of assigned PPE indicates that the employee has not retained the requisite understanding or skill.

12.2.3 TTC will issue annual PPE refresher training via the e-learning system.

12.3 Ongoing instruction and training

12.3.1 Site safety meetings will periodically include instruction and training on the safe use, care and storage of PPE.

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13 APPENDIX: version history

Version No.	Date	Description of Changes
00	2006.11.27	First edition
01	2006.12.19	Minor revisions and re-numbering due to re-organization of the OHSMS manual – Fall Protection now has its own section.
02	2009.02.24	Added PPE Matrix to Section 10 (TBD). All other changes highlighted in grey.
03	2010.01.01	Content revalidated and template updated
04	2010.04.15	Section 4.2.1: Safety footwear reimbursement updated from $150 to $250.
05	2010.07.09	PPE Matrices added to Section 10. DMS numbers/links for QSE Manual documents added.
06	2010.07.16	PPE Matrices updated (updates to long-sleeved shirt requirements)
07	2011.03.24	PPE Matrices updated
08	2012.03.07	Sections: 1,3,4,5,6,7,8,9,10,12
09	2014.01.15	Annual Review Deleted reference to Arc Flash Inspection
00	2015.01.13	Changed document from T09 (0028-9809) to T03 Updated sections 3, 4, 6, 7, 8, 9, 10 Changes highlighted in grey
01	2015.05.21	Added “employee-owned” to sections 4, 10
00	2015.01.13	Changed document from T09 (0028-9809) to T03 Updated sections 3, 4, 6, 7, 8, 9, 10 Changes highlighted in grey
01	2015.05.21	Added “employee-owned” to sections 4, 10

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PPE Matrix

Areas (Service)	Long pants, long sleeved shirt	Long Pants, Short sleeved shirt	Safety Footwear	Safety Helmet	Safety Glasses	High Visibility Vest	Sealed Eyeware	Hand PPE (Task Specific)
Administrative areas	x	x						
Parking lot,	x	x	x					
Warehouse, shops and stock areas	x	x	x		x			x
In a service truck on site (Includes Rental)	x	x	x					
At turbine pad	x	x	x	x	x			x
Crane/Hoist work	x	x	x	x	x	x		x
Ascending/ descending tower	x	x	x	x	x			x
In the nacelle	x	x	x	x	x		x	x
Working near pressurized hydraulics	x		x	x	x		x	x
Electrical troubleshooting	x		x	x	x			x
In a hub	x	x	x	x	x		x	x
Crane/Hoist work in hub	x	x	x	x	x			x
On top of the nacelle	x	x	x	x	x			x

NOTE: This matrix is a Vestas general guideline; check site and customer rules and regulations

Safety Helmets: Safety Helmet requirements in shop and warehouse areas task specific, ie overhead hazards with forklift operation (25 ft radius)

Safety Helmets: in tower: Required at all times. If a task requires hardhat to be removed, certain requirements must be met, unable to engineer this need out (ie different tools), it is noted on on the JHA, approved by site management, and area is inspected prior to for overhead obstructions. Task in question must be in extremely tight areas where hardhat impedes access.

Hand PPE: Task Specific (ie climbing, work with chemicals, sharp and rough edges)

Safety Footwear: Required at all times, except in Admin Areas and Parking Lot/ when arriving/leaving from work.

High Vis Vests: Required when working around mobile equipment.

Sealed Eye Wear: Required whenever working around chemicals, fluids, corrosives in warehouse, in towers when working around pressurized systems or when breaking lines newly de-pressurized systems.

Additional PPE: Additional PPE may be required at times. Examples are High Voltage PPE, and faceshields. This list of additional PPE is not all inclusive.

Arc Flash Clothing Requirements: Personnel standing or working in the base of the turbine while the electrical cabinets are energized are required to wear the appropriate Class 0 PPE per NFPA 70E.
All personnel working in areas where electrical hazards are present shall use protective equipment that is designed and constructed for the specific part of the body to be protected and for the work to be per-formed.

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PPE Matrix

Areas PPE(Construction /Projects)	Long pants, long sleeved shirt	Long Pants, short sleeved shirt	Safety Footwear	Safety Helmet	Safety Glasses	High Visibility Vest	Sealed Eyeware	Hand PPE (Task Specific)
Administrative areas	x	x						
Parking lot	x	x	x		x	x		
Warehouse, shops and stock areas	x	x	x	x	x	x		x
In a service truck on site (Includes Rental)	x	x	x			x		
At turbine pad	x	x	x	x	x	x		x
Crane/Hoist work	x	x	x	x	x	x		x
Ascending/ descending tower	x	x	x	x	x			x
In the nacelle	x	x	x	x	x		x	x
Working near pressurized hydraulics	x		x	x	x		x	x
Electrical troubleshooting	x		x	x	x			x
In a hub	x	x	x	x	x		x	x
Crane/Hoist work in hub	x	x	x	x	x			x
On top of the nacelle	x	x	x	x	x			x

NOTE: This matrix is a Vestas general guideline; check site and customer rules and regulations

Safety Footwear: Required at all times when on the jobsite except in Admin Areas and Parking Lot/ when arriving/leaving from work.

Safety Helmet: Required at all times except while riding in work trucks and while in admin buildings.

Safety Glasses: Required at all times except while riding in work trucks and while in admin buildings.

Sealed Eye Wear: Required whenever working around chemicals, fluids, corrosives in warehouse, in towers when working around pressurized systems or when breaking lines for the first time on newly de-pressurized systems.

Hand PPE: Task Specific (ie climbing, work with chemicals, sharp and rough edges)

High Vis Vests: Required at all times. Exception is inside the towers.

Additional PPE: Additional PPE may be required at times. Examples are High Voltage PPE, and faceshields. This list of additional PPE is not all inclusive.

Arc Flash Clothing Requirements: Personnel standing or working in the base of the turbine while the electrical cabinets are energized are required to wear the appropriate Class 0 PPE per NFPA 70E.
All personnel working in areas where electrical hazards are present shall use protective equipment that is designed and constructed for the specific part of the body to be protected and for the work to be per-formed.

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Rev. No.	Date
00	2012.01.30
01	2012.02.22
03	2012.04.23
04	2014.01.21
00	2015.03.12

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RESTRICTED

PPE Hazard Assessment Certification Form

Document ID: 0049-0692
INS SUS-MET-MAI (AME US/CAN)
PPE Hazard Certification

Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.03.12		Version: 00

Name of workplace: _____ **Assessment conducted by:** _____
Workplace address: _____ **Date of assessment:** _____
Work area(s): _____ **PPE Selected By:** _____
Job/Task(s): _____ **Effective Date:** _____

EYES/FACE ☐ **Negligible Hazard** **Can hazard be eliminated without the use of PPE? Yes** ☐ **No** ☐

Work-related exposure to:	PPE required to manage hazard:	Comments:
☐ Airborne dust ☐ Flying particles ☐ Hazardous liquids/chemicals ☐ Intense light ☐ Blood splashes ☐ Other: _____	☐ Safety glasses ☐ Safety goggles ☐ Face Shield ☐ Shading/Filter (#_____) ☐ Welding shield ☐ Other: _____	

HEAD ☐ **Negligible Hazard** **Can hazard be eliminated without the use of PPE? Yes** ☐ **No** ☐

Work-related exposure to:	PPE required to manage hazard:	Comments:
☐ Beams ☐ Pipes ☐ Falling objects ☐ Machine parts ☐ Other: _____	☐ Protective Helmet ☐ Type 1 (top protection) ☐ Type 2 (lateral protection) ☐ Other: _____	

HANDS/ARMS ☐ **Negligible Hazard** **Can hazard be eliminated without the use of PPE? Yes** ☐ **No** ☐

Work-related exposure to:	PPE required to manage hazard:	Comments:
☐ Hazardous liquids/chemicals ☐ Scrapes, bruise, or cut ☐ Injuries from tools ☐ Extreme heat/cold ☐ Blood (OPIM) ☐ Other: _____	☐ Gloves ☐ Chemical resistance ☐ Liquid/leak resistance ☐ Temperature resistance ☐ Cut resistance ☐ Gauntlet or long necked ☐ Work Gloves ☐ Chemical Protective sleeves ☐ Long sleeves ☐ Other: _____	

FEET/LEGS ☐ **Negligible Hazard** **Can hazard be eliminated without the use of PPE? Yes** ☐ **No** ☐

Work-related exposure to:	PPE required to manage hazard:	Comments:
☐ Hazardous liquids/chemicals ☐ Heavy falling/rolling objects ☐ Heavy equipment ☐ Exposed electrical wiring or components ☐ Slippery surfaces ☐ Explosive atmospheres ☐ Tools ☐ Other: _____	☐ Closed shoes (e.g. no opened toes or sandals) ☐ Long pants ☐ Safety shoes or boots ☐ Toe protection ☐ Metatarsal protection ☐ Electrical protection ☐ Heat/cold protection ☐ Anti-slip soles ☐ Chemical resistance ☐ Leggings or chaps ☐ Foot-Leg guards ☐ Other: _____	

BODY/SKIN ☐ **Negligible Hazard** **Can hazard be eliminated without the use of PPE? Yes** ☐ **No** ☐

Work-related exposure to:	PPE required to manage hazard:	Comments:
☐ Hazardous liquids/chemicals ☐ Sharp or rough edges ☐ Extreme heat/cold ☐ Other: _____	☐ Lab Coat ☐ Raingear ☐ Coveralls, Body suit ☐ Apron ☐ Welding leathers ☐ Abrasion/cut resistance ☐ Other: _____	

BODY/WHOLE ☐ **Negligible Hazard** **Can hazard be eliminated without the use of PPE? Yes** ☐ **No** ☐

Work-related exposure to:	PPE required to manage hazard:	Comments:
☐ Working from heights of 6 feet or more ☐ Working around electrical ☐ Other: _____	☐ Fall Arrest/Restraint: Type: _____ ☐ Arc Flash Fire Resistive clothing Class _____ ☐ Other: _____	

LUNGS/EARS ☐ **Negligible Hazard** **Can hazard be eliminated without the use of PPE? Yes** ☐ **No** ☐

Work-related exposure to:	PPE required to manage hazard:	Comments:
☐ Irritating dust or particulate ☐ Irritating or toxic gas/vapor ☐ Loud work environment ☐ Noisy machines/tools ☐ Other: _____	☐ Respirator (Cartridge type: _____) ☐ Particulate Mask ☐ Hearing Protection ☐ Other: _____	

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Hazard Assessment Certification for PPE

This tool is used to perform a hazard assessment for the purpose of identifying the type of PPE required within an area, for a task or for a group of tasks. It is to serve as written certification that a hazard assessment has been done as required by regulations and/or standards. Document your hazard assessment for PPE. Make sure that the blank fields at the beginning of the checklist are filled out.

Instructions:

1. Do a walk through survey of each work area and job/task. Read through the list of work activities in the first column, putting a check next to the activities performed in that work area or job.

2. Read through the list of hazards in the second column, putting a check next to the hazards to which employees may be exposed while performing the work activities or while present in the work area. (For e.g., work activity: climbing turbine ladders; work-related exposure: working from heights of 6 feet or more.)

3. Decide how you are going to control the hazards. Try considering engineering, workplace, and/or administrative controls to eliminate or reduce the hazards before resorting to using PPE. If the hazard cannot be eliminated without using PPE, indicate which type(s) of PPE will be required to protect your employee from the hazard.

4. Make sure that you complete the following fields on the form to certify that a hazard assessment was done:

    - Name of your workplace
    - Address of the workplace where you are doing the hazard assessment
    - Name of person certifying that a workplace hazard assessment was done
    - Date the hazard assessment was done

5. Keep completed form as part of site records.

6. If assessor identifies PPE requirements in excess of associated Work Instructions, forward a copy to Tech Support for WI update.

T03 0082-0022 Ver 00 - Approved - Exported from DMS: 2016-06-03 by RIREG

VESTAS PROPRIETARY NOTICE

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PPE Inspection Record

Name: _____ ☐ Initial Issue

Dept./Title: _____ ☐ Quarterly

Date: _____ ☐ Annual

Site/Location: _____ ☐ Random

☑	Equipment	Present Condition	Stored Properly	Actions Required	Site Supervisor	Date Corrected
	Gear Bag					
	Gloves, Leather					
	Gloves, Mechanic					
	Gloves, Latex or Nitrile					
	Hard Hat/Chin Strap (Petzl, Class 1 or 2)					
	LOTO – Lock, Tags, Hasp set					
	Respirator, Half face or full face					
	Respirator Cartridges					
	Safety Glasses (Generic or prescription)					
	Safety Goggles					
	Safety Glasses tether					
	High Visibility Vest					
	First Aid Kit – personal size					
	Work Uniform					
	Safety Footwear					

CERTIFICATION:

I have conducted a thorough inspection of PPE on the date and location specified above. I have indicated the present condition of each PPE item and noted actions required and acknowledge each item is clean, in good repair and suitable for use.

Please use this space to express concerns and to make comments and suggestions to improve this procedure.
Use back side of sheet if necessary.

_____ _____

Employee Signature Date

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VESTAS PROPRIETARY NOTICE

Rev. No.	Date	Description
00	2010.02.26	New Document
01	2010.02.26	Replace Bump Caps with Petzel
02	2010.02.26	Document Review no changes
03	2012.06.28	Revised Equipment list and notes at the bottom
04	2014.01.20	Document Review no changes
00	2015.03.12	Converted T09 Document (0008-6840) to T03

T03 0052-6529 Ver 00 - Approved - Exported from DMS: 2016-06-03 by RIREG

RESTRICTED

Equipment Defect Record

This form can be used to report defects in any equipment, including Personal Fall Arrest System (PFAS) and emergency descent equipment.

Site: | City, State/Prov.:

Inspector Name: | Signature:

DATE OF THIS INSPECTION: | Date of Next Inspection:

ITEM DESCRIPTION (Include Make/Model #s):

Serial # or Identifying Mark(s):

DEFECT FOUND: ☐ During Scheduled Inspection ☐ During Daily Pre Use Check ☐ *During Use

DESCRIBE DEFECT(s):

CAUSE OF DEFECT *(Probable Cause, or if Defect is the result of an incident, reference incident report and date):*

REMEDIAL ACTION(s) *(Check any/all that apply):*

DEFECTIVE CONDITION:

☐ CAN BE REPAIRED ☐ Returned to MANUFACTURER for Repair on (date):

☐ Sent to:

for Repair on (date): Phone:

☐ **CANNOT** BE REPAIRED* ☐ Item *DESTROYED to prevent accidental misuse OR,

☐ Replacement Ordered (date): PO #:

From:

**** Some Safety Items, once subjected to impact forces, must be immediately removed from service and destroyed.***

Attach original to the appropriate inspection form and file in Site Safety Records.

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T03 0049-0694 Ver 00 - Approved - Exported from DMS: 2016-06-08 by RIREG

Rev. No.	Date	Description
0	2010.02.26	New Document
01	2010.02.26	Rearranged Header
02	2014.09.23	Revised bottom noted to eleiminate Equipment register& footer
00	2015.03.12	Converted T09 Document (0008-6893) to T03

T03 0052-6529 Ver 00 - Approved - Exported from DMS: 2016-06-03 by RIREG

Hearing Conservation Program				Document ID: 0049-0695 INS SUS-SAF-OPC (AME US) Hearing Conservation
Owner(s): BPO Del.SUS	Author(s): RIREG	Valid from: 2015.01.13		Version: 00

Version history

Version No.	Date	Description of Changes
00	2015.01.13	Converted T09 Document (0008-7995) to T03

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VESTAS PROPRIETARY NOTICE

1 Purpose

Vestas-American Wind Technology will ensure that the noise hazards within our facility are evaluated, and that information concerning the hazards is transmitted to all employees. This standard practice instruction is intended to address comprehensively the issues of: evaluating the potential hazards of noise, communicating information concerning these hazards, and establishing appropriate protective measures for all employees.

2 Responsibility

2.1 Senior Management

2.1.1 Ensure effective program development and implementation.

2.1.2 Provide Site/Construction Management/Authorized Supervisor with adequate resources and support to carry out program responsibilities and obligations.

2.1.3 Require adherence to all policies, procedures, practices and rules related to the use of Subcontractors.

2.1.4 Oversee and evaluate site supervisor performance.

2.2 Site/Construction Manager/Authorized Supervisor

2.2.1 Ensure all personnel under Vestas supervision:

2.2.1.1 Adhere to all policies, procedures and rules related to occupational noise.

2.2.1.2 Receive training from a competent person:

2.2.1.3 Acknowledge and have adequate knowledge and skills to protect them occupational noise hazards.

2.2.1.4 Follow the Vestas Safety programs.

2.2.1.5 Complete required Vestas documentation.

2.2.2 Maintain written plans or procedures that, at a minimum, comply with all local, state, provincial and federal laws and regulations that apply to the facility

2.2.3 Comply with the most stringent requirement established either by local law or by this program.

2.2.4 Initiate a survey of the site to determine if there is any area where noise levels exceeds 85dB per 8-hour time weighted average.

2.2.5 Exercise the ability to stop work at any time safety is being questioned and/or compromised.

2.2.6 Implement administrative and/or engineering controls to reduce sound levels to within acceptable limits.

2.2.7 Ensure proper initial fitting and supervise the correct use of all hearing protectors.

2.3 Quality, Safety & Environmental (QSE) Department

2.3.1 Develop and monitor the implementation of the hearing conservation plan.

2.3.2 Ensure efficient and effective instruction and training are conducted with regards to hearing protection.

2.3.3 Propose and implement improvements to the Hearing Conservation Plan.

2.3.4 Assist site supervision in setting up the hearing conservation plan on sites where it is determined to be required.

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2.3.5 Determine the appropriate PPE for use in all exposure situations.

2.4 Employees

2.4.1 Read and comply with all hazard and PPE signage posted.

2.4.2 Properly use, handle and store hearing protection devices.

2.4.3 All personnel must wear personal protective equipment that meets or exceeds requirements of the hazard they are exposed to.

2.4.4 Properly inspect, and maintain PPE prior to use in accordance with the manufacturer's instruction and training received.

2.4.5 Provide feedback in a timely manner to Site/Construction Management about the effectiveness of PPE.

2.4.6 Report any incident of misuse, symptoms of overexposure or injury while working in PPE.

2.4.7 Ask questions when in doubt.

3 References

Document No.	Title
0049-2070	Personal Protective Equipment Plan
29CFR1910.95	Occupational Noise Exposure
ANSI	S1.4-1971
OHS Regulation	SOR/86-304 Part 7

4 Scope

Effective implementation of this program requires support from all levels of management within Vestas-American Wind Technology. This written program will be communicated and apply to all personnel that are affected by it.

5 Terms and Abbreviations

Term or Abbreviation	Definition
ANSI	American National Standards Institute
Competent person	Person capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as in their application and use with related equipment.
PPE	Personal Protective Equipment
QSE	Quality, Safety and Environmental
Action level	An 8 hour time weighted average of 85 decibels measured on the A-scale, slow response, or equivalently, a dose of fifty percent.
Audiogram	Chart, graph, or table resulting from an audiometric test showing an individual's hearing threshold levels as a function of frequency.
Audiologist	Professional, specializing in the study and rehabilitation of hearing, which is certified by the American Speech-Language-Hearing Association or licensed by a state board of examiners.
Baseline audiogram	The audiogram against which future audiograms are compared.
Criterion sound level	A sound level of 90 decibels
Decibel (dB)	Unit of measurement of sound level
Hertz (Hz)	Unit of measurement of frequency, numerically equal to cycles

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VESTAS PROPRIETARY NOTICE

Term or Abbreviation	Definition
	per second
Medical pathology	Disorder or disease. Condition or disease affecting the ear, which should be treated by a physician specialist
Noise dose	The ratio, expressed as a percentage, of (1) the time integral, over a stated time or event, of the 0.6 power of the measured SLOW exponential time-averaged, squared A-weighted sound pressure and (2) the product of the criterion duration (8 hours) and the 0.6 power of the squared sound pressure corresponding to the criterion sound level (90 dB)
Noise dosimeter	Instrument that integrates sound pressure over a period of time in such a manner that it directly indicates a noise dose
Otolaryngologist	Physician specializing in diagnosis and treatment of disorders of the ear, nose, and throat
Representative exposure	Measurements of an employee's noise dose or 8 hour time weighted average sound level that the employers deem to be representative of the exposures of other employees in the workplace
Sound level	Ten times the common logarithm of the ratio of the square of the measured A-weighted sound pressure to the square of the standard reference pressure of 20 micropascals. Unit: decibels (dB). For use with this instruction, SLOW time response, in accordance with ANSI S1.4-1971 (R1976), is required
Sound level meter	An instrument for the measurement of sound level
Time weighted average (TWA)	That sound level, which if constant over an 8 hour exposure, would result in the same noise dose as is measured

6 Forms

Document No.	Title

7 Hearing Conservation Program

7.1 Controls

7.1.1 Insofar as is reasonably practicable, Vestas shall implement engineering controls or other physical means other than hearing protectors to reduce employee exposure to sound levels that do not exceed the prescribed limits.

7.2 Sound Survey

7.2.1 Vestas has performed noise surveys on various turbine platforms during normal maintenance and none of the surveys resulted in personnel being exposed to levels of 85dB or higher during an 8hr TWA.

7.2.2 Vestas will continue to conduct noise surveys at our client's facilities and during work tasks to insure noise levels are not exceeded.

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7.3 Monitoring

7.3.1 Vestas shall administer a continuing, effective hearing conservation program, whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale (slow response) or, equivalently, a dose of fifty percent.

7.3.2 No employee in a work place shall, in any 24-hour period, be exposed to (a) an A-weighted sound pressure level set out in column I of the schedule for a duration of exposure exceeding the applicable duration set out in column II, or (b) a noise exposure level that exceeds 87 dBA.

7.3.3 When information indicates that any employee's exposure may equal or exceed an 8-hour TWA of 85 decibels, the Vestas shall develop and implement a monitoring program.

7.3.4 Vestas shall use representative personal sampling to comply with the monitoring requirements.

7.3.5 Monitoring shall be repeated whenever a change in production, process, equipment or controls increases noise exposures to the extent that:

7.3.5.1 Additional employees may be exposed at or above the action level, or

7.3.5.2 The attenuation provided by hearing protectors being used by employees may be rendered inadequate to meet the requirements.

7.3.6 If the variations in noise level involve intervals of 1 second or less, it will be considered to be continuous. When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect will be considered, rather than the individual effect of each.

7.3.7 Exposure to impulsive or impact noise will not exceed 140 dB peak sound pressure level.

7.4 Notification

7.4.1 Vestas shall notify each employee exposed at or above an 8-hour time-weighted average of 85 decibels of the results of the monitoring.

7.4.2 Vestas shall provide affected employees or their representatives with an opportunity to observe any noise measurements conducted.

7.5 Audiometric Testing

7.5.1 Vestas-American Wind Technology will maintain an audiometric testing program in accordance with the following guidelines.

7.5.1.1 Vestas-American Wind Technology will establish and maintain an audiometric testing program free of charge for employees whose exposures equal or exceed an 8-hour time-weighted average of 85 decibels.

7.5.1.2 Audio metric tests will be performed by a licensed or certified audiologist, otolaryngologist, or other physician, or by a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation. A technician who performs audiometric tests must be responsible to an audiologist, otolaryngologist or physician.

7.5.1.3 Vestas-American Wind Technology will provide protection against the effects of noise exposure when the sound levels within our facility exceed those shown in Table 7.1, when measured on the A scale of a standard sound level meter at slow response.

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Table 7.1 - PERMISSIBLE NOISE EXPOSURES

Duration per day, hour's	Sound level dBA slow response
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
0 ½	110
1/4 or less	115

7.6 Baseline audiogram

7.6.1 Within 6 months of an employee's first exposure at or above the action level, Vestas-American Wind Technology will establish a valid baseline audiogram against which subsequent audiograms can be compared.

7.6.2 Vestas will obtain a valid baseline audiogram within 1 year of an employee's first exposure at or above the action level.

7.6.3 Where baseline audiograms are obtained more than 6 months after the employee's first exposure at or above the action level, employees will wear hearing protectors for any period exceeding six months after first exposure until the baseline audiogram is obtained.

7.6.3.1 Testing to establish a baseline audiogram will be preceded by at least 14 hours without exposure to workplace noise. Hearing protectors may be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to workplace noise.

7.7 Annual audiogram

7.7.1 At least annually after obtaining the baseline audiogram, Vestas-American Wind Technology will obtain a new audiogram for each employee exposed at or above an 8-hour time weighted average of 85 decibels.

7.8 Evaluation of audiogram

7.8.1 Each employee's annual audiogram will be compared to that employee's baseline audiogram to determine if the audiogram is valid and if a standard threshold shift has occurred

7.8.2 If the annual audiogram shows that an employee has suffered a standard threshold shift, a retest will be accomplished within 30 days and the results considered as the annual audiogram.

7.9 Problem audiograms

7.9.1 Vestas will ensure that an audiologist, otolaryngologist, or physician review problem audiograms and determine whether there is a need for further evaluation. The reviewer will be provided the following information:

7.9.1.1 Employee's baseline and most recent audiograms.

7.9.1.2 Measurements of background sound pressure levels in the audiometric test room.

7.9.1.3 Records of audiometer calibrations, (if the testing was not conducted at the reviewer's facility).

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7.10 Follow-up procedures

7.10.1 If a comparison of the annual audiogram to the baseline audiogram indicates a standard threshold shift has occurred, the employee will be informed of this fact in writing, within 21 days of the determination.

7.11 Standard threshold shift

7.11.1 A standard threshold shift is a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear.

7.11.2 Vestas-American Wind Technology will ensure that the following steps are taken when a standard threshold shift occurs:

7.11.2.1 Employees exposed or potentially exposed to high noise will be fitted with hearing protectors, trained in their use and care, and required to use them.

7.11.2.2 For known high noise job assignments employees will be fitted and trained prior to job assignment.

7.11.2.3 Employees already using hearing protectors will be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation if necessary.

7.11.2.4 Employees will be referred for a clinical audiological evaluation or an ontological examination, as appropriate, if additional testing is necessary.

7.11.2.5 Employees will be informed of the need for an ontological examination if a medical pathology of the ear that is unrelated to the use of hearing protectors is suspected.

7.11.2.6 If subsequent audiometric testing of an employee whose exposure to noise is less than an 8-hour TWA of 90 decibels indicates that a standard threshold shift is not persistent, the employer:

7.11.2.6.1 Shall inform the employee of the new audiometric interpretation; and

7.11.2.6.2 May discontinue the required use of hearing protectors for that employee.

7.12 Revised baseline

7.12.1 An annual audiogram may be substituted for the baseline audiogram when, in the judgment of the audiologist, otolaryngologist or physician evaluating the audiogram determines that:

7.12.1.1 The standard threshold shift revealed by the audiogram is persistent.

7.12.1.2 The hearing threshold shown in the annual audiogram indicates significant improvement over the baseline audiogram.

7.13 Hearing protectors

7.13.1 Where engineering controls are not practicable Vestas shall make hearing protectors available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater at no cost to the employees. Hearing protectors shall be replaced as necessary.

7.13.2 Only approved hearing protection equipment with the appropriate Noise Reduction Rating (NRR) on the hearing protector package shall be utilized.

7.13.3 A realistic estimate of protection can be obtained by reducing the labeled NRR by 50%, for example:

Environmental noise level = 92dB
Hearing protection NRR = 26dB,
Reduced by 50% becomes 13dB
Level of noise entering the ear is 92dB – 13dB = 79dB

7.13.4 Employers shall ensure that hearing protectors are worn:

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7.13.4.1 By any employee required by this program to wear personal protective equipment; and

7.13.4.2 By any employee who is exposed to an 8-hour time-weighted average of 85 decibels or greater and has not had a baseline audiogram or has experienced a standard threshold shift.

7.13.5 Always check the container for the actual NRR for the protection being used:

7.13.5.1 Typical NRR Values for the style of protection:

Reusable Earplugs	NRR 25-27dB
Disposable	NRR 23-33dB
Hearing Bands	NRR 17-28dB
Earmuffs	NRR 20-30dB

7.14 Training

7.14.1 Vestas shall provide training upon hire and annually:

7.14.1.1 To employees exposed to noise at or above an 8-hour TWA of 85 decibels.

7.14.2 Training shall include:

7.14.2.1 Employees need to observe posted signage and adhere to the program.

7.14.2.2 Use and care of hearing protectors.

7.14.2.3 The effects of noise on hearing;

7.14.2.4 The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care; and

7.14.2.5 The purpose of audiometric testing, and an explanation of the test procedures

8 Recordkeeping

8.1 Access to information and training materials

8.1.1 Vestas will make available to affected employees or their representatives copies of this standard practice instruction.

8.1.2 All records cited in this program will be provided upon request to employees, former employees, representatives designated by the individual employee, and government representatives.

8.1.3 If Vestas ceases to do business, the records will be transferred to the successor employer and maintained by the successor employer. Should Vestas cease to function entirely the records will be provided to the respective employees, or as required by current law.

8.2 Exposure measurements

8.2.1 Vestas-American Wind Technology will maintain an accurate record of all employee exposure measurements.

8.3 Audiometric tests

8.3.1 Vestas will retain all employee audiometric test records. This record will include as a minimum:

8.3.1.1 Name and job classification of the employee.

8.3.1.2 Date of the audiogram.

8.3.1.3 The examiner's name.

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8.3.1.4 Date of the last acoustic or exhaustive calibration of the audiometer.

8.3.1.5 Employee's most recent noise exposure assessment.

8.3.2 Vestas will maintain accurate records of the measurements of the background sound pressure levels in audiometric test rooms.

8.4 Record retention

8.4.1 Noise exposure measurement records will be retained for two years.

8.4.2 Audiometric test records will be retained for the duration of the affected employee's employment.

9 APPENDIX: version history

Version No.	Date	Description of Changes
00	Unknown	New document (old Document #31031)
01	Unknown	Unknown
02	2002.10.15	Unknown
03	2010.01.10	Content and template updates
04	2014.09.23	Updated Template

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VESTAS PROPRIETARY NOTICE

Respiratory Protection Plan Vestas System Instruction				Document ID: 0049-0696 INS SUS-SAF-RPP (AME US) Respirator Protection
Owner(s): BPO Del. SUS	Author(s): RIREG	Valid from: 2016.03.21		Version: 02

Version history

Version No.	Date	Description of Changes
02	2016.03.21	Revised sections 7.5.1 to include fit testing for Dusk Masks during required use. Deleted 7.5.5

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1 Purpose

The purpose of this program is to ensure that Vestas American Wind Technology, Inc. personnel are properly protected from airborne and chemical hazards during their work activities. This is typically accomplished by using accepted engineering controls such as general and local exhaust ventilation. When engineering controls are not feasible, while they are being instituted, or in an emergency, only personnel who have been medically evaluated, trained, fit-tested and certified in their use and limitations may use appropriate respirators.

2 Responsibilities

2.1 Senior Management

2.1.1 Ensure effective program development and implementation.

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2.1.2 Provide Site/Construction Management/Authorized Supervisor with adequate resources and support to carry out program responsibilities and obligations.

2.1.3 Require adherence to all policies, procedures, practices and rules related to site hazards.

2.1.4 Oversee and evaluate site supervisor performance.

2.2 Site/Construction Management/Authorized Supervisor

2.2.1 Ensure all personnel under Vestas supervision adhere to all policies, procedures and rules related to hazard communication.

2.2.2 Assess the site hazards and provide at no cost the required PPE for all Vestas personnel and visitors.

2.2.3 Ensure contractors supply required, approved PPE for their personnel as required by the site hazard assessment.

2.2.4 Conduct scheduled and random inspections of respiratory equipment and record results utilizing the QSE Site Inspection Checklist (DMS# 0049-0546).

2.2.5 Ensure that personnel maintain all required respiratory protection devices in good repair and in a clean and sanitary condition and take immediate action to repair and/or replace defective respiratory equipment.

2.2.6 Conduct and/or arrange for air sampling to evaluate the need for respiratory protection and inform personnel of the nature of the hazard(s)

2.2.7 Verify respirator is approved for the hazards presented and fully protects the user.

2.2.8 Ensure identified personnel are medically able to wear respirators before assigning them to tasks requiring the use of a respirator.

2.2.9 Ensure personnel with facial hair that will inhibit a proper seal are not assigned tasks or required to shave prior to use of a respirator.

2.2.10 Ensure that personnel are properly instructed in the use and maintenance of their respirator and fit-tested before using a respirator.

2.2.11 Schedule annual training, medical evaluations and fit testing for individuals required to wear respirators.

2.2.12 Provide Voluntary respirator users with the information contained in OSHA Appendix D Acknowledgement; DMS 0053-9309.

2.3 QSE Department

2.3.1 Develop and monitor implementation of the Respiratory Protection Program.

2.3.2 Assist in identifying areas where respiratory protection may be required.

2.3.3 Arrange for air sampling to evaluate the need for respiratory protection.

2.3.4 Select and assist in procuring appropriate PPE.

2.3.5 Ensure efficient and effective respiratory protection training is conducted.

2.3.6 Conduct workplace inspections and audits to evaluate the effectiveness of the program.

2.3.7 Conduct a program review/evaluation annually.

2.3.8 Propose and implement improvements to the Respiratory Protection Program.

2.3.9 The QSE Technical Support Specialist is designated as Respiratory Protection Program Administrator.

2.4 Technical Training Center

2.4.1 The Design and development of respiratory protection training in accordance with Respiratory Protection Standard 29 CFR 1910.134 and this program.

2.4.2 Conduct respiratory protection training in Basic Safety Training for all newly hired personnel.

2.4.3 Assign the annual respiratory protection refresher e-learning training module.

2.4.4 Maintaining training records.

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2.5 Personnel

2.5.1 Use assigned respirators in accordance with instructions and training received.

2.5.2 Inform site management of any personal health problems that could be aggravated by the use of respirators.

2.5.3 Maintain respirator in good repair and use fresh filters of the appropriate type.

2.5.4 Report any damaged, defective or malfunctioning respirator to the site management immediately.

2.5.5 If the respirator malfunctions while in use, go to a safe area and do not remain in a hazardous atmosphere.

2.5.6 Inspect the respirator and perform the applicable pressure fit tests each time before using the respirator.

2.5.7 Do not disassemble or alter a respirator other than to change cartridges or to clean.

2.5.8 Do not share or give your respirator to another person to use.

2.5.9 Ensure facial hair will not come between the face piece-to-face seal when required to wear a tight fitting respirator.

2.5.10 Conduct air sampling to evaluate the need for respiratory protection per the Confined Space Program.

2.5.11 Attend the training.

2.5.12 Read and complete the OSHA Appendix D Acknowledgement; DMS 0053-9309 if voluntarily using a respirator.

3 References

Document No.	Title
29 CFR 1910.134	Respiratory Protection: App A, B-1, B-2, C, D
0049-2070	VAME PPE Plan
0049-0584	US Confined Space Program
0001-0410	PPE Sheets

4 Forms

Document No.	Title
0049-0546	VAWT QSE Site Inspection Checklist
0049-0549	Job Safety Analysis
0049-2062	Respirator Fit-test Record
0049-0698	Vestas Respiratory Protection Questionnaire
0053-9309	OSHA Appendix D Voluntary Use of Respirator Acknowledgement

5 Scope

This program applies to all Vestas personnel and contractors who voluntarily wear or who are required to wear respirators during their normal work activities or during emergencies.

In the event an assigned job task requires the use of a respirator, the program in its entirety applies.

6 Terms and Abbreviations

Term or Abbreviation	Definition
APF	Assigned Protection Factor
IDLH	Immediately Dangerous to Life or Health
JSA	Job Safety Analysis
NIOSH	National Institute for Occupational Safety and Health

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Term or Abbreviation	Definition
PEL	Permissible Exposure Limit
PLHCP	Physician Licensed Health Care Professional
PPE	Personal Protective Equipment
QLFT	Qualitative fit-test
QNFT	Quantitative fit-test
SCBA	Self-Contained Breathing Apparatus
SDS	Safety Data Sheet
VAWT	Vestas American Wind Technologies
Filtering Face piece	Dust mask
Tight Fitting	Negative pressure respirator

7 Program

7.1 General Requirements

7.1.1 Initial respirator screening shall be completed by the individual utilizing the Vestas Respirator Protection Questionnaire (DMS# 0049-0698)

7.1.2 A physician or other licensed health care professional (PLHCP) will be assigned the responsibility of confirming each person is physically able to perform assigned work while using a respirator via a respiratory questionnaire and/or exam as determined by the questionnaire results.

7.2 Job Safety Analysis (JSA)

7.2.1 Each site's (projects, service) department will identify and evaluate all workplace respiratory hazards by means of a JSA (DMS# 0049-0549).

7.2.2 The JSA will include a reasonable estimate of individual's exposures to the hazards and the identity of each hazard's chemical state and physical form.

7.2.3 The information obtained from the JSA will be used to select and assign respirators to personnel.

7.3 Selection of Respirators

7.3.1 The Site/Construction Management/Authorized Supervisor with the assistance of the QSE representative will refer to the Vestas PPE sheets DMS 0001-0410 and the SDS to select respirators based on the potential for personnel to be exposed to levels above the materials Permissible Exposure Limit (PEL) or there is a specific reason that an individual needs such protection.

7.3.2 The current NIOSH-Assigned Protection Factors (APFs) shall be used when selecting respirators.

7.3.3 If the exposure cannot be reduced below the PEL, the Site/Construction Management/Authorized Supervisor with the assistance of the QSE representative will select the appropriate type of respirator based upon the following:

7.3.3.1 Chemical toxicity;

7.3.3.2 Maximum expected concentration;

7.3.3.3 Oxygen deficiency;

7.3.3.4 Chemical warning properties;

7.3.3.5 Sorbent limitations;

7.3.3.6 Face piece fit;

7.3.3.7 Mobility requirements; and

7.3.3.8 Type of use (routine, escape, or emergency entry).

7.3.4 The Site/Construction Management/Authorized Supervisor with the assistance of the QSE representative are responsible for selecting the appropriate respirator filters and/or cartridges based on a review of SDS's and/or other relevant air contaminant data.

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7.3.5 Only respirators approved by the National Institute for Occupational Safety and Health (NIOSH) shall be used.

7.3.6 Only filters and/or chemical cartridges matched to expected atmospheric contaminants known to be present at Vestas - American Wind Technology, Inc. facilities will be used.

7.3.7 Air-purifying respirators shall not be used in oxygen deficient atmospheres. Only air supplied (positive pressure) respirators (SCBA, or air-supplied) are to be used under these conditions.

7.3.8 Consideration must be given to the limitations of the protective device and the work environment in which it will be used.

TABLE 1: RESPIRATOR SELECTION CRITERIA	
Type of Exposure:	**Selection Procedure**:
Particulate exposure	Respirators will be selected on the basis of potential oil mist exposure (N, R or P), severity of the inhalation hazard (95%, 99% or 100% efficient), air particulate concentration, and the availability of 21% oxygen.
Vapor and gas exposure	Respirators will be selected on the basis of chemical composition, physical state (vapor or gas), air contaminant concentration, and the availability of 21% oxygen.
Atmospheric oxygen at or below 19.5% or air contaminants Immediately Dangerous to Life or Health (IDLH)	Supplied-air respirators will be selected. Only Grade D breathing air will be used for supplied-air respirators. Only oil-less breathing air compressor or oil-compressor systems provided with carbon monoxide (10 ppm) or high-temperature alarms periodically tested for the presence of carbon monoxide will be used.

7.4 Medical Surveillance

7.4.1 Personnel required to wear a respirator (tight fitting or dusk mask) shall be medically evaluated.

7.4.2 Personnel voluntarily wearing a tight fitting respirator shall be medically evaluated but not fit-tested.

7.4.3 The Site/Construction Management/Authorized Supervisor or designee will ensure each individual has a medical evaluation, using the Vestas Respirator Protection Questionnaire (DMS# 0049-0698). A physician or licensed health care professional will make this evaluation.

7.4.4 Depending on the results of the evaluation a follow-up appointment and/or physical exam may be required.

7.4.5 Should it be determined that an exam is required the Site/Construction Management/Authorized Supervisor may need to provide physician or other licensed health care professional with the following information:

7.4.5.1 The type and weight of the respirator each person will use;

7.4.5.2 The duration and frequency of use;

7.4.5.3 The expected physical work effort;

7.4.5.4 Any other protective clothing and equipment worn;

7.4.5.5 Temperature and humidity extremes at the workplace; and

7.4.5.6 Air contaminants and concentration levels the individual may encounter.

7.4.6 The physician or other licensed health care professional clinic may discuss the results of the evaluation with the individual and provide a written determination to the Site/Construction Management/Authorized Supervisor. This determination will not contain confidential medical information, but will include:

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7.4.6.1 An opinion regarding the individual's ability to tolerate a respirator;

7.4.6.2 Any limitations on respirator use;

7.4.6.3 Any need for follow-up evaluations; and

7.4.6.4 A statement confirming that the individual has been informed of the determination.

7.4.7 If the physician or other licensed health care professional recommends alternative respiratory protection, such as a powered air-purifying respirator, the Site/Construction Management/Authorized Supervisor will comply with the recommendation.

7.4.8 Personnel will receive follow-up medical evaluations under the following conditions:

7.4.8.1 The individual reports medical signs or symptoms related to respirator use;

7.4.8.2 A reevaluation is recommended by a Site/Construction Management/Authorized Supervisor, or the licensed health care provider;

7.4.8.3 A fit-test or other program information indicates a need for reevaluation; or

7.4.8.4 Any change in the workplace environment that increases respiratory stress on an individual.

7.4.9 Vestas has contracted to have a PLHCP perform medical evaluations based on the Respirator Protection Questionnaire (DMS# 0049-0698) submitted electronically by the individual.

7.4.9.1 Sites may obtain local services for the completion of the evaluations.

7.4.10 Respirator clearance or non-clearance reports will be sent to the Site/Construction Management/Authorized Supervisor and the individual.

Note: Respirator Protection Questionnaires are considered Private Medical Information.

7.4.10.1 Personnel shall complete Respirator Protection Questionnaire and either: fax, mail, e-mail or hand deliver the questionnaire to the PLHCP office.

7.5 Fit-Testing

7.5.1 All personnel required to wear respirator (tight fitting or dusk mask) must pass an appropriate qualitative fit-test (QLFT) or quantitative fit-test (QNFT).

7.5.1.1 The Site/Construction Management/Authorized Supervisor will determine which test is appropriate based on the type of respirator and atmosphere that may be entered.

7.5.1.2 Qualitative fit testing shall be performed with the use of irritant smoke or Bitrex and testing procedures shall conform to the protocols found in OSHA 1910.134, App A.

7.5.1.3 A qualitative fit-test may only be used to fit-test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less.

7.5.2 Personnel must be fit-tested before they are required to use a tight fitting respirator for the first time, or whenever they are required to use a different respirator face piece, and after any changes in their physical condition (obvious change in body weight, dental changes, facial scarring, cosmetic surgery, etc.) that could affect respirator fit.

7.5.3 Fit-tests will be administered using the individual's assigned respirator or from a selection of respirators of the same make, model, style and size set up for fit-testing purposes (for an initial fit-test).

7.5.4 Personnel required to wear tight fitting respirators must be fit-tested annually and the results of the tests must be documented on the Respirator Fit Test Record (DMS 0049-2062).

7.6 Required (Non Voluntary) Respirator Use

7.6.1 Personnel must be clean shaven so that no hair comes between the face-to-face piece seal or valve function in order to wear tight-fitting respirator face pieces.

7.6.2 PPE or clothing that interferes with the face-to-face piece seal or valve function is not permitted.

7.6.3 Corrective lenses (contacts) or glasses with temple bars or straps that interfere with the face-to-face piece seal cannot be used with any respirator.

7.6.4 Personnel shall be instructed on how to perform a positive pressure and negative pressure seal check whenever they don an air purifying respirator.

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7.7 Monitoring Respirator Effectiveness

7.7.1 The Site/Construction Management/Authorized Supervisor and/or designated trained representative will monitor and reevaluate the effectiveness of the individuals' respirators after any significant changes in work conditions or exposure levels.

7.7.2 Personnel must leave the areas in which they wear respirators to wash their faces and their respirator face pieces:

7.7.3 If they detect face piece leaks or changes in breathing resistance; or

7.7.4 To change respirators, filters, cartridges, or canister elements.

7.7.5 Respirators will not be used to enter IDLH atmospheres. If an IDLH atmosphere is known or suspected, personnel will report the condition to their supervisor, but will not enter the area or confined space where the IDLH atmosphere exists.

7.8 Voluntary Use

7.8.1 The Site/Construction Management/Authorized Supervisor will provide a respirator at the request of the individual if it is determined that any voluntary respirator use will not in itself create a hazard. If use is permissible, the employer shall provide the respirator user with the information contained in Appendix D DMS 0053-9309.

7.8.2 In addition, the employer must establish and implement those elements of a written respiratory protection program necessary to ensure that any individual using a respirator voluntarily is medically able to use that respirator, and that the respirator is cleaned, stored, and maintained so that its use does not present a health hazard to the user.

Exception: Personnel whose only use of respiratory protection involves the voluntary use of filtering face pieces (dust masks) are not required to be medically qualified or fit-tested.

7.8.3 Respirators are an effective method of protection against designated hazards when properly selected and worn.

7.8.4 Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers.

7.8.5 However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker.

7.8.6 Workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards if they perform the following:

7.8.6.1 Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.

7.8.6.2 Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.

7.8.6.3 Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.

7.8.6.4 Keep track of your respirator so that you do not mistakenly use someone else's respirator.

7.8.7 Any individual who asks to wear a filtering face piece (dust mask) is not subject to the medical evaluation requirements of this program.

7.9 Respirator Maintenance and Care

7.9.1 Respirators must be washed, cleaned, sanitized and inspected according to the manufacturer's instructions and 1910.134 App B-2:

7.9.1.1 Before any new respirator is used;

7.9.1.2 After each use; and

7.9.1.3 Whenever respirators are used for fit testing.

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7.9.2 Warm water with a mild detergent is used for cleaning air-purifying respirators. All parts should be allowed to dry thoroughly before reassembling.

7.9.3 Personnel must inspect their respirators before they use them and after they clean them. Inspection includes:

7.9.3.1 A check of respirator function;

7.9.3.2 Tightness of connections;

7.9.3.3 Condition of the elastomeric face piece;

7.9.3.4 Head straps;

7.9.3.5 Valves;

7.9.3.6 Connecting tubes; and

7.9.3.7 Cartridges, filters or canisters.

7.9.4 Only trained personnel can replace worn or deteriorated respirator parts. All repair work, adjustments, and replaced parts must comply with the respirator manufacturer's instructions.

7.9.5 Air-purifying respirators are to be stored by the user in a bag or box in such a way that the device is kept clean and dry away from contamination and sunlight.

7.9.6 Replacement parts, such as filters, cartridges, and valve assemblies, shall be kept in a central location in each department.

7.9.7 Respirators used in emergency situations shall be inspected at least monthly, in accordance with the manufacturer's recommendations, and checked for proper function before and after each use.

7.10 Identity of Filters, Cartridges and Canisters

7.10.1 All filters, cartridges and canisters must be maintained as received from the manufacturer or supplier and be labeled and color-coded with the NIOSH approval label.

7.10.2 The label on a cartridge, filter or canister cannot be removed and must remain legible.

7.10.3 Defective filters, cartridges, and canisters cannot be used and must be removed from service.

7.10.4 If Cartridges do not have End of Service Life Indicators (ESLI) cartridges shall be change at the end of each day's work.

7.10.5 Particulate filters (but not cartridges with an integrated particular filter) do not have a similar time-based life. These are generally replaced when the filter is damaged or soiled or if there is restriction to the user's inhalation.

NOTE: VAWT has done extensive airborne testing of materials that could potentially be harmful and possible require a respirator. (Brake Dust, Slip ring dust, Oil fumes) All testing showed contamination levels are below the PEL for each which indicates respirators are not required. Personnel can request a copy of these tests from their Regional QSE Representative.

7.11 Training

7.11.1 Before any personnel wear a respirator for the first time, they must receive and understand training that covers:

7.11.1.1 What the hazard is and why a respirator is necessary;

7.11.1.2 How improper fit, use or maintenance can compromise the protective effects of the respirator;

7.11.1.3 The respirator's capabilities and limitations;

7.11.1.4 How to use the respirator in emergency situations, including situations in which the respirator malfunctions;

7.11.1.5 How to inspect, put on, check the seals, and remove the respirator;

7.11.1.6 Proper maintenance and storage procedures; and

7.11.1.7 Recognizing physiological signs and/or symptoms that may limit or prevent effective respirator use.

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7.11.2 A person designated by the Trainer and/or designated representative will provide training, which will be fully documented, certifying that the individual understands the concepts presented and has demonstrated how to use and wear the respirator.

7.11.3 The training must give each user an opportunity to handle the respirator; to have it fitted properly; to test the face piece-to-face seal; to wear it in normal air for a trial period; and to wear it in a test atmosphere.

7.11.4 Retraining must be performed at least annually or as deemed necessary by the Site/Construction Management/Authorized Supervisor, Trainer and/or designated representative.

7.12 Program Evaluation

7.12.1 The Site/Construction Management/Authorized Supervisor, and/or designated trained representative will consult personnel about respirator fit, selection, proper use and maintenance, and will make periodic workplace observations to confirm that respirators are being used and maintained correctly.

7.13 Recordkeeping

7.13.1 The completed Vestas Respiratory Protection Questionnaires should be considered a medical record. This document is to be sent directly from the technician to the PLHCP via e-mail, fax or mail.

7.13.2 The Site/Construction Management/Authorized Supervisor or designated representatives will maintain records of non-confidential medical evaluation determinations, the Respirator Fit-test Record (DMS# 0049-2062) (or similar), training documentation, and annual inspection audits and make them available to personnel and OSHA.

7.13.3 Record Retention

7.13.3.1 Fit test records must be retain until next successful fit test.

7.13.3.2 Medical Evaluation determinations from the PLHCP shall be maintained for 30 years after employment.

8 APPENDIX: version history

Version No.	Date	Description of Changes
00-05	2010.02.26	Issues with DMS no Documents
06	2010.02.26	New Document
07	2012.03.05	Sections: 2.1-2.5, 3, 4, 5, 6, 7.1, 7.3, 7.4, 7.5, 7.7, 7.8, 7.10, 7.11, 7.12
08	2014.02.28	Sections:2,6,7 see gray highlighted content
00	2015.01.15	Converted T09 Document 0008-7994 to T03. Updated Sections:2, 3, 4, 6, 7 See areas highlighted in grey
01	2015.02.23	Revised sections 2.2, 2.5, 4, 5, 6, 7.4, 7.5, 7.8 See areas highlighted in grey. Clarified voluntary use of respirators

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Respirator Fit Test Record				Document ID: 0049-2062 INS SUS-SAF-TCP (AME US/CAN) Respirator Fit Test
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.03.13		Version: 00

Employee has had a medical review and has no limitations that would prevent the use of respiratory protection equipment:

Signature of employee tested _____ Date _____

A. Employee name (print): _____

Employee No: _____ Employee job title/description: _____

B. Employer name: _____

Location/address: _____

Telephone: _____ Fax: _____

C. Respirator selected:

Manufacturer: _____

Model: _____ NIOSH approval number: _____

D. Conditions: (which could affect respirator fit):

Clean shaven ☐ Facial scar ☐ PPE worn ☐

Comments/other: _____

E. Fit checks:

Negative pressure: ☐ Positive pressure: ☐

F. Fit testing:

Qualitative: Bitrex ☐ Irritant smoke ☐ Saccharine ☐

Quantitative: Fit factor _____ Passed ☐ Failed ☐

G. Employee acknowledgement of test results:

Employee signature: _____ Date: _____

Test conducted by: _____ Date: _____

DISCLAIMER: This respirator fit test(s) training was performed on and by the person listed. The results indicate the performance of the listed respiratory protective device under controlled conditions, as tested on the employee named. Fit testing, as performed, measures the ability of the respiratory protective device to provide protection to the individual tested. The manufacturer or test conductor express or imply no guarantee that this or any identical respiratory protective device will provide adequate protection under conditions other than were present when this test was performed. Improper use, maintenance, or application of this or any other respiratory protective device will reduce or eliminate protection.

Initials of person tested: _____

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Qualitative Test

TEST EXERCISES AND FIT FACTORS
All Activities Are Performed For A Minimum of 60 Seconds.

PASS FAIL NORMAL BREATHING
(standing in place, no talking)

PASS FAIL DEEP BREATHING
(standing in place, breathe slowly, deeply)

PASS FAIL TURN HEAD SIDE TO SIDE
(standing in place, inhale at extreme positions)

PASS FAIL MOVE HEAD UP AND DOWN
(standing in place, inhale in up position)

PASS FAIL TALKING
(repeat or read out loud the Rainbow Passage)

PASS FAIL BENDING OVER OR JOGGING IN PLACE
(bend at waist as if to touch toes or jog in place)

PASS FAIL NORMAL BREATHING
(standing in place, no talking)

PASS FAIL FINAL FIT TEST FACTOR

NOTE: A HEPA filter cartridge was used while performing this test. The proper filter cartridge for your job may be different..

Quantitative Test

Attach print out from port-a counter

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RESTRICTED

WorkCare® Making Health Count

Respirator Questionnaire

DMS 0049-0698 R00

Please Fax completed questionnaire to: (714)922-1020 or Email to: Teampacific@workcare.com

I. Vestas Respirator Questionnaire

Name:		Today's Date:
Address:		SSN:
City/State/Zip:		Date of Birth:
Home Number:	Your email:	Gender (check one): ☐ Male ☐ Female
Please provide a phone number where you can be reached by the health care professional during business hours:	Your Height: ft. in.	Your Weight: lbs.

II. Site/Project Name:

Supervisor:	Supervisor Email:
Job Title:	Cost Center Number:

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Please answer every question.

1. Has your employer told you how to contact the health care professional who will review this questionnaire?

   ☐ Yes ☐ No

2. Check the type of respirator you will use (you can check more than one category):

   ☐ N, R, or P disposable respirator (filter-mask, non-cartridge type only).

   ☐ Other type (for example, half-or-full face piece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

3. Have you worn a respirator?

   ☐ Yes ☐ No

   If "yes", what type(s)?

   _____

4. Have you smoked tobacco?

   ☐ Currently — How many per day?_____

   How many years? _____

   ☐ Former — How many per day? _____

   How many years? _____

   How long ago did you quit? _____

   ☐ Never

5. Have you ever had any of the following conditions?

   a. Seizures (fits): ☐ Yes ☐ No

   b. Diabetes (sugar disease): ☐ Yes ☐ No

   c. Allergic reactions that interfere with your breathing: ☐ Yes ☐ No

   d. Claustrophobia (fear of closed-in places): ☐ Yes ☐ No

   e. Trouble smelling odors: ☐ Yes ☐ No

6. Have you ever had any of the following pulmonary or lung problems?

   a. Asbestos: ☐ Yes ☐ No

   b. Asthma: ☐ Yes ☐ No

   c. Chronic bronchitis: ☐ Yes ☐ No

   d. Emphysema: ☐ Yes ☐ No

   e. Pneumonia: ☐ Yes ☐ No

   f. Tuberculosis: ☐ Yes ☐ No

   g. Silicosis: ☐ Yes ☐ No

   h. Pneumothorax (collapsed lung): ☐ Yes ☐ No

   i. Lung cancer: ☐ Yes ☐ No

   j. Broken ribs: ☐ Yes ☐ No

   k. Any chest injuries or surgeries: ☐ Yes ☐ No

   l. Any other lung problem that you've been told about: ☐ Yes ☐ No

7. Do you currently have any of the following symptoms of pulmonary or lung illness?

   a. Shortness of breath:

      ☐ Yes ☐ No

   b. Shortness of breath when walking fast on a level ground or walking up a slight hill or incline:

      ☐ Yes ☐ No

   c. Shortness of breath when walking with other people at an ordinary pace on level ground:

      ☐ Yes ☐ No

   d. Have to stop for breath when walking at your own pace on level ground:

      ☐ Yes ☐ No

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7. Do you currently have any of the following symptoms of pulmonary or lung illness? ***(Continued)***

   e. Shortness of breath when washing or dressing yourself:
   ☐ Yes ☐ No

   f. Shortness of breath that interferes with your job:
   ☐ Yes ☐ No

   g. Coughing that produces phlegm (thick sputum):
   ☐ Yes ☐ No

   h. Coughing that wakes you up early in the morning:
   ☐ Yes ☐ No

   i. Coughing that occurs mostly when you are lying down:
   ☐ Yes ☐ No

   j. Coughing up blood in the last month:
   ☐ Yes ☐ No

   k. Wheezing:
   ☐ Yes ☐ No

   l. Wheezing that interferes with your job:
   ☐ Yes ☐ No

   m. Chest pain when you breathe deeply:
   ☐ Yes ☐ No

   n. Any other symptoms that you think may be related to lung problems:
   ☐ Yes ☐ No

8. Have you ever had any of the following cardiovascular or heart problems?

   a. Heart attack: ☐ Yes ☐ No
   b. Stroke: ☐ Yes ☐ No
   c. Angina: ☐ Yes ☐ No
   d. Heart failure: ☐ Yes ☐ No
   e. Swelling in your legs or feet (not caused by walking): ☐ Yes ☐ No
   f. Heart arrhythmia (heart beating irregularly): ☐ Yes ☐ No
   g. High blood pressure: ☐ Yes ☐ No
   h. Any other heart problem that you've been told about: ☐ Yes ☐ No

9. Have you ever had any of the following cardiovascular or heart symptoms?

   a. Frequent pain or tightness in your chest:
   ☐ Yes ☐ No

   b. Pain or tightness in your chest during physical activity:
   ☐ Yes ☐ No

   c. Pain or tightness in your chest that interferes with your job:
   ☐ Yes ☐ No

   d. In the past two years, have you noticed your heart skipping or missing a beat:
   ☐ Yes ☐ No

   e. Heartburn or indigestion that is not related to eating:
   ☐ Yes ☐ No

   f. Any other symptoms that you think may be related to heart or circulation problems:
   ☐ Yes ☐ No

10. Are the conditions listed in questions 5, 6 and 8 stable:
    ☐ Yes ☐ No

11. If you've used a respirator, have you ever had any of the following problems?

    a. Eye irritation: ☐ Yes ☐ No
    b. Skin allergies or rashes: ☐ Yes ☐ No
    c. Anxiety: ☐ Yes ☐ No
    d. General weakness or fatigue: ☐ Yes ☐ No
    e. Any other problem that interferes with your use of a respirator: ☐ Yes ☐ No

12. What is your current blood pressure reading, if known:

    _____

13. Do you currently take medication for any of the following problems?

    a. Breathing or lung problems: ☐ Yes ☐ No
    b. Heart trouble: ☐ Yes ☐ No
    c. Anxiety: ☐ Yes ☐ No
    d. Seizures (fits): ☐ Yes ☐ No

14. Have you ever lost vision in either eye (temporarily or permanently)?
    ☐ Yes ☐ No

15. Do you currently have any of the following vision problems?

    a. Wear contact lenses: ☐ Yes ☐ No
    b. Wear glasses: ☐ Yes ☐ No
    c. Color blind: ☐ Yes ☐ No
    d. Any other eye or vision problem: ☐ Yes ☐ No

16. Have you ever had an injury to your ears, including a broken eardrum?
    ☐ Yes ☐ No

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17. Do you currently have any of the following hearing problems?

a. Difficulty hearing: ☐ Yes ☐ No

b. Wear a hearing aid: ☐ Yes ☐ No

c. Any other hearing or ear problem: ☐ Yes ☐ No

18. Have you ever had a back injury?

☐ Yes ☐ No

19. Do you currently have any of the following musculoskeletal problems?

a. Weakness in any of your arms, hands, legs or feet:

☐ Yes ☐ No

b. Back pain:

☐ Yes ☐ No

c. Difficulty fully moving your arms and legs:

☐ Yes ☐ No

d. Pain or stiffness when you lean forward or backward at the waist:

☐ Yes ☐ No

e. Difficulty fully moving your head up or down:

☐ Yes ☐ No

f. Difficulty fully moving your head side to side:

☐ Yes ☐ No

g. Difficulty bending your knees:

☐ Yes ☐ No

h. Difficulty squatting to the ground:

☐ Yes ☐ No

i. Climbing a flight of stairs or a ladder carrying more than 25lbs:

☐ Yes ☐ No

j. Any other muscle or skeletal problem that interferes with using a respirator:

☐ Yes ☐ No

20. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen?

☐ Yes ☐ No

21. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals?

☐ Yes ☐ No

If "yes", name the chemicals if you know them:

_____

22. Have you ever worked with any of the materials, or under any of the conditions, listed below:

a. Asbestos: ☐ Yes ☐ No

b. Silica (e.g., in sandblasting): ☐ Yes ☐ No

c. Tungsten/cobalt (e.g., grinding or welding this material): ☐ Yes ☐ No

d. Beryllium: ☐ Yes ☐ No

e. Aluminum: ☐ Yes ☐ No

f. Coal (e.g., mining): ☐ Yes ☐ No

g. Iron: ☐ Yes ☐ No

h. Tin: ☐ Yes ☐ No

i. Dusty environments: ☐ Yes ☐ No

j. Any other hazardous exposures: ☐ Yes ☐ No

If "yes", describe these exposures:

_____

23. If you have a side business, are you exposed to any chemicals while doing this activity?

_____

24. List your previous occupations:

_____

25. List your current and previous hobbies:

_____

26. Have you been in the military services?

☐ Yes ☐ No

If "yes", were you exposed to biological or chemical agents (either in training or combat)?

☐ Yes ☐ No

27. Have you ever worked on a HAZMAT team?

☐ Yes ☐ No

28. Other than medications for breathing and lung problems, heart-trouble, blood pressure and seizures mentioned earlier in the questionnaire, are you taking any other medications for any reason (including over-the-counter medications)?

☐ Yes ☐ No

If "yes", name the medications if you know them:

_____

29. Will you be using any of the following items with your respirator(s)?

a. HEPA Filters: ☐ Yes ☐ No

b. Canisters (e.g., gas masks): ☐ Yes ☐ No

c. Cartridges: ☐ Yes ☐ No

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30. How often are you expected to use the respirator(s) (check "yes" or "no" for all answers that apply to you)?

a. Escape only (no rescue): ☐ Yes ☐ No

b. Emergency rescue only: ☐ Yes ☐ No

c. Less than 5 hours per week: ☐ Yes ☐ No

d. Less than 2 hours per day: ☐ Yes ☐ No

e. 2 to 4 hours per day: ☐ Yes ☐ No

f. Over 4 hours per day: ☐ Yes ☐ No

31. During the period you are using the respirator(s), is your work effort:

☐ Light (less than 200 Kcal per hour):

If "yes", how long does this period last during the average shift: _____ hrs. _____ min.

(Examples of light work effort are sitting while writing, typing, drafting or performing light assembly work; standing while operating a drill press (1-3 lbs.) or controlling machines.)

☐ Moderate (200 to 350 Kcal per hour):

If "yes", how long does this period last during the average shift: _____ hrs. _____ min.

(Examples of moderate work effort are sitting while mailing or filing; driving a truck or bus in urban traffic; standing while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; walking on a level surface about 2 mph or down a 5-degree grade about 3 mph; or pushing a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.)

☐ Heavy (above 350 Kcal per hour):

If "yes", how long does this period last during the average shift: _____ hrs. _____ min.

(Examples of heavy work are lifting a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; shoveling; standing while bricklaying or chipping castings; walking up an 8-degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.))

32. Will you be wearing protective clothing and/or equipment (other than the respirator) when you are using your respirator?

☐ Yes ☐ No

If "yes", describe this protective clothing and/or equipment:

_____

33. Will you be working under hot conditions (temperature exceeding 77°F)?

☐ Yes ☐ No

34. Will you be working under humid conditions?

☐ Yes ☐ No

35. Describe the work you will be doing while you are using your respirator(s):

_____

36. Describe any special or hazardous conditions you might encounter when you are using your respirator(s) (e.g., confined spaces, life-threatening gases):

_____

37. Provide the following information, if you know it, for each toxic substance that you will be exposed to when you are using your respirator(s):

a. Name the first toxic substance:

_____

Estimated maximum exposure level per shift:

_____

Duration of exposure per shift:

_____

b. Name the second toxic substance:

_____

Estimated maximum exposure level per shift:

_____

Duration of exposure per shift:

_____

c. Name the third toxic substance:

_____

Estimated maximum exposure level per shift:

_____

Duration of exposure per shift:

_____

d. The name of any other toxic substances that you will be exposed to while using your respirator:

_____

38. Describe any special responsibilities you will have while using your respirator(s) that may affect the safety and well-being of others (e.g., rescue, security):

_____

39. Would you like to be contacted by the health care professional reviewer?

☐ Yes ☐ No

_____ _____

Signature Date

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VAWT Fall Protection Program				Document ID: 0049-0571 INS SUS-SAF-IEM-EMR (AME US) Fall Protection
BPO.Del.SUS	Author(s): RIREG	2016.03.28		Version: 01

Version history

Version No.	Date	Description of Changes
01	2016.03.28	Revised sections 3.0, 7.1.3, 7.1.8, 7.2.2, 7.2.4, 7.3.1, 7.3.6, 7.3.8

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1 Purpose

To establish defined Fall Protection procedures for all Vestas employees and contractors who are exposed to potential fall hazards.

2 Responsibility

2.1 Senior Management

2.1.1 Ensure effective program development and implementation.

2.1.2 Provide Site/Construction/Authorized Supervisor with adequate resources and support to carry out program responsibilities and obligations.

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2.1.3 Require adherence to all policies, procedures, practices and rules related to the use and care of PPE/PFAS.

2.1.4 Oversee and evaluate Site/Construction/Authorized Supervisor performance.

2.2 Site/Construction/Authorized Supervisors

2.2.1 Ensure all personnel under Vestas supervision adhere to all policies, procedures and rules related to the use, care and storage of personal fall arrest and restraint equipment.

2.2.2 Assess the site hazards and provide the required Personal Fall Protection System and equipment for all Vestas personnel and visitors.

2.2.3 Ensure contractors supply required, approved personal fall restraint equipment for their personnel as required by the site hazard assessment.

2.2.4 Ensure all personnel under Vestas supervision have received training from a competent person and have adequate knowledge and skills to perform their duties using the required Personal Fall Arrest System (PFAS).

2.2.5 Ensure timely reporting of defective personal fall arrest equipment, restraint or other PPE-related concerns to the QSE Department utilizing an Equipment Defect Record (DMS 0049-0694).

2.2.6 Conduct scheduled and random inspections of personal fall protection systems and components to make sure all is in good condition using the Fall Arrest System Inspection form (DMS 0049-0572).

2.2.7 Take immediate action to repair and/or replace defective PPE and/or defective storage containers.

2.2.8 Make sure the use of personal fall arrest equipment does not endanger the user.

2.2.9 Ensure the work is carried out in compliance with the requirements of the Vestas Procedures, Federal, State and Local Regulations;

2.2.10 Ensure that all required fields in the Job Safety Analysis (DMS 0049-0549) pertaining to Fall Protection Plan are filled out daily in all worksites;

2.2.11 Ensure the Personal Fall Arrest System Inspection Record (DMS 0049-0572) are on file and completed upon initial assignment and quarterly for all personnel, contractors and visitors utilizing PFAS;

2.2.12 Ensure RTU Descent Device Inspection Records (DMS 0049-0559) are completed annually for each Descent device in use on site;

2.2.13 Investigate all personnel complaints and incidents involving fall protection and identify and implement corrective action wherever necessary.

2.2.14 Assign a competent person to perform and document a candidate tower climb practical test on (DMS 0049-2061).

2.3 QSE Department

2.3.1 Oversee and administer the Fall Protection Program;

2.3.2 Act as a resource for inquiries pertaining to the Fall Protection Program; and

2.3.3 Lead the annual review the Fall Protection Program and ensure it meets the regulatory requirements.

2.4 Employee

2.4.1 Be familiar with the Vestas fall protection work procedures and systems;

2.4.2 Follow the procedures as trained;

2.4.3 Inspect equipment before use;

2.4.4 Fill out Job Safety Analysis (DMS 0049-0549), Personal Fall Arrest System Inspection Record (DMS 0049-0572), RTU_Descent Device Inspection Record (DMS 0049-0559) and an Equipment Defect Record (DMS 0049-0694) when necessary;

2.4.5 Maintain equipment in accordance with manufacturer's specifications and this procedure;

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2.4.6 Report any concerns to the Site/Construction/Authorized Supervisors;

2.4.7 Use and inspect equipment in accordance with manufacturer's specifications whenever instructions are not provided in VAWT procedures; and

2.4.8 Work in a safe manner.

2.5 Technical Training Center (TTC)

2.5.1 Design and develop Personal Fall Protection Program training per applicable standards.

2.5.2 Conduct Personal Fall Protection and Emergency descent training in Basic Safety Training for all newly hired personnel.

2.5.3 Assign annual refresher e-learning training.

2.5.4 Maintain training records.

3 References

Document No.	Title
29CFR1910.132	Personal Protective Equipment (General Requirements)
OSHA 1910 Subpart D	Walking and Working Surfaces
0049-0995	VAWT Electrical Safety Program
29CFR1910.66 APP C	Personal Fall Arrest System
29CFR1910.269 (g)(2)	Electrical Power Generation, Transmission and Distribution (Fall Protection)
29CFR1926.Subpart M	Fall Protection
ASTM F 887-91	Standard Specifications for Personal Climbing Equipment
ANSI 14.3	Ladders-Fixed Safety Requirements
0000-5212	Requirement Specification for Fall Arrest Systems
0001-3167	Vestas Fall Arrest System
0049-0574	Crane Safety Program
Cal/OSHA T8 CCR 1670 & 2940.6	Cal/OSHA Construction Safety Orders Article 24 Fall Protection and High Voltage Safety Order

4 Scope

This procedure applies to all Vestas personnel, contractors and visitors who are exposed to potential fall hazards.

5 Terms and Abbreviations

Term or Abbreviation	Definition
Anchor	Secure point of attachment for a lifeline or lanyard (usually painted yellow).
Competent person	A person who is capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as in their application and use with related equipment.
Personal Fall arrest system (PFAS)	System used to arrest an employee in a fall from a working level.
Personal Fall restraint system	System to prevent personnel from falling from a work position, or from travelling to an unguarded edge from which the worker could fall.

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Term or Abbreviation	Definition
Personal Fall protection system	(a) a fall restraint system, (b) a fall arrest system, or (c) Work procedures that minimize the risk of injury to a worker from a fall.
Full body harness	A body support device consisting of connected straps designed to distribute the force resulting from a fall over at least the thigh, shoulders and pelvis, with provision for attaching a lanyard, lifeline or other components. A device specifically for the purpose of securing, suspending, or retrieving a worker in or from a hazardous work area.
Horizontal lifeline system	A system composed of a synthetic or wire rope, installed horizontally between 2 anchors, to which a worker attaches a personal fall protection system.
Lanyard	Flexible line of webbing, or synthetic or wire rope, used to secure a full body harness to a lifeline or anchor.
Lifeline	A synthetic or wire rope, rigged from one or more anchors, to which a worker attaches a lanyard or other part of a personal fall protection system.
Rope Grab	A deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking, or both.
Self-Retracting Lifeline/Lanyard	A deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.
Positioning Device System	A harness system rigged to allow an employee to be supported on an elevated surface, such as a wall or a fixed ladder, and work with both hands free.
Qualified Person	Personnel with a recognized degree or professional certificate and extensive knowledge and experience in the subject field who is capable of design, analysis, evaluation and specifications in the subject work, project, or product.
ERP	Emergency Response Plan
JSA	Job Safety Analysis
OEM	Original Equipment Manufacturer
PPE	Personal Protective Equipment
QSE	Quality Safety & Environmental
TTC	Technical Training Center

6 Forms

Document No.	Title
0049-0572	Personal Fall Arrest System Inspection Record
0049-0559	RTU Descent Device Inspection
0049-0694	Equipment Defect Record
0049-0549	Job Safety Analysis
0049-2061	Tower Climb Practical Test

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7 Process

7.1 General Fall Arrest System requirements

7.1.1 Limits maximum arresting force on an employee to 1,800lbs (8kN) when used with a body harness;

7.1.2 Be rigged such that an employee can neither free fall more than 6 ft. (1.8m), nor contact any lower level, and, where practicable, the anchor end of the lanyard shall be secured at a level not lower than the employee's waist;

7.1.3 Bring an employee to a complete stop and limit maximum deceleration distance an employee travels to FF-1 48 in. and FF-2 is 60 in. California requires 42 in. distance;

7.1.4 Sufficient strength to withstand twice the potential impact energy of an employee free fall a distance of 6 ft. (1.8m), or the free fall distance permitted by the system, whichever is less.

7.1.5 Self-retracting lifelines and lanyards which automatically limit free fall distance to 2 ft. (0.6m) or less shall be capable of sustaining a minimum tensile load of 3,000 pounds (13.3kN) applied to the device with the lifeline or lanyard in the fully extended position.

7.1.6 Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds (22.2kN).

7.1.7 Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body belts and body harnesses shall be made from synthetic fibers except for when they are used in conjunction with hot work where the lanyard may be exposed to damage from heat or flame.

7.1.8 Special equipment will be provided if the combined weight of a climber and his/her equipment and any load exceeds 300 lbs.

7.1.9 Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds (22.2kN) per employee attached, or shall be designed, installed, and used as follows:

7.1.9.1 As part of a complete personal fall arrest system which maintains a safety factor of at least two times the maximum arrest forces.

7.2 Fall Protection Plan

7.2.1 When work is performed at elevated locations more than 4 feet (1.2 meters) above the ground on poles, towers or similar structures, personnel are required to use PFAS equipment, along with work positioning equipment, or travel restricting equipment, if other fall protection methods have not been provided (e.g., guard rails, safety nets, etc.)

7.2.2 When working outside of this Fall Protection Program a Fall Protection Plan shall be prepared by a qualified person and developed specifically for the site where the work is being performed and the plan must be maintained up to date. The plan must specify:

7.2.2.1 The fall hazards at the work site;

7.2.2.2 The fall protection system to be used at the work site;

7.2.2.3 The anchors to be used during the work;

7.2.2.4 That clearance distances below the work area, if applicable, have been confirmed as sufficient to prevent an employee from striking the ground or an object or level below the work area;

7.2.2.5 The procedures used to assemble, maintain, inspect, use and disassemble the fall protection system, where applicable; and

7.2.2.6 The rescue procedures to be used if a person falls, is suspended by a personal fall arrest system or safety net and requires rescued.

7.2.3 All elements of the Fall Protection Plan are covered in this Fall Protection Program and the Vestas Job Safety Analysis (JSA) Form (DMS 0049-0549).

7.2.4 Should rope access be required, personnel involved must be SPRAT or IRATA certified.

7.3 Fall Protection Devices

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7.3.1 Guardrails

7.3.1.1 A standard guardrail shall consist of top rail, midrail or equivalent protection, and posts, and shall have a vertical height within the range of 42 inches to 45 inches from the upper surface of the top rail to the floor, platform, runway, or ramp level.

7.3.2 Full Body Harness

7.3.2.1 Must meet or exceed the requirements of ANSI Z359 Fall Protection Standards.

7.3.2.2 An employee using a personal fall arrest system must wear a full body harness;

7.3.3 Lanyards

7.3.3.1 Must meet or exceed the requirements of ANSI Z359 Fall Protection Standards.

7.3.3.2 Lanyards should be anchored as high as possible to reduce the distance an employee could fall;

7.3.3.3 Lanyards should be arranged to limit a free fall to no more than 4ft (1.2m) in a fall arrest situation.

7.3.4 Energy Absorber

7.3.4.1 Must meet or exceed the requirements ANSI Z359.13 Standard.

7.3.5 Anchors

7.3.5.1 In a temporary fall/travel restraint system, an anchor for a personal fall protection system must have an ultimate load capacity in any direction in which a load may be applied of at least:

7.3.5.1.1 1000lbs (4.5kN); or

7.3.5.1.2 Two times the weight of personnel to be connected to the system;

7.3.5.2 Each personal fall protection system that is connected to an anchor must be secured to an independent point of anchorage.

7.3.5.3 In a temporary fall arrest system, an anchor for a personal fall protection system must have an ultimate load capacity in any direction required to resist a fall of at least:

7.3.5.3.1 5000lbs (22kN); or

7.3.5.3.2 Two times the maximum arrest force.

7.3.5.4 A permanent anchor for a personal fall protection system must have an ultimate load capacity in any direction required to resist a fall of at least 5000lbs (22kN).

7.3.5.5 Anchorage points for personal protective equipment are marked (Stamped or Tag) and painted yellow.

7.3.5.6 Anchorage points must be checked for damage (prior to use).

7.3.5.7 Anchorage points for fall arrest equipment must never be used as lifting points.

7.3.6 Connectors, Carabineers and Snap Hooks

7.3.6.1 Connecting components of a fall arrest system consisting of carabineers, D-rings, O-rings, oval rings, self-locking connectors and snap hooks must be approved to ANSI Z359.12 and marked with 3600lbs gate strength on the gate or spine.

7.3.6.2 Must be self-closing and self-locking;

7.3.6.3 Must require at least two consecutive deliberate manual actions; and

7.3.6.4 Must be marked with the name or Trade Mark of the manufacturer, along with breaking strength of device in the major axis.

7.3.7 Personal Fall Arresting System

7.3.7.1 Fall arresting system must be approved to ANSI Z359.1;

7.3.7.2 Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials;

7.3.7.3 D-rings and snap hooks shall have a minimum tensile strength of 5,000 pounds (22.2kN).

7.3.7.4 Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of at least two.

7.3.7.5 Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds (22.2kN).

7.3.8 Positioning Devices

7.3.8.1 Positioning device systems and their use shall conform to the following provisions:

7.3.8.1.1 Devices shall be rigged such that an employee cannot free fall more than 2 feet.

7.3.8.1.2 Device systems shall be inspected prior to each use for wear, damage, and other deterioration, and defective components shall be removed from service.

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7.3.8.1.3 The use of non-locking snaphooks shall be prohibited after January 1, 1998.

7.3.8.1.4 Anchorage points for positioning device systems shall be capable of supporting two times the intended load or 3,000 pounds, whichever is greater.

7.3.9 Self-Retracting Device

7.3.9.1 Self-Retracting device must be approved to ANSI Z359.14;

7.3.9.2 Anchored above the personnel head unless the manufacturer's specifications allow the use of a different anchor location; and

7.3.9.3 Used in a manner that minimizes the hazards of swinging and limits the swing drop distance to 4ft. (1.2m) if a worker falls.

7.3.10 Descent Control Device

7.3.10.1 Manual descent control device must be approved to ANSI Z359.4.

7.3.11 Life Safety Rope

7.3.11.1 Life safety rope must be approved to ANSI Z359.4

7.3.11.1.1 Must extends downward to within 4ft. (1.2m) of ground level or another safe lower surface;

7.3.11.1.2 Be free of knots or splices throughout the travel portion except for a stopper knot at its lower end;

7.3.11.1.3 Effectively protected to prevent abrasion by sharp or rough edges; and

7.3.11.1.4 Made of material appropriate to the hazard and able to withstand adverse effects;

7.3.11.2 Personnel must use a vertical life safety rope in a manner that minimizes the hazards of swinging and limits the swing drop distance to 4ft. (1.2m) if personnel fall.

7.3.11.3 Only one worker may be attached to a life safety rope at any one time unless the manufacturer's specifications or specifications certified by a professional engineer allow for the attachment of more than one person.

7.4 Equipment Maintenance and Inspection

7.4.1 Personal fall arrest/restraint equipment used in a fall protection system must be:

7.4.1.1 Inspected by a competent person:

7.4.1.1.1 During initial assignment,

7.4.1.1.2 Quarterly; and

7.4.1.1.3 Before use on each work shift;

Note: Inspections completed during initial assignment and those performed quarterly shall be documented on the Fall Arrest system Inspection Record (DMS 0049-0572)

7.4.1.2 Kept free from substances and conditions that could contribute to its deterioration; and

7.4.1.3 Maintained in good working order.

7.4.2 Fall Protection systems, whether permanent or temporary, with horizontal or vertical lifelines, shall be:

7.4.2.1 Inspected by a qualified person:

7.4.2.1.1 After initial installation,

7.4.2.1.2 Annually; and

7.4.2.1.3 Daily by the user or a competent person;

7.4.3 Personal Fall Arrest Systems shall be inspected in accordance with Vestas Fall Arrest System (Wire) (DMS 0001-3167) and the manufacturer's specifications for the Avanti Rail Fall Arrest System.

7.4.4 Defective equipment shall be removed from service upon evidence of defects, damage, or deterioration, wear beyond manufacturer's limits, or upon expiration of the manufacturer's specified service limit, or upon impact loading, whichever comes first.

7.4.4.1 Defective equipment shall be documented on an Equipment Defect Record form (DMS 0049-0694)

7.4.5 Personal fall arrest systems or components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection unless inspected and determined by a Competent Person to be undamaged and suitable for reuse;

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7.4.6 Maintenance other than simple cleaning will be performed by a person identified as qualified to maintain the equipment, by the OEM, or their agent.

7.4.7 Records evidencing proper inspection and maintenance must be maintained and made available upon request.

8 Personnel Platforms

8.1 Requirements

8.1.1 Only trained authorized persons shall operate a lift or platform.

8.1.2 Personnel shall always stand firmly on the floor of the basket, and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.

8.1.3 A harness shall be worn and a lanyard attached to a structural member within the personnel platform capable of supporting a fall impact for employees using the anchorage.

8.1.4 A controlled descent device or an installed recue system shall be included in each platform.

8.1.5 Refer to the Crane Safety Program for requirement for crane suspended personnel platforms.

9 Rescue Procedures

9.1 Uninjured Worker (Self Rescue)

9.1.1 Personnel whom have fallen and are able to regain stability should; cease work activity, notify their supervisor and surrounding personnel and exit the turbine.

9.2 Injured Worker

Employee who has fallen and/or is suspended by a personal fall protection system that is unable to self-rescue.

9.2.1 It is the responsibility of Vestas personnel or their designee to rescue a suspended worker, and if necessary to deliver the person to the hospital or central first aid facility;

9.2.1.1 Rescue personnel are allowed to utilize equipment and services outside this program to perform emergency rescue.

9.2.2 Immediately notify supervisor and initiate the site ERP;

9.2.3 All personnel involved must ensure their own protection and the protection of other personnel participating in the rescue;

9.2.4 Where possible, all rescue work will be initiated from the ground up;

9.2.5 A secondary belay on rescuer may be used, where it does not impede the process of the rescue;

9.2.6 Effective first aid, in particular head, neck, and spine stabilization, must be applied while lowering and recovering the injured employee;

9.2.7 Where possible, the injured worker will be lowered to ground;

9.2.8 An ambulance will be immediately requested;

9.2.9 Worker must be examined by a doctor prior to returning to work.

10 Candidate Climb Test

10.1 Requirements

10.1.1 Only competent personnel designated by the Site/Construction/Authorizes Supervisor shall perform tower climb practical test evaluations for pre-hire candidates.

10.1.2 Two technicians qualified in the use of control descent equipment and procedures for rescuing personnel from turbine shall be utilized when performing climb test evaluations.

10.1.3 Technician performing the evaluation must complete the Tower Climbing Practical Test Form (DMS 0049-2061). The top section of the form up to Stage 4 must be completed prior to testing with Stage 4 completed during or after the practical.

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11 Training

11.1 Fall Protection System

11.1.1 Personnel must be trained in the safe use of the fall protection system before allowing them to work in an area where a fall protection system must be used.

11.1.2 Training must include the following:

11.1.2.1 A review of current legislation pertaining to fall protection;

11.1.2.2 An understanding of what a fall protection plan is;

11.1.2.3 Fall protection methods personnel are required to use at a work site;

11.1.2.4 Identification of fall hazards;

11.1.2.5 Assessment and selection of fall protection system anchors;

11.1.2.6 Instructions for the correct use of connecting hardware;

11.1.2.7 Information about the effect of a fall on the human body, including:

11.1.2.7.1 Maximum arresting force;

11.1.2.7.2 The purpose of the energy absorber;

11.1.2.7.3 Swing fall; and

11.1.2.7.4 Free fall.

11.1.2.8 Pre-use inspection;

11.1.2.9 Emergency response procedures;

11.1.2.10 Practice and practical application in:

11.1.2.10.1 Inspecting, fitting, adjusting and use of equipment;

11.1.2.10.2 Connecting fall protection systems and components; and

11.1.2.10.3 Emergency rescue procedures.

11.1.3 Only personnel who are considered as competent in the use and inspection of required equipment and procedures are allowed to work independently, where they are exposed to fall hazards; and

11.1.4 Personnel who have not demonstrated competence will only work under the direct supervision of a competent person or supervisor.

11.2 Climb Test Evaluator

11.2.1 Climb Test Evaluator training is available via e-learning for developing competent personnel.

11.3 Rescue

11.3.1 All Vestas personnel and contractors requiring unlimited access to the turbine must be trained initially and annual thereafter in:

11.3.1.1 Control descent equipment inspection and use; and

11.3.1.2 Procedures for rescuing personnel from turbine compartments or ladders.

11.4 Retraining

11.4.1 Additional retraining will be conducted whenever a periodic inspection reveals:

11.4.1.1 There is reason to believe, that there are deviations from this program; or

11.4.1.2 Inadequacies in the employee's knowledge in the use of fall protection equipment or procedures; and

11.4.1.3 Whenever a fall protection procedure fails.

11.4.2 The retraining will reestablish employee proficiency and introduce new or revised methods and procedures, as necessary

12 APPENDIX: version history

Version No.	Date	Description of Changes

T03 0052-0329 Ver 01 - Approved - Exported from DMS: 2016-08-05 by RIREG

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00	2011.06.09	New document
01	2012.04.16	Inserted Section 6,revised sections 7.3, 7.4, Inserted section 10, 11.2
02	2014.03.05	Revised HSE to QSE revised sections 2.2, 2.3, 2.4, 2.5, 5, 6, 7.3, 11.4
00	2015.03.13	Converted T09 Document (0028-1600) to T03 document, revised DMS#'s, sections 7.1, 7.2, 9.2

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RESTRICTED

Personal Fall Arrest System (PFAS) Inspection Record

Owner: BPO.DEL.SUS
Valid from 2015.11.02

DMS 0049-0572 R02
INS-SUS-LET-MIF (AME US/CAN)
PFAS Inspection

State: City: Date of Inspection: This PFAS is assigned to: Cost Center:

NOTICE: Each quarter your PFAS equipment must be inspected by a competent person other than yourself. (employee trained in according to Vestas Fall Protection Program is considered competent)

Inspection Frequency Select... Competent Person Initials

Inspection Checklist :
(Mark "✓" if there is no defect. If the item does not meet all inspection criteria, it must be **taken out of service** and **quarantined**)
**If the manufacturer's information for the piece of equipment being inspected is not available or is missing, the item must be quarantined.*

1.a. Cable Grab or Sleeve:

Has a cable grab/sleeve assigned to you? Make: Model: Serial:

Body:

a. All labels and markings legible.....
b. No cracks, bends or deformities.....
c. All fasteners present and secure.....

Rollers and Upper Roller Extension:

d. All moving parts move freely.....
e. (3) springs function properly.....
f. Normal wear from cable on body and shoe.....

1.b Runner/Slider (Avanti):

Has a Runner/Slider assigned to you? Make: Model: Serial:

Shock Absorber Serial Number: Shock Absorber Exp. Date:

Slider:

a. Free of paint, dirt, grease, etc.....
b. Markings are clearly readable.....
c. No cracks or deformities.....
d. Springs are intact and working.....

Shock Absorber:

e. Free of paint, dirt, grease, etc.....
f. No tears, abrasions, mold, or burns.....
g. No chemical, heat, or UV damage.....
h. Energy absorber cover is secure, not torn or damaged.....

2. Harness *(Full body harness, front, back, & side "D" rings:*

Harness Make: Model: Serial Number: Mfr. Year/Month:

a. Webbing free of cuts, frays or broken fibers.....
b. No tears, abrasions, mold, or burns.....
c. No chemical, heat, or UV damage.....
d. No pulled or cut stitches (*May indicate impact loading*).....
e. Hardware not cracked, corroded, damaged, or distorted.....
f. Buckles move freely and lock securely.....
g. Trauma Straps are properly attached with no signs of wear .....

3. Anchorage Connector or Carabineer *(Steel, one-handed operation, Double-Action, self-locking/self-closing gates):*

Identifying Marks: Steel or Aluminum:

a. No bends, cracks, dents, deformities.....
b. Rivets are not bent, loose or missing.....
c. Gate closes & locks automatically after releasing.....
d. Marked with ANSI Z359.1(07) stamp fall arrest standards.....

4. Energy Absorbent Lanyard(s) *(With self-locking snap hooks):*

Lanyard Make: Lanyard Model: Serial Number: Mfr. Year/Month:

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a. Webbing free of cuts, frays, or broken fibers..... ☐
b. No knots, excessive dirt or paint buildup..... ☐
c. No tears, abrasions, mold or burns..... ☐
d. No chemical, heat, or UV damage..... ☐
e. No pulled or cut stitches *(May indicate impact loading)*..... ☐
f. Measured length is same (+/- 6") as marked on label..... ☐
g. Energy absorber cover is secure, not torn or damaged..... ☐
h. Connecting hooks work properly..... ☐
i. Snap hook gates move freely, lock upon closing..... ☐

5. Positioning Lanyard(s) *(With cam and self-locking carabineer):*

Lanyard Make:	Lanyard Model:	Serial Number:	Lanyard Length:

Rope:

a. Free of UV or chemical damage (discoloration)..... ☐
b. Free of tears, abrasions, mold or burns..... ☐
c. Free of modifications..... ☐
d. No pulled or cut stitches..... ☐
e. Label markings are clearly readable..... ☐

Attachment Hardware *(Carabineer, Cam)*

f. Components function as intended..... ☐
g. Free of deformations..... ☐
h. Free of cracks..... ☐
i. Free of corrosion or pitting..... ☐

Additional Comments *(Use the Safety Equipment Defect Record to promptly address any noted defects):*

Every PFAS should be thoroughly inspected during initial assignment and then quarterly thereafter. When complete, click 'Submit' below.

Submit

Restricted and Proprietary to Vestas

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VESTAS PROPRIETARY NOTICE

Vestas Americas

Descent Device/Rescue Transfer Unit (RTU) Inspection Form

Basic Information:

Employee Initials: | Date of Inspection: | Country: | State:

City: | Cost Center: | Device Being Inspected: Select... | Serial Number:

Rescue equipment must receive inspection, care and maintenance at least once annually by an authorized person as outlined within ANSI Z359.4-07. Rescue equipment must be inspected in accordance with this form performing visual, tactile and functional checks. Record your findings in the appropriate fields below:

A tower descent device is designed for ready availability/emergency use and must be checked after EVERY unpacking/use.

All documented inspections of this equipment shall be filed in the Vestas North America Sustainability Hub page by clicking the 'submit' button below.

Inspection Checklist:

Rope: *Visually inspect the entire length of the rope for cuts, areas of excessive chafing, soft or hard spots, glazed or melted areas, discolorations or variations in diameter. Along with this visual inspection, feel the rope to detect possible damage to the core. Pay special attention to any areas that may have been knotted or that were drawn over or against edges. Putting tension on the rope can help you feel irregularities. Some wear to the sheath is normal, but when 50% of the fibers at any point on the sheath are worn through, the rope must be retired from service.*

	Satisfactory Condition: Yes	No
a. Is the measured length of rope equal to or greater than specified?	☐	☐
b. Is the rope free of ruptures/abrasions/cuts and free of holes on the sheath?	☐	☐
c. Is the rope free of knots, kinks or any other deformities?	☐	☐
d. Is the rope free of UV Degradation (discoloration)?	☐	☐
e. Is the rope show free of chemical damage (discoloration)?	☐	☐
f. Is the rope free of excessive heat exposure & burns (hard spots)?	☐	☐
g. What is length of the rope?		Feet
h. What is the height of the tower where this device is being used ?		Feet

Carabineers/Snap Hooks:	Yes	No
a. Is the anchor connector intact and functional?	☐	☐
b. Does the gate automatically close upon opening?	☐	☐
c. Is the carabineer or hook free of any deformities?	☐	☐
d. Is the carabineer or hook free of any cracks?	☐	☐

Anchor Slings: Length: inches Manufacturer:

	Yes	No
a. Are slings free of UV degradation or chemical damage (discoloration)?	☐	☐
b. Are slings free of ruptures/abrasions/cuts/crushing damage?	☐	☐

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	Yes	No
c. Do slings show evidence of modification (knots)?	☐	☐
e. Do the slings show evidence of excessive heat exposure & burns (hard spots)?	☐	☐
g. Are the slings free worn, abraded or loose stitching?	☐	☐

Upper Pulley Assembly (RTU devices only):	Yes	No
a. Is the attachment ring/pin existent and in place?	☐	☐
b. Is the bent attachment pin for the rope existent and in place?	☐	☐
c. Does the lower sheave function roll freely?	☐	☐
d. Do cleat mechanisms and adjustment pins function as intended?	☐	☐

Lower Pulley Assembly (RTU devices only):	Yes	No
a. Is the attachment ring/pin existent and in place?	☐	☐
b. Is the bent attachment pin for the rope existent and in place?	☐	☐
c. Does the upper sheave function roll freely?	☐	☐

d. Other:

Mechanical Check/Metal Components (Descent Device Only):	Yes	No
a. Is the descent device free of corrosion?	☐	☐
b. Is the descent device free of defects or flaws?	☐	☐
c. Does the descent device function correctly?	☐	☐
d. Are descent device fasteners secure and tight?	☐	☐
e. Pulling the rope forward and backward, is the device operational?	☐	☐
f. While pulling the rope forward and backward, is it free of unusual resistance?	☐	☐

Repacking for Storage: *(If the unit is wet after use, all metal components should be wiped dry with a clean dry cloth, and allowed to dry thoroughly at room temperature, protected from light, and never in a hot cabinet, boiler room or likewise. Also note, the brake vents must be closed when the device is stored. Immediately after the inspection, the equipment must be repacked into the carry bag as follows):*

a. Pull the rope through the brake unit on one end of the rope with the snap hook hanging approximately 40-60 cm from the brake unit.
b. The long end of the rope will packed into the bag with the attachment snap hook first.
c. The rope is packed into the bag on top of the snap hook.
d. After each ten packs, press the rope with your hand to compress in the bag.
e. Repeat steps 2 and 3 until the entire length of rope is packed into the bag.
f. Place the descent device on top of the packed rope.
g. Cinch the bag closed and return the device to its proper storage area, protected from sunlight.
h. Complete the inspection form and click 'submit' below to file on the sustainability hub site.
i. If any deficiencies are noted, complete and attach a safety equipment defect form.
j. Attach the snaplink (from line A-repacking) to the anchoring carabineer on the device.
k. Make sure that edge protector, wire rope, daisy chain and safety cutter are all accounted for when repacking.
l. If applicable, make sure pigtails, braking systems (cleat or flipper) are functioning as intended.

Comments:

Submit

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VESTAS PROPRIETARY NOTICE

Tower Climbing Practical Test				Document ID: 0049-2061 INS SUS-SAF-TCP (AME US/CAN) Climb Test Practical
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2016.02.21		Version: 01

Trainee (Print)_____ Date of Test_____

Trainer (Print)_____ Site/Location: _____

Turbine Model/ID #: _____ ☐ Prospective Employee ☐ Site Guest ☐Other: _____

I understand that the opportunity for employment with VAWT/VCWT at this site as a Wind Turbine Technician is dependent on the successful completion of this test.

I verify that my weight with all required PFAS equipment is less than 300lbs.(136 kg)

Signature_____ Date (MM-DD-YR)_____

☐ I have reviewed the **Turbine Safety Instruction** for this wind turbine

Check or Initial as Training Points are reviewed:

Stage 1: HAZARD AWARENESS	**Trained**		**Trained**
Heights		Location of ER Equipment	
Wind Speeds		Stop/Start Turbine (General Awareness)	
Fatigue		PPE for Hazard Abatement	
Radio or Phone Contacts		Sign JSA	
Loose object in pockets		Falling objects	

Stage 2: PPE USE, FIT, LIMITATIONS	**Trained**
Climbing Harness Fit	
Head Protection, Gloves, Glasses, Boots	
Cable Glider/Avanti Slider to Cable/Rail Operation	
Anchorage Device Operation	

Stage 3: REVIEW OF CLIMBING PROCEDURE	**Trained**
Cable Glider/Avanti Slider Operation	
Platforms, Transitions, Tie-Offs (signs or yellow)	

Note: Trainer can elect to discontinue test AT ANY TIME). After each stage, trainer will decide if test should continue, or comment why test should terminate. Prior to any climb test, notify Site Operations.

Stage 4: PRACTICAL TEST - TOWER ASCENT/DESCENT Trainer shall perform and observe condition; Trainee shall duplicate each line item:	***TASK S/U**	**Cond S/U**
Attach to PFAS, climb 15 feet and return		
Climb to first platform, tie-off, transition to platform, detach from PFAS, detach tie-off		
Tie-off, attach to PFAS, detach tie-off, climb to next platform, tie-off, transition to platform, detach from PFAS, detach tie-off		
Tie-off, transition to ladder, attach to PFAS, detach from tie-off, climb ladder to nacelle		
Ascends to nacelle roof and tie-off, point out nacelle components including tie-off points.		
Transition to last anchor point, observe Trainee transition to first/second anchor point.		
Transition to hub, (for turbine requiring external transition to nose cone)		
Review descent procedures, Trainee: tie-off, transition to ladder, attach to PFAS, detach from tie-off , climbs to next platform, waits – Trainer observe then follow		
Trainee: tie-off, transition to ladder, attach to PFAS, detach from tie-off , climbs to tower base, detach from PFAS - Trainer observe then follow.		
Trainer and Trainee remove climbing harnesses, notify operations, and re-start turbine.		
After return to site office trainer will verify all equipment issued for test has been returned		

*Trainer evaluates Sat or Unsat and trainee's condition Sat or Unsat: coherent, fatigued, dizzy, anxious

Trainer evaluation of tower climbing practical test: ☐ passed ☐ failed (Add comment for failure)

Trainer Signature:_____

Comments:_____

RETEST RECOMMENDED YES ☐ NO ☐ DATE: _____

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Ladder Safety Vestas System Instruction				Document ID: 0052-6020 INS SUS-MET-MAI (AME US/CAN) Ladder Safety
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.010.02		Version: 01

Version history

Version No.	Date	Description of Changes
01	2015.10.02	Incorporated Canadian references

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1 Purpose

To ensure that ladders are used safely at Vestas.

2 Responsibility

2.1 Site/Construction Managers and Supervisors

2.1.1 Ensure that defective ladders identified by employees are tagged out of service;

2.1.2 Site/Construction Managers are to repair or order replacement ladders if the ladder has been tagged defective;

2.2 Personnel

2.2.1 Inspect each ladder before use. Ladders with loose, broken, or missing rungs, split or bent side rails, or other defects must be identified and removed from service. The Site/Construction Manager or Supervisor is to be informed of the defective ladder.

2.2.2 Ensure that the ladder rests against a firm structure when in use;

2.2.3 Follow proper ladder safety procedures such as always facing the ladder when ascending, descending or standing and maintain three points of contact with the ladder.

2.3 QSE Department

2.3.1 Ensure that Ladder Safety procedures are implemented at Vestas.

2.4 Joint Health and Safety Committee

2.4.1 It is the responsibility of the Joint Health and Safety Committee (JHSC) to ensure that the Ladder Safety procedure is implemented at Vestas.

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3 References

Document No.	Title
CSA Standard CAN3-Z11-M81	Portable Ladders
RRO 1990 Reg 851 S. 18	Fixed Ladder
ANSI A14.1,2,5	Ladders-Portable
ANSI A14.3,	Ladders-Fixed
29 CFR 1910.26	Portable Metal Ladders
29 CFR 1910.27	Ladders-Fixed

Applicable provincial legislation relating to ladders listed below:

Province	Applicable provincial legislation
Ontario	Ontario Regulation 851- Industrial Regulations; Section 18 and Section 73
British Columbia	Occupational Health and Safety Regulation Division 2 (13.4-13.6)
Alberta	Occupational Health and Safety Code; Section 133 (1), 136 and 137
Saskatchewan	Occupational Health and Safety Regulations; Section 252-254
Manitoba	Workplace Safety and Health Regulations; Section 13.11-13.20
Quebec	Regulation Respecting Occupational Health and Safety; Section 26-28
New Brunswick	Occupational Health and Safety Act; Section 124 and 125
Prince Edward Island	Occupational Health and Safety Act General Regulations; Part 23
Nova Scotia	Occupational Safety General Regulations; Section 148, 150 and 151
Yukon	Occupational Health and Safety Act- Part 10 Sections 10.25, 10.28, 10.29
Newfoundland and Labrador	Occupational Health and Safety Regulations; Section 151

4 Forms

Document No.	Title
0052-6016	Ladder Inspection

5 Scope

This procedure applies to all Vestas employees, contractors and visitors who use ladders at Vestas managed facilities.

6 Terms and Abbreviations

Term or Abbreviation	Definition
ANSI	American National Standards Institute
CSA	Canadian Safety Association
HSE-A	Health Safety and Environment Alert
PIP	Process Industrial Practices
JHSC	Joint Health and Safety Committee
QSE	Quality Safety and Environmental

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7 Process

7.1 General Ladder Requirements

7.1.1 Ensure every ladder is designed and constructed to ANSI specifications.

7.1.2 Ensure every ladder is used, inspected and maintained to perform its function safely;

7.1.3 Check the condition of the ladder before use. Do not use broken or damaged ladders. Ladders to be repaired must be tagged “Do Not Use” and taken out of service;

7.1.4 Ladders used during the servicing of energized or potentially energized electrical equipment must be made of non-conducting materials.

7.1.5 To ensure a minimum of a 250# minimum weight capacity for portable ladders only class I, IA, or IAA in the US and Class I in Canada shall be used.

7.2 Fixed Ladders

7.2.1 Cages are required on fixed ladders of more than 6 meters (20 feet) to a maximum unbroken length of 9 meters (30 feet), where the length of ladder refers to the vertical distance between landings. Cages are also required on fixed ladders less than 6 meters (20 feet) in length where the ladder is located at an elevated platform that does not provide adequate fall protection. Fall arrest systems may be used in lieu of the required cage protection. Cages must meet the requirements of Process Industry Practices (PIP) Standard STF05501 August 2000, Fixed Ladders and Cages;

7.2.2 On fixed ladders there must be a safety gate, or equally effective means, at floor openings and platforms; and

7.2.3 Ensure that any fixed ladder is no more than 15 degrees from the vertical and does not lean back.

7.3 Portable Ladders (Includes Step Ladders and Extension Ladders)

7.3.1 Portable ladders must be secured against movement and placed on a base that is stable. Secure the ladder either mechanically or have it held by another person so it does not slip or fall;

7.3.2 Portable ladders used by personnel in Canada must also be CSA certified;

7.3.3 Ladders are to have non-slip feet;

7.3.4 Maintain 3-points of contact with the ladder when ascending, descending or stationary;

7.3.5 The side rails of portable ladders must extend at least 1 meter above any platform;

7.3.6 The base of an inclined portable ladder is no further from the base of the wall or structure than one quarter the length of the ladder, measured from the point at which the ladder contacts the wall or structure;

7.3.7 Do not splice short ladders together to make a longer ladder;

7.3.8 Do not place ladders in front of doors that open towards the ladder;

7.3.9 When ascending or descending a ladder, ensure personnel face the ladder and have free use of both hands. A hand-line shall be used to raise or lower objects;

7.3.10 Use of a closed top pouch for holding small tools while working on a ladder;

7.3.11 Never lean from a ladder to reach work unless utilizing an approved positioning lanyard;

7.3.12 Ensure no more than one person is on a ladder at any one time;

7.3.13 Always hold the side rails rather than the rungs of a ladder when ascending or descending;

7.3.14 When working from a portable ladder and there is a potential for personnel to fall a distance of 3 meters or more, an approved fall arrest system must be used. This fall protection requirement does not apply while personnel ascends or descends the portable ladder.

7.3.14.1 Where it is not practical to use this fall arrest system, personnel may work from a portable ladder without a fall arrest system provided the work is a light duty task of short duration or another employee is physically stabilizing the base of the ladder.

7.3.14.2 Personnel are not to extend any portion of their body except for their arms beyond the side rails of the ladder, and personnel are required to have one hand available to hold on to the ladder or other support;

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7.3.15 Metal spreader or locking device must be provided on stepladders to hold the front and back sections in an open position when ladders are being used; and

7.3.16 Personnel must not work from either of the top two rungs of a ladder.

7.3.17 When portable ladders are used for access to an upper landing surface, the side rails must extend at least 3 feet (.9 m) above the upper landing surface. When such an extension is not possible, the ladder must be secured and a grasping device such as a grab rail must be provided to assist workers in mounting and dismounting the ladder.

8 Communication

This procedure is communicated to all employees, contractors and visitors during site orientation.

9 Training

All personnel will be trained during site orientation on the safe use of ladders.

10 Evaluation and Inspection

10.1 Evaluation

10.1.1 This procedure will be reviewed once every three years through the QSE procedure review.

10.2 Inspection

10.2.1 All ladders must be inspected before use and annually. Annual inspection are to be documented on the Ladder Inspection form DMS# 0052-6016

11 Acknowledge Success

Success or any improvement needed for this procedure will be communicated to personnel via an HSE-A.

12 APPENDIX: version history

Version No.	Date	Description of Changes
00	2015.06.09	New document

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RESTRICTED

Portable Ladder Inspection

Name of Inspector:	
Ladder Identification / #:	
Type of Ladder:	
Ladder Rating:	
*** Construction of Ladder:**	

General Inspection Items	YES	NO
Loose steps or rungs (considered loose if they can be moved at all with the hand)?		
Loose nails, screws, bolts, or other metal parts?		
Cracked, spilt, or broken uprights, braces, or rungs?		
No Splinters/Slivers on uprights, rungs, or steps?		
Damaged or worn non-slip bases?		
Wobbly (from side strain)?		
Loose or bent hinge spreaders?		
Stop on hinge spreaders broken?		
Loose hinges?		
Broken, split, or worn steps?		
Loose, broken, or missing extension locks?		
Defective locks that do not seat properly while extended?		
Worn or rotted rope?		

Use of Ladders Evaluation	YES	NO
Are all ladders maintained in good condition, joints between steps and side rails tight, all hardware and fittings securely attached, and moveable parts operating freely without binding or undue play?		
Are non-slip safety feet provided on each metal or rung ladder, and surfaces free of grease and oil?		
Are employees prohibited from placing a ladder in front of doors opening toward the ladder unless the door is blocked open, locked, or guarded?		
Are employees prohibited from placing ladders on unstable bases to obtain additional height?		
Are employees prohibited from using ladders that are broken, have missing steps, rungs, or cleats, broken side rails, or other faulty equipment?		
Are employees instructed not to use the top step of ordinary stepladders as a step?		
When extension ladders are used to gain access to elevated platforms, roofs, etc., does the ladder always extend at least 3 feet (0.9144 meters) above the elevated surface?		
Are employees required to secure the base of a portable rung or cleat type ladder to prevent slipping, or otherwise lash or hold it in place?		
Are portable metal ladders legibly marked with signs reading "CAUTION - Do Not Use Around Electrical Equipment" or equivalent wording?		
Are employees prohibited from using ladders as guys, braces, skids, gin poles, or for other than their intended purposes?		
Are employees instructed to only adjust extension ladders while standing at a base (not while standing on the ladder or from a position above the ladder)?		
Are the rungs of ladders uniformly spaced at 12 inches (30.48 centimeters) center to center?		
Are all manufacture labels and stickers legible?		

* Fiberglass ladders must be used in the turbine per the Electrical Safety Plan DMS #0049-0995

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Rev. No.	Date	Description
00	2015.06.09	New Document

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Ladder Type

Extension
Step
Rolling

Ladder Rating

1AA - 375#
1A - 300#
1 - 250#
2 - 225#
3 - 200#

Construction

Fiberglass
Steel
Wood

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VAWT Electrical Safety Manual Vestas System Instruction				Document ID: 0049-0995 INS SUS-SAF-OPC [AME-US] Electrical Safety
Owner(s): BPO Del. SUS	Author(s): JATYL	Valid from: 2016.01.26		Version: 02

Version history

Version No.	Date	Description of Changes
02	2016.01.26	• Added Mechanical Operations near overhead energized lines • Updated section 3.1 • Added reference to crane safety program

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1 Purpose

VAWT believes incidents and injuries are preventable. While the company has an obligation to provide a safe and healthful workplace, each individual has a personal responsibility to maintain that safe environment through safe performance of tasks. Through joint efforts, an incident and injury free work environment can be achieved and maintained.

1.1 Program Administration

The purpose of this document is to establish the minimum requirements for an electrical safety program. This written manual has been developed as the written component of VAWT's Electrical Safety Program.

1.2 Objectives:

1.2.1 Establish a method for identifying and mitigating potential electrical hazards in the workplace.

1.2.2 Establish VAWT's standard practices related to electrical safety in the workplace.

1.2.3 Comply with US and Canadian regulatory requirements for electrical safety in the workplace.

2 Scope

This program applies to all VAWT individuals working at wind turbines in the US and Canada. It covers individuals and contractors who work on or near exposed energized electrical conductors or circuit components operating at between 50 volts and 40,000 volts.

3 Responsibilities

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3.1 Senior Management

3.1.1 Ensure effective program development and implementation.

3.1.2 Provide Site/Construction Management with adequate resources and support to carry out program responsibilities and obligations.

3.1.3 Require adherence to all policies, procedures, practices and rules related to the use and care of PPE.

3.1.4 Oversee and evaluate site/construction managers' performance.

3.1.5 Ensure all electrical equipment is approved for its intended use. All electrical equipment shall be of a type and rating approved for the specific purpose for which is to be used.

3.2 Site/Construction Manager/Authorized Supervisors

3.2.1 Ensure all personnel under Vestas supervision adhere to all policies, procedures and rules related to the Electrical Safety Program.

3.2.2 Ensure only Qualified Electrical Persons perform work on electrical equipment.

3.2.3 Ensure all personnel under Vestas supervision have received training from a competent person and have adequate knowledge and skills to perform their duties.

3.2.4 Ensure all contractors under Vestas supervision have received training from a competent person and have adequate knowledge and skills to perform their duties.

3.2.5 Maintain written plans or procedures that, at a minimum, comply with all local, state, provincial and federal laws and regulations that apply to the facility.

3.2.6 Comply with the most stringent requirement established either by local law or by this Electrical Safety Manual.

3.2.7 Evaluate differences between Vestas American Wind Technologies (VAWT) Control of Hazardous Energy Program (COHE) and Customers COHE and develop of written memorandum of agreement with the Customer.

3.2.8 The site/construction manager or his/her delegate shall schedule the Site QSE Inspection checklist to be completed monthly and a copy uploaded to the Site Self Audit document library on the QSE Hub page.

3.2.9 Conduct or delegate to a competent person, Personal Work Practice Audits for each assigned Qualified Person.

3.2.10 Qualify, at a minimum, to the Ordinary Person (Unqualified Person) Level.

3.2.11 Maintain a local record of training in each individual's file for assigned personnel including contractors/sub-contractors.

3.2.12 Ensure all electrical shock or arc flash injuries are promptly reported, employees or sub-contractors receive a prompt medical evaluation and obtain a Release to Work from the attending physician prior to the employee or sub-contractor resuming work.

3.2.13 Ensure employees acknowledge applicable Electrical Safety Notices when distributed from QSE.

3.2.14 Assist QSE Department by performing a thorough investigation following any electrical safety or arc flash incident.

3.2.15 Ensure there is a documented meeting with subcontractors to identify known wind turbine generator electrical hazards.

3.3 Quality, Safety and Environmental (QSE)

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3.3.1 Develop and monitor implementation of the ESP Program.

3.3.2 Ensure efficient and effective ESP instruction and training are conducted.

3.3.3 Conduct workplace inspections and audits.

3.3.4 Conduct a program review annually in conjunction with the Electrical Safety Team.

3.3.5 Review program within 90 days of the release of any revision to the referenced standards.

3.3.6 Propose and implement improvements to the ESP Program.

3.3.7 Develop and distribute HSE-Alerts on behalf of the Electrical Safety Team.

3.4 Personnel

3.4.1 Comply with the requirements of the ESP.

3.4.2 Eliminate hazardous conditions and practices in the workplace.

3.4.3 Perform specific responsibilities as designated to certain positions under the Electrical Safety Program.

3.4.4 Report incidents of misuse while working with ESP.

3.5 Contractors

3.5.1 All contractors are expected to comply with the requirements of this section and shall perform all tasks in a manner that assures the safety of the contractor's individuals and the safety of VAWT individuals.

3.5.2 Contractors shall contact the VAWT Site/Construction Manager or Authorized Supervisor whenever a need arises to perform work on energized electrical circuitry. The contractor shall assure that an Energized Electrical Work Permit request is completed and approved prior to initiation of the work.

3.5.3 Contractors shall furnish proof upon request that all personnel who will perform Electrical Work are qualified for the tasks they will perform before work begins.

3.5.4 Upon request, the contractor shall provide full disclosure regarding any regulatory citations that have been issued against the company and contacted sub-contractors during the previous five years, the resolution of those citations, and any pending regulatory action(s) against the company.

3.5.5 All equipment necessary for contractor and sub-contract individuals to perform electrical work in a safe manner, including personal protective equipment, tools and instruments, warning signs, barriers and barricades, and insulated tools shall be furnished by the contractor to their individuals and used as prescribed.

3.5.6 VAWT reserves the right to immediately stop any work that is deemed unsafe by VAWT until the contractor or sub-contractor corrects the deficiencies.

3.5.7 Repeated instances of unsafe conduct, conditions, and violations of applicable regulatory standards or VAWT policy may result in cessation of the project, termination of the contract, and potential removal from consideration for future work.

3.6 Electrical Safety Team

3.6.1 Electrical Safety Program Review

3.6.1.1 The Electrical Safety Team shall lead the annual review of the Electrical Safety Program.

3.6.1.2 The Electrical Safety Team shall be responsible for ensuring that the

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Electrical Safety Program remains up to date with new turbine technologies, electrical work tasks and electrical safety standards.

3.6.2 Issue Resolution:

3.6.2.1 The Electrical Safety Team shall be the VAWT authority in resolving technical or program interpretation questions.

3.6.2.2 As a result of technical interpretations, the Electrical Safety Team will draft a HSE Alert for issues that merit dissemination. Some technical interpretations may require a revision of the Electrical Safety Manual outside of the normal annual revision cycle.

3.6.2.3 All interpretations or revisions shall be communicated in writing to the following groups via a HSE Alert:

3.6.2.3.1 Technology/Electrical Engineering

3.6.2.3.2 Technician Training

3.6.2.3.3 QSE

3.6.2.3.4 Technical Support

3.6.2.3.5 Operations

4 References

Document No.	Title
CFR 1910.147	Control of Hazardous Energy
1910 Subpart S	Electrical
CFR 1910.269	Electric Power Generation, Transmission, and Distribution
CFR 1910.333	Subpart S Electrical –Selection and use of work practices
NFPA 70E	Electrical Safety in the Workplace
CSA Z460	Control of Hazardous Energy – Lockout and Other Methods
CSA Z462	Workplace Electrical Safety
0049-0574	Crane Safety Program
Cal/OSHA T8CCR, Chapter 4, Subchapter 5 Sections 2229-2989	Electrical Safety Orders

5 Forms

DMS No.	Title
0049-0546	Site QSE Inspection Checklist
0049-0597	Site Electrical Audit
0049-2058	Energized Electrical Work Permit
0049-0599	ESP_CoHE Training Level Matrix
0049-0600	Personal Electrical Work Practice Audit
0049-0601	Assured Grounding Test Log
0049-0602	Electrical Safety/Control of Hazardous Energy Equivalency Matrix

6 Terms and Abbreviations

Term or Abbr.	Definition
AC (VAC)	Alternating Current
AFHA	Arc Flash Hazard Analysis
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
ATPV	Arc Thermal Performance Value
cal/cm2	Calories Per Centimeter Squared

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COHE	Control of Hazardous Energy Program
COHS	Canadian Occupational Health and Safety
CPR	Cardiopulmonary Resuscitation
CSA	Canadian Safety Association
DC (VDC)	Direct Current
EBT	Break Through Energy
ESP	Electrical Safety Plan
ESN	Electrical Safety Notice
FR	Flame Resistant
GFCI	Ground Fault Circuit Interrupt
HSE-A	Health, Safety and Environmental - Alert
HV	High Voltage
JSA	Job Safety Analysis
NFPA	National Fire Protection Association
OJT	On the Job Training
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
PTP	Pre-task Plan
QSE	Quality, Safety and Environmental
RMS	Root Mean Square
SBU	Sales Business Unit
TTC	Technical Training Center
UL	Underwriter Laboratory
UPS	Uninterruptable Power Supply

7 Definitions

Access: Operating (opening, closing, performing visual inspections of, or charging) a circuit breaker within the cabinet or opening the cabinet.
Affected Employee: An employee whose job requires operation or use of a machine or equipment on which service or maintenance is performed under lockout/tagout or whose job requires him/her to work in an area in which servicing or maintenance is performed.
Approved: 1) Accepted, certified, listed, or labeled by a recognized testing laboratory/agency (for example, UL Listed), or 2) acceptable to the authority having jurisdiction.
Arc Flash Hazard: A dangerous condition associated with the possible release of energy caused by an electric arc. An arc flash hazard may exist when energized electrical conductors or circuit parts are exposed or when they are within equipment in a guarded or enclosed condition, provided a person is interacting with the equipment in such a manner that could cause an electric arc. Under normal operating conditions, enclosed energized equipment that has been properly installed and maintained is not likely to pose an arc flash hazard.
Arc Flash Hazard Analysis (AFHA): A study investigating a worker's potential exposure to arc-flash energy, conducted for the purpose of injury prevention and the determination of safe work practices, arc flash protection boundary, and the appropriate levels of PPE.
Arc Flash Suit: An arc-rated clothing and equipment system that covers the entire body, except for the hands and feet. Including a beekeeper-type hood fitted with a face shield and hard hat.
Arc Rated: The maximum incident energy resistance demonstrated by a material (or a layered system of materials) prior to break-open or at the onset of a second-degree skin burn. Arc rating is normally expressed in cal/cm^2.
Arc Rated Clothing: Clothing tested and certified to withstand the labeled arc rating.

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Arc Rating: The value attributed to materials that describe their performance to exposure to an electrical arc discharge. The arc rating is expressed in cal/cm^2 and is derived from the determined value of the arc thermal performance value (ATPV) or energy of break open threshold (EBT) (should a material system exhibit a break open response below the ATPV value) derived from the determined value of ATPV or EBT. (*Break open* is a material response evidenced by the formation of one or more holes in the innermost layer of arc-rated material that would allow flame to pass through the material.)
Authorized Person: A trained person who can perform lockout and/or Tagout in accordance with COHE program. An Authorized Person can hang his/her personal locks on equipment that has already been locked out by the Person in Charge (Qualified Person).
Boundary, Arc Flash Protection: When an arc flash hazard exists, an approach limit at a distance from a prospective arc source within which a person could receive a second degree burn if an electrical arc flash were to occur.
Boundary, Limited Approach (Shock): A shock protection boundary, intended to define the approach limit for the unqualified worker and to eliminate the risk of contact with an exposed energized electrical conductor or circuit part within which a shock hazard exists. The term is used to identify an imaginary distance beyond which special considerations are necessary to protect the worker.
Boundary, Restricted Approach (Shock): The approach limit for a qualified electrical person. An approach limit at a distance from an exposed energized conductor or circuit within which there is an increased risk of shock due to an electrical arc-over.
Circuit Breaker: A device designed to open and close a circuit by no automatic means and to open the circuit automatically on a predetermined overcurrent without damage to itself when properly applied within its rating.
Deenergized: Circuit or systems free from any electrical connection to a source of voltage and from electrical charge; not having a voltage different from that of the earth.
Deenergized Work: Deenergized work shall be considered any work performed on or near equipment and circuits that has been placed in an electrically safe work condition by a Lockout/Tagout procedure that meets the requirements outlined in the VAWT Control of Hazardous Energy Program.
Deranged Equipment: Electrical equipment that has been subjected to an electrical failure shall be considered damaged equipment until its electrical integrity can be verified by testing and inspection.
Device: A unit of an electrical system that carries or controls electric energy as its principal function.
Disconnecting Means: A device, or group of devices, or other means by which the conductors of a circuit can be disconnected from their source of supply.
Disconnecting (or Isolating) Switch (Disconnect or, Isolator): A mechanical switching device used for isolating a circuit or equipment from a source of power.
Electrical Hazard: A dangerous condition such that contact or equipment failure can result in electric shock, arc flash burn, thermal burn, or blast.
Electrical Incident: An event resulting from personnel action or equipment failure involving electrical installations, portable electrical equipment or electrical test equipment that has a capability to result in an injury due to: 1) electrical flash or burn, 2) electrical shock from a source greater than 50 VAC or 100 VDC, or 3) reflex action to an electric shock (any voltage).
Electrical Injury: Any injury resulting from an electrical incident.
Electrical Injury, Serious: Any electrical injury that results in unconsciousness, memory loss, first degree burn, retinal burn, puncture wound, muscular cramp, arrhythmia shown by electrocardiogram (ECG), long term tissue or nerve damage, bone fracture, shock lung, perforated eardrum, or disruption of the blood serum balance.
Electrical Safety: Recognizing hazards associated with the use of electrical energy and taking precautions so that hazards do not cause injury or death.
Electrical Safety Notice: An interpretation released by the Electrical Safety Team to provide clarification to the ESP/COHE Programs
Electrical Safety Program (ESP): The culmination of documents, policies, procedures and programs that exist for the purpose of electrical safety.
Electrical Safety Team: A team thoroughly familiar with electrical safety concepts. The Electrical Safety Team holds various responsibilities outlined in this manual, and reports to VAWT QSE for all matters of electrical safety.
Electrical Work: Maintenance, service, modification or troubleshooting of electrical systems or components.

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Electrically Safe Work Condition: A state in which an electrical conductor or circuit part has been disconnected from energized parts, locked/tagged in accordance with established standards, tested to ensure the absence of voltage, and grounded if determined necessary. In the generic term, this is a Zero-Energy State.
Enclosed: Surrounded by a case, housing, fence, or wall(s) that prevents persons from accidentally contacting energized electrical conductors or circuit parts.
Enclosure: The case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from inadvertently contacting energized electrical conductors or circuit parts or to protect the equipment from physical damage. This requirement is fulfilled by equipment designed to IP-2X specifications in accordance with IEC 60529.
Energized: Electrically connected to, or is, a source of voltage.
Energized Electrical Work Permit: This permit is required to perform work on energized electrical systems. Exceptions are troubleshooting and voltage testing. (0049-2058).
Energized Work: Energized work shall be considered any work that the individual is exposed to an electrical hazard. An example would be making contact with any object that has the potential of 50 volts (AC or DC) or higher. Energized work is also considered by VAWT as any work within the restricted approach boundary where inadvertent movement by the individual could cause contact with any object that has the potential of 50 volts or higher. VAWT considers any work that places the individual in a high risk factor due to flash and blast hazard as energized work.
Energy Control Coordinator: The Energy Control Coordinator's duties are defined in the VAWT Control of Hazardous Energy Program (0049-0580).
Equipment: A general term, including material, fittings, devices, appliances, luminaries, apparatus, machinery, and the like used as a part of, or in connection with, an electrical installation.
Exposed (as applied to energized electrical conductors or circuit parts): Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to electrical conductors or circuit parts that are not suitably guarded, isolated, or insulated.
Externally Operable: Capable of being operated without exposing the operator to contact with energized electrical conductors or circuit parts.
Feeder: All circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit overcurrent device.
Flame-Resistant (FR): The property of a material whereby combustion is prevented, terminated, or inhibited following the application of a flaming or non-flaming source of ignition, with or without subsequent removal of the ignition source.
Fuse: An over-current protective device with a circuit opening fusible part that is heated and severed by the passage of overcurrent through it.
Grounded (Grounding): Connected (connecting) to ground or to a conductive body that extends the ground connection.
Ground-Fault Circuit-Interrupter (GFCI): A device intended for the protection of personnel that functions to deenergize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device. Class A ground-fault circuit-interrupters trip when the current to ground is 6 mA or higher and do not trip when the current to ground is less than 4 mA.
Guarded: Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers, casings, barriers, rails, screens, mats, or platforms to remove the likelihood of approach or contact by persons or objects to a point of danger.
Incident Energy: The amount of energy impressed on a surface, a certain distance from the source, generated during an electrical arc event. One of the units used to measure incident energy is calories per centimeter squared (cal/cm^2).
Insulated: Separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to the passage of current. When an object is said to be insulated, it is understood to be insulated for the conditions to which it is normally subject. Otherwise, it is, within the purpose of these rules, uninsulated.
Labeled: Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, which maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.
Live Parts: Energized conductive components.

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Neutral Conductor: The conductor connected to the neutral point of a system that is intended to carry current under normal conditions.
On or Near: On or near refers to work within the limited approach boundary.
Ordinary Person: Person who is not a Qualified Electrical Person.
PPE Category: PPE clothing categories identified in NFPA 70E.
Personal Protective Grounds: Grounding conductors that are designed to carry the maximum fault current that could appear at the point of grounding for the time necessary to clear the fault.
Qualified Electrical Person: One who has demonstrated the skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to identify and avoid the hazards involved. Only personnel designated by the Business Unit as Qualified Electrical Persons shall be allowed to work on electrical equipment.
Root Cause: An incident's most basic cause that can be reasonably identified, and, when mitigated, will prevent (or significantly reduce the likelihood or consequences of) the incident's recurrence.
Safety Bulletin: An important message generated by VAWT Sustainability that calls out a serious incident, job hazard or document that requires immediate action.
Separately Derived System: A premises wiring system whose power is derived from a source of electric energy or equipment other than a service. Such systems have no direct electrical connection, including a solidly connected grounded circuit conductor, to supply conductors originating in another system.
Shock Hazard: A dangerous condition associated with the possible release of energy caused by contact or approach to energized electrical conductors or circuit parts.
Short-Circuit Current Rating: The prospective symmetrical fault current at a nominal voltage to which an apparatus or system is able to be connected without sustaining damage exceeding defined acceptance criteria.
Single-Line Diagram: A diagram that shows, by means of single lines and graphic symbols, the course of an electric circuit or system of circuits and the component devices or parts used in the circuit or system.
Static Grounds: Grounding conductors designed to dissipate induced voltages. They are not designed to carry the full fault current in the event the circuit is inadvertently energized.
Switch, Isolating: A switch intended for isolating an electric circuit from the source of power. It has no interrupting rating, and it is intended to be operated only after the circuit has been opened by some other means.
Switching Device: A device designed to close, open, or both, one or more electric circuits.
Task Based Certification (TBC): A structured program which gauges the demonstrated skill set of the entire technician population which consists of a series of grouped tasks which are to be performed (demonstrated) by technicians and reviewed by certifiers.
Test before Touch: Verification of the absence of voltage immediately upon opening the electrical enclosure for the equipment being worked on. Every conductor, the connectors termination points and at any location to be touched by the individual will be tested first with a non-contact voltage detectors then again with the appropriate voltage detector.
Troubleshooting: Process of fault isolation by working within the Limited Approach Boundary of an energized circuit.
Ultimate Point of Isolation: During a grid outage, this is the upstream isolation device that is used for lockout. It still has voltage on the line (grid) side. Other isolation points downstream are all deenergized on both the line and load side.
Unqualified Person: A person who is not qualified to perform electrical work. VAWT Level 0 or 1 Unqualified Technician.
Utilization Equipment: Equipment that utilizes electric energy for electronic, electromechanical, chemical, heating, lighting, or similar purposes.
Ventilated: Provided with a means to permit circulation of air sufficient to remove an excess of heat, fumes, or vapors.
Vestas Offsite Manager: The immediate supervisor for the Site Manager or Construction Manager, i.e. Regional/Construction Directors, whose permission is required for certain activities.
Voltage (of a Circuit): The greatest root-mean-square (RMS) (effective) difference of potential between any two conductors of the circuit concerned.
Voltage, High: Nominally rated at greater than 1000 VAC or 1500 VDC.
Voltage, Low: Nominally rated at or below 1000 VAC or 1500 VDC.

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Voltage, Nominal: A nominal value assigned to a circuit or system for the purpose of conveniently designating its voltage class (e.g., 120/240 volts, 480Y/277 volts, 600 volts). The actual voltage at which a circuit operates can vary from the nominal within a range that permits satisfactory operation of equipment.
Voltage to Ground: For grounded circuits, the voltage between the given conductor and that point or conductor of the circuit that is grounded; for ungrounded circuits, the greatest voltage between the given conductor and any other conductor of the circuit.
Working On (energized electrical conductors or circuit parts): Coming in contact with energized electrical conductor or circuit parts with the hands, feet, or other body parts, with tools, probes, or with test equipment, regardless of the personal protective equipment a person is wearing. There are two categories of "working on":

Diagnostic (testing) is taking readings or measurements of electrical equipment with approved test equipment that does not require making any physical change to the equipment; and
Repair is any physical alteration of electrical equipment (such as making or tightening connections, removing or replacing components, etc.).

8 Electrical Safety Program

8.1 Electrical Incident Reporting and Investigation

8.1.1 All incidents shall be reported and investigated in accordance with VAWT Incident Reporting, Investigation, and Prevention Policy.

8.1.2 A mandatory medical assessment shall immediately follow any electric shock incident or arc flash exposure, however minor. Return to work will require following the Return to Work check sheet (0049-0552).

8.1.3 In the event of an electrical shock, a QSE representative will, in conjunction with the site leadership, conduct an investigation.

8.1.4 The results of the investigation, including corrective actions, will be forwarded to the management team for review.

8.2 Disciplinary Actions Non-Compliance

8.2.1 Failure to comply with the requirements of this standard may result in disciplinary action up to and including termination.

8.2.2 Failure of a contractor or sub-contractor to follow specified procedures and/or observation of the contractor engaging in activities deemed to be unsafe may result in the immediate cessation of the activity, removal of that company or individual from current and future contracts.

8.3 SBU Electrical Safety Team

8.3.1 VAWT shall maintain a small team of individuals to help steer the Electrical Safety Program and will meet quarterly.

8.3.2 The SBU Electrical Safety Team shall be composed of the following mandatory representatives:

8.3.2.1 Electrical Engineering: one electrical engineer shall be the Electrical Safety Engineer.

8.3.2.2 Technical Support: one individual from the Technical Support group shall be the Electrical Safety Technician.

8.3.2.3 Technician Training: one representative from the Technician Training department.

8.3.2.4 QSE: one representative from QSE department

8.3.2.5 Operations: one management representative from the Operations department.

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8.3.3 Coordinate with the Technician Training Department to ensure that adequate and timely training is made available to technicians.

8.3.4 Draft as appropriate, safety messages for electrical safety issues that merit dissemination and forward to QSE for review and release.

8.3.5 Consult Vestas Electrical Safety Committee with any issues that need evaluation or ruling by higher authority.

8.3.6 Conduct electrical training audits of the TTC.

8.4 Internal Auditing

8.4.1 The strength of the Electrical Safety Program rests in large part on the effectiveness of the internal audit program. Audit requirements shall focus on those elements that are most critical in improving electrical safety for the individual. These focus elements are determined from incident reporting and are expected to vary over time. Any electrical audit is primarily expected to quantify electrical skill level and safety attitude, as these are the root elements of safe electrical behavior.

8.5 Internal audit required by this program:

8.5.1 Site Electrical Audit is to be completed as part of the Site QSE Inspection checklist (0049-0546) which focuses on records, training effectiveness, material condition of equipment, condition of PPE, etc.

8.5.2 Personal Electrical Work Practices Audit (0049-0600)

8.5.2.1 A personal work practices audit focuses on one particular individual at a time. The individual is observed performing a particular electrical task and is evaluated on the basis of his or her behavior, technical competency, skill level, and safety attitude.

8.5.3 Training Audit

8.5.3.1 The Training Audit focuses on the training performed by the Technician Training department. The audit will evaluate both the content of the course and the effectiveness of the instructor.

8.6 Periodicity

8.6.1 The site/construction manager or his/her delegate shall schedule the Site QSE Inspection checklist to be completed monthly and a copy uploaded to the Site Self Audit document library on the QSE Hub page. http://teamsitesame.vestas.net/sites/21007/Site%20Self%20Audit%20Forms/Forms/AllItems.aspx

8.6.2 The Site/Construction Manager/Authorized Supervisor or his/her delegate shall coordinate periodic Personal Electrical Work Practices Audit on each qualified electrical person during the calendar year.

8.6.3 A representative of the Electrical Safety Team shall audit each electrical safety course given at the Technician Training Center annually.

8.7 Documentation

8.7.1 The Site Electrical Audits and Personal Electrical Work Practices Audit shall be made available upon request by the QSE department.

9 Electrical Qualification and Safety Training

9.1 Purpose

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9.1.1 This section provides overview information on the electrical safety training requirements established for specific job assignments. To be qualified and authorized to perform a task safely the individual must have safety training and demonstrated skills as required for that task.

9.2 Qualification Prerequisites

9.2.1 All new technicians must successfully complete Basic Safety Training before receiving job assignments. This training provides an overview of the OSHA, COHS and VAWT requirements prior to individuals commencing work. Specialized safety training and/or on-the-job training is provided to each individual based on assigned tasks and duties.

9.2.2 All VAWT Technicians shall work to attain the Qualified Electrical Person level.

9.2.3 VAWT Site/Construction Managers/Authorized Supervisors shall qualify, at a minimum, to the Ordinary Person (Unqualified Person) Level.

9.3 Training Requirements and Scope of Work

9.3.1 The individual's immediate manager shall ensure the appropriate level of safety training is provided prior to the individual performing any work in a wind turbine. Refer to the ESP/COHE Training Matrix (0049-0599)

9.3.2 The immediate manager shall maintain a local record of training in each individual's file.

9.3.3 Escorted Visitor

9.3.3.1 Visitor Training Requirements:

9.3.3.1.1 Visitor site orientation

9.3.3.1.2 Site safety briefing

9.3.3.2 Escorted Visitor Scope of Work

9.3.3.2.1 Cannot perform electrical work

9.3.3.2.2 Cannot enter into the arc flash protection boundary or limited approach boundary

9.3.3.2.3 Must install LOTO (locks and/or tags) under the supervision of a Qualified Electrical Person; and

9.3.3.2.4 Must wear PPE appropriate for the hazards present.

9.3.4 Ordinary Person

9.3.4.1 Ordinary Person Training Requirements:

9.3.4.1.1 Site orientation

9.3.4.1.2 Site safety briefing

9.3.4.1.3 Basic Safety Training

9.3.4.2 Ordinary Person Scope of Work:

9.3.4.2.1 Must install locks and/or tags under the direction of a Qualified Person while in an established lockout boundary

9.3.4.2.2 Can perform non-electrical work around energized electrical equipment as long as the cabinets are closed and remain closed

9.3.4.2.3 Cannot enter the limited approach boundary

9.3.4.2.4 Can perform non-electrical work in electrical cabinets that have been placed in an electrically safe work condition.

9.3.4.2.5 Can perform general electrical work under instruction as a Qualified Electrical Person.

9.3.5 Qualified Electrical Person

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9.3.5.1 General Electrical Work Scope

9.3.5.1.1 Voltage testing to verify circuit is deenergized.

9.3.5.1.2 Component replacement within the lockout boundary.

9.3.5.1.3 HV switchgear operation and transformer grounding.

9.3.5.2 General Electrical Work Training Requirements

9.3.5.2.1 Shall be trained in the construction and operation of the equipment;

9.3.5.2.2 Shall be trained on specific work methods, and shall be trained to recognize and avoid the electrical hazards that might be present with respect to that equipment;

9.3.5.2.3 Electrical Safety for Qualified Workers or approved equivalent;

9.3.5.2.4 HV switchgear operation requires hands-on training on switchgear of the same manufacturer and similar model;

9.3.5.2.5 "C" pipeline course or possess a "C" Merit Certificate, or TTC equivalent; and

9.3.5.2.6 TBC 200 certified

9.3.5.2.7 Contact release training

9.3.5.3 Advanced Electrical Work Scope

9.3.5.3.1 Can perform all electrical work.

9.3.5.3.2 Work under an energized work permit.

9.3.5.3.3 Troubleshooting.

9.3.5.3.4 Establishing an Interlock bypass.

9.3.5.4 Advanced Electrical Work Training Requirements

9.3.5.4.1 B" pipeline course, possess a "B" Merit Certificate or TTC equivalent; and

9.3.5.4.2 LOTO level 3 certification

9.3.5.4.3 Contact release training

9.4 Training Content

9.4.1 Ordinary Person Training Content

9.4.1.1 Initial training is expected to last one hour and shall cover basic principles of electrical safety around the worksite, such as safe usage of power tools and extension cords. An e-learning module and/or a video of this material are acceptable.

9.4.1.2 Retraining for Electrical Safety for Ordinary Persons is required every 2 years. It can consist of the same material as the initial training, but shall be augmented with lessons learned from electrical safety incidents the previous year.

9.4.2 Qualified Electrical Person Training Content

9.4.2.1 VAWT Technician Training shall ensure that the electrical courses developed to qualify individuals meets the generic requirements outlined in NFPA 70E / CSA Z462.

9.4.2.2 Training content shall include a mixture of classroom and supervised hands-on exercises and shall be augmented with lessons learned from electrical safety incidents from previous year.

9.4.2.3 Training content shall include knowledge of the construction and operation of equipment or a specific work method and recognition and avoidance of electrical hazards that may be present with respect to that equipment or work method.

9.4.3 Training shall ensure familiarity with:

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9.4.3.1 The proper use of: special precautionary techniques, personal protective equipment, arc-flash, insulating and shielding materials, and insulated tools and test equipment.

9.4.3.2 The skills and techniques necessary to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment.

9.4.3.3 The skills and techniques necessary to determine the nominal voltage of exposed energized electrical conductors and circuit parts.

9.4.3.4 The approach distances specified in this manual and the corresponding voltages to which the qualified person will be exposed.

9.4.3.5 The decision-making process necessary to determine: the degree and extent of the hazard, the personal protective equipment and job planning necessary to perform the task safely.

9.4.3.6 Selection of an appropriate voltage detector and how to use a device to verify the absence of voltage including; interpreting indications provided by the device. The training shall include information that enables the individual to understand all limitations of each specific voltage detector that may be used.

9.4.3.7 Proper response to an electrical incident or injury.

9.4.3.8 Contact release. This training is to be retrained annually.

9.5 Retraining

9.5.1 Retraining on this program shall be conducted annually or following significant changes to this program. Retraining shall be augmented with lessons learned from electrical safety incidents from the previous year.

9.5.2 Retraining of personnel on this program shall be conducted following any electrical incident unless VAWT determines the incident requires the termination of employment.

9.5.3 An individual shall receive additional training (or retraining) under any of the following conditions:

9.5.3.1 If the supervision or annual inspections indicate that the individual is not complying with the safety-related work practices.

9.5.3.2 If new technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices.

9.5.3.3 Tasks that are performed less often than once per year shall require retraining before the performance of the work practices involved.

10 Electrical Approach Boundaries

10.1 General Requirements

Table 10: Shock Approach Boundary

Nominal System Voltage Range, Phase to Phase	*Limited Approach Boundary*	*Restricted Approach Boundary*
50 V - 300 V	1000 mm (3 ft 6 in)	Avoid Contact
301 V - 1500 V	1000 mm (3 ft 6 in)	300 mm (1 ft 0 in)
1501 V - 36 kV	1800 mm (6 ft 0 in)	750 mm (2 ft 7 in)

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11 Shock Protection Boundaries

11.1 General

11.1.1 All shock protection boundaries are defined based on equipment voltage alone. Shock protection boundaries are not defined unless an energized conductor is exposed or the worker is physically operating an electrical device.

11.1.2 Energized electrical conductors and circuit parts are considered exposed if capable of being inadvertently touched or approached nearer than a safe distance by a person, by not being enclosed or insulated.

11.1.3 IP2X (finger-safe) guarding per IEC 60529 is sufficient when not handling conductive tools or parts that could breach IP2X guarding.

11.1.4 IP5X (dust-protected) guarding per IEC 60529 is required when handling conductive tools or parts that could breach IP2X guarding.

11.1.5 Conductive measuring tapes, ropes or similar devices shall not be used when working on or near exposed energized conductors or parts of equipment conductive fish tapes shall not be used in raceways entering enclosures containing exposed energized parts unless such parts are isolated by suitable barriers.

11.2 Limited Approach Boundary

11.2.1 The Limited Approach Boundary is the closest distance that an unqualified person can approach exposed energized conductors without escort.

11.2.2 An unqualified worker may be escorted within the Limited Approach Boundary by a Qualified Electrical Person but shall never enter the Restricted Approach Boundary.

11.2.3 All persons in the Limited Approach Boundary must wear the minimum PPE for electrical work.

11.3 Restricted Approach Boundary

11.3.1 The Restricted Approach Boundary may only be entered by a Qualified Electrical Person.

11.3.2 All parts of the Qualified Electrical Person that enter the Restricted Approach Boundary must be insulated from the equipment voltage.

11.3.3 All tools that enter the Restricted Approach Boundary must be insulated for the equipment voltage.

12 Arc Flash Protection Boundary

12.1 General

12.1.1 An arc flash hazard is highest on the low voltage side of the transformer, and decreases by one order of magnitude after each protective device. Typically, after two protective devices, the arc flash energy is low enough that FR clothing is not required to prevent a second-degree burn.

12.1.2 The arc flash protection boundary is defined as the distance from an exposed energized conductor at which the arc flash energy is calculated to be 1.2 cal/cm^2. This is the energy where unprotected, exposed skin would receive a second degree burn in the event of an arc flash.

12.2 Working Distance

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12.2.1 The arc flash energy is calculated by an Arc Flash Hazard Analysis (AFHA). The AFHA assumes a typical working distance depending on the type of electrical gear. The arc flash energy is calculated at the specified working distance. This energy is the basis for the required arc flash protective equipment.

12.3 Requirements

12.3.1 Only qualified persons are permitted to enter the arc flash boundary. All personnel working within the arc flash boundary must be suited for the arc flash energy at the working distance.

12.4 Application to Wind Turbines

12.4.1 In wind turbines, the highest arc flash hazard will be where the main step-up transformer feeds into the low-voltage power panel.

12.4.2 The AFHA sets the arc flash boundary based on the available energy. In a wind turbine, the arc flash boundary is defined by the available energy but may be set by physical constraints of space within the wind turbine.

12.4.3 When working on or nearby such sources, consideration shall be given to first deenergizing the equipment completely by disconnecting the high voltage switch of the transformer. Do not rely on shock protection shielding alone. Depending on the task, small parts may fall through and initiate a severe arc blast.

12.4.4 For electrical work in the nacelle, where access is severely restricted, the arc flash boundary is designated as the plane of the yaw bearing. All personnel in the nacelle during electrical work that requires arc flash PPE will wear the same PPE as the person doing the work. In addition, no one is allowed in the hub or on the roof during this time. Personnel who do not don the required arc flash PPE shall move to the yaw deck or below until the electrical work is complete.

12.4.5 For electrical work at the bottom of the tower, the arc flash boundary is at the bottom of the tower access stairs or 6’ outside the turbine door on turbines without stairs. All personnel in the tower during electrical work that requires arc flash PPE will wear the same PPE as the person doing the work. Personnel who do not wish to don the required arc flash PPE shall move away from the tower until the electrical work is complete.

12.5 Barricade

12.5.1 General

12.5.1.1 All electrical work areas will be signed and barricaded. Personnel entering the work area must be fully briefed on the work and fully equipped with the appropriate levels of personal protective equipment.

12.6 Turbine Posting

(Subject to Customer requirements)

12.6.1 High Voltage Sign

12.6.1.1 All turbines will have a “Danger – High Voltage” sign posted on the turbine door. The sign will conform to ANSI Z535 standards for safety signing.

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12.6.1.2 Arc Flash Hazard – Non-Melting Clothing Sign all turbines will have a "Warning – Arc Flash Hazard – Non-Melting Clothing Required" sign posted on the turbine door.



13 Electrical Personal Protective Equipment

13.1 Shock Protection PPE

13.1.1 Prohibited Articles

13.1.1.1 Conductive articles of jewelry, such as watch bands, bracelets, rings, earrings, necklaces, miscellaneous body piercings, metal-framed glasses, PDA's, cell phones, pagers and oversized belt buckles shall be removed from the worker's body whenever entering the Limited Approach Boundary.

13.2 Rubber Insulated Protective Equipment

13.2.1 Each individual who is assigned protective equipment shall be responsible for the care and storage of the issued equipment.

13.2.2 All new protective rubber equipment shall be tested by a certified testing laboratory and documented prior to being issued for service.

13.2.3 Do not apply any markings to the rubber insulating equipment, whether with permanent markers, paint pens or stamps. Only the test stamp applied by the certified testing laboratory is permitted.

13.2.4 Rubber insulating protective equipment shall be inspected for damage before each use and immediately following any incident that can reasonably be suspected of having caused damage. Insulating equipment with any of the following defects shall not be used:

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13.2.4.1 Holes, tear, puncture, or cut;

13.2.4.2 Ozone cutting or checking; (Cutting action produced by ozone into a series of interlacing cracks when rubber is under mechanical stress).

13.2.4.3 An embedded foreign object;

13.2.4.4 Any of the following texture changes: swelling, softening, hardening, or becoming sticky or inelastic; or

13.2.4.5 Defects that damage the insulating properties.

13.2.5 Rubber Insulating Gloves

13.2.5.1 When exposed to electrical hazards of 50 volts or greater, approved rubber insulating gloves shall be used. At no time shall the voltage rating of the glove be exceeded. Gloves shall conform to ANSI/ASTM D120 - Standard Specification for Rubber Insulating Gloves, and ASTM F496 - Specification for In-Service Care of Insulating Gloves and Sleeves.

13.2.5.2 Each Qualified individual shall test their rubber gloves prior to each use. To test gloves for pinholes and other damage, fill the glove with air, roll up the cuff of the glove to make a seal, and squeeze the glove. Then hold the inflated glove close to the face and ear to feel and listen for air escaping from holes.

13.2.5.3 Defective rubber gloves shall not be used and shall be removed from service. If a rubber protective glove is found to be defective, then one of the fingers of the glove shall be cut off. The glove pair shall be exchanged for a new set.

13.2.5.4 Do not apply any markings to the rubber insulating glove, whether with permanent markers, paint pens or stamps. Only the test stamp applied by the certified testing laboratory is permitted.

13.2.6 Care of Gloves:

13.2.6.1 Gloves in service shall be kept cuff-down in canvas glove bags. Gloves shall not be folded, creased, or rolled while in storage.

13.2.6.2 Gloves shall be protected from heat, ozone, or prolonged exposure to the direct rays of the sun, and from contact with sharp articles or materials likely to damage gloves or cause deterioration of the rubber.

13.2.6.3 Clean only with lukewarm water and mild soap detergent. Do not use solvents, oils, or grease on rubber gloves.

13.2.6.4 Dust with talcum powder to counteract sweat inside the rubber insulating gloves. Only talcum powder approved by the glove manufacturer may be used.

13.2.6.5 Rubber protective gloves shall be tested and labeled with test date on cuff at intervals not to exceed 6 months (3 months in Oregon and parts of Canada).

13.2.6.6 Gloves covered under this written program are designated by voltage rating. The electrical properties that correspond to these classes are shown below in Table 13.1. The voltage glove rating shall be selected based on the equipment's line-to-line voltage rating.

13.2.6.7 The required lengths for the gloves are indicated in Table 13.2.8.

Table 13.2 – Voltage Requirements

Glove Class	Label Color	Proof Test Voltage AC/DC	Max Use Voltage AC/DC	Required Cuff Length
0	Red	5,000/20,000	1,000/1,500	14 inches (35.5 cm)
4	Orange	40,000/70,000	36,000/54,000	16 inches (40.6 cm)

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13.2.6.8 The insulating gloves are to be returned to the individual's Inventory Coordinator or Safety Coordinator to be exchanged every six months (three months in Oregon) for a fresh pair of insulating gloves. A glove test date will be stamped or permanently marked on the cuff of the glove. In no case is an issued glove to be used beyond its expiration date, which is 1 year (6 months in Oregon and parts of Canada) from the test date.

13.2.7 Storage

13.2.7.1 When not in use, the gloves are to be stored in a glove bag kept in a location as cool, dark, and dry as possible.

13.2.7.2 The gloves should be stored in a horizontal position to minimize the stress on the edge creases.

13.2.7.3 The location shall be free as practicable from ozone, chemicals, oils, solvent, damaging vapors and fumes, and away from electrical discharge and sunlight.

13.2.7.4 Gloves shall be stored in their natural shape.

13.2.7.5 Gloves shall be kept inside of protectors or in a bag, box, or container that is designed for and used exclusively for them.

13.2.7.6 Gloves shall not be stored folded, creased, inside out, compressed, or in any manner that will cause stretching or compression.

13.2.7.7 The maximum shelf life for non-issued insulating gloves is 12 months.

13.2.8 Leather Protectors

13.2.8.1 The protector leather gloves shall be worn over the insulating rubber gloves to prevent mechanical damage.

13.2.8.2 The leather protector glove shall be sized so that the insulating glove shall not be deformed from its natural shape.

13.2.8.3 The top cuff of the protector glove shall be shorter than the roller top of the insulating glove by at least the distance specified in Table 13.2 below.

Table 13.2.8 – Leather Protector Cuff Requirements

Glove Class	Cuff Distance (in)
0	0.5
4	4

13.2.8.4 Leather gloves that have been used for any other purpose shall not be used to protect insulating gloves. Protector gloves shall not be used if they have holes, tears, or other defects that affect their ability to give mechanical protection to the insulating glove.

13.2.8.5 Care should be exercised to keep the protector gloves as free as possible from oils, grease, chemicals, and other materials that may injure the insulating gloves. Protector gloves that become contaminated with injurious materials to the extent that damage may occur to the insulating glove shall not be used as protector gloves unless they have been thoroughly cleaned of the contaminating substance.

13.2.8.6 The inner surface of the protector gloves should be inspected for sharp pointed objects. This inspection should be made as often as the rubber gloves are inspected.

13.2.9 Cloth Glove Liners

13.2.9.1 Cloth gloves may be worn inside the insulating gloves for warmth in the winter and to absorb perspiration in the hot weather.

13.2.10 Rubber Insulating Blankets

13.2.10.1 Rubber insulating blankets shall be used to provide additional protection

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when work is being performed adjacent to exposed, energized parts. Blankets shall conform to ASTM D1048 - Standard Specification for Rubber Insulating Blankets and ASTM F479 - Standard Specification for In-Service Care of Insulating Blankets.

13.2.10.2 Blankets shall be inspected prior to each use. Defective blankets shall not be used and shall be removed from service.

13.2.10.3 Care of Blankets - Blankets shall be stored in a cool, dark, and dry location free from ozone, chemicals, oils, solvents, damaging vapors and fumes, and away from electrical discharges. Blankets shall be stored in a container that is designed for and used exclusively for them and shall not be kept folded, creased, distorted, or compressed in any manner that will cause stretching or compression.

13.2.10.4 Blankets shall be cleaned as necessary to remove foreign substances and shall be wiped clean of any oil, grease or other damaging substances as soon as practicable. Clean only with lukewarm water and mild soap detergent. Rinse thoroughly with water to remove all of the soap or detergent.

13.2.10.5 Rubber insulating blankets shall be tested at intervals not to exceed 12 months (6 months in Oregon).

13.3 Arc Flash PPE

13.3.1 Prohibited Clothing

13.3.1.1 Synthetic materials, such as acetate, nylon, polyester, polypropylene, spandex, and acrylic will melt when exposed to the heat of an arc blast and should not be worn inside the turbine at any time. Any synthetic material outerwear should be removed once inside the wind turbine.

13.3.2 Personal Protective Clothing Categories

13.3.2.1 Vestas uses Categories 0, 2 and 4.

13.3.2.2 Category 0 clothing is required by all persons where arc flash labels dictate. If the AFHA is not complete and no label are posted all personnel are required to use VAWT Personal Protective Clothing Minimum Requirements for Protection from Flash Energy Table 13.3 or NFPA 70E-2015 Table 130.7(C)(15)(A)(a).

13.3.2.3 Category 2 clothing is required whenever working within the arc flash boundary of equipment rated from 1.2 cal/cm^2 to 8 cal/cm^2.

13.3.2.4 Category 4 clothing is required whenever working within the arc flash boundary of equipment rated from 8.1 cal/cm^2 to 40 cal/cm^2.

13.3.3 Layering

13.3.3.1 When wearing arc-rated clothing, the outermost layer must always be arc-rated. Inner layers must be of non-melting clothing all the way to the skin.

13.3.3.2 It is acceptable, but not required, to wear the Category 2 clothing underneath the Category 4 suit.

13.3.4 Limitations

13.3.4.1 Arc-rated clothing is designed to limit the injury to a second-degree burn and protect the face. It will mitigate the seriousness of the burns but will not prevent physical trauma injuries.

13.3.4.2 Where national regulations require the use of protective face shields to perform electrical work, the face shield shall be arc-rated.

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13.3.4.3 Incident energies greater than 40 cal/cm² are classified “Dangerous”. Although clothing class for energies greater than 40 cal/cm² exists to protect from thermal energies, the clothing will not protect from incident energies. Any task on the electrical equipment with energies greater than 40 cal/cm² is prohibited. In cases like this, it is recommended that the upstream electrical equipment be turned off before servicing the electrical equipment or modify the electric equipment in order to reduce the incident range so that the equipment can be safely serviced.

13.3.4.4 Individuals are required to remove the fall protection harness and all non-arc-rated outerwear prior to performing electrical work. The fall protection harness must be staged for quick access in case an emergency descent is required.

Table 13.3
VAWT Personal Protective Clothing Minimum Requirements for Protection from Flash Energy

NFPA 70E Clothing Category	Clothing Description
Class 0	Non-melting materials (i.e. untreated cotton, wool, rayon or silk, or a blend of these materials) with a fabric weight at least 4.5 oz/yd² (some dress shirts are too light) Long-sleeve shirt Pants Protective Equipment Safety glasses or goggles Leather work shoes
Class 2	Arc-rated clothing, minimum arc rating (ATPV) of 8 cal/cm² Arc-rated long-sleeve shirt Arc rated pants or Arc-rated coveralls Arc-rated arc flash suit hood Arc-rated Protective Equipment Hard hat Safety glasses or goggles Hearing protection (ear canal inserts) Leather gloves Leather work shoes
Class 4	Arc-rated clothing, minimum arc rating (ATPV) of 40 cal/cm² Hard hat Safety glasses or goggles Hearing protection (ear canal inserts) Leather gloves Leather work shoes

1 Some manufacturers make arc flash suits rated to 100 cal/cm². Although 100 cal/cm² offers greater flash protection, the blast energy is too great. Engineered fixes shall only be used if they are approved by the VAWT Technology/Electrical Engineering department in cooperation with QSE and the Electrical Safety Team.
2 FR and Arc Rated clothing is not the same. In order to be labeled “Arc Rated” the article must have been tested and certified to provide protection at the level indicated. There is no testing or certification for FR rated clothing.

13.3.5 Standards for Arc-Rated Clothing

13.3.5.1 All clothing used as arc flash PPE shall conform to ASTM F1506. Such clothing is identified by a tag that specifies the arc rating in one of three ways:

13.3.5.2 Arc Thermal Performance Value, e.g. ATPV 16.8 cal/cm²

13.3.5.3 Break-Through Energy, e.g. EBT 12.1 cal/cm²

13.3.5.4 PPE Category 2

13.3.5.4.1 ATPV refers to the material’s ability to resist ignition. EBT refers to the material’s ability to resist breaking open. One or the other will be the limiting parameter for the arc-rating. Arc-rated clothing that does not have a tag identifying its arc

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flash rating is not suitable for electrical work.

13.3.5.4.2 Arc-rated fabric usually is composed of 100% cotton or a cotton-synthetic blend. The fabric is impregnated with a chemical that is activated by the arc flash to prevent ignition. The fabric is then tested to determine the arc rating. Manufacturer's laundry instructions must be followed to ensure arc-rating effectiveness. Some arc-rated fabric is made of Nomex. However, only articles that have an arc rating tag shall be used. Do not assume that all Nomex articles meet the requirements for arc flash.

13.3.6 Inspections

13.3.6.1 The arc-rated clothing shall be examined by the individual for rips, tears, and/or flaws in the material or workmanship prior to each use. If they are damaged in any way, they shall not be used.

14 Electrical Safe Work Practices

14.1 Requirement for Deenergization

14.1.1 Before beginning any construction or maintenance work that requires activities that will place the individual within the Limited Approach Boundary or the Arc Flash Boundary of exposed energized parts, the equipment shall be placed in an electrically safe work condition.

Caution: All electrical equipment and systems shall be treated as energized until tested and proven dead.

14.1.2 Exceptions to the requirement for deenergization

14.1.2.1 If it can be demonstrated that deenergizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations as specified in the guidelines set forth in OSHA 29 CFR 1910. 333 or 1910.269, then the equipment may remain energized and the work will be classified as energized work. Energized work shall require a VAWT Energized Electrical Work Permit (0049-2058).

14.1.2.2 An example of additional or increased hazards include, but are not limited to removal of illumination for an area.

14.1.3 An example of energized work being allowed because de-energizing is infeasible due to equipment design or operational limitations are as follows:

14.1.3.1 Performing diagnostics or startup

14.1.3.2 Performing testing or troubleshooting

14.1.4 Exceptions to the Energized Electrical Work Permit

14.1.5 A VAWT Energized Electrical Work Permit is not required to perform visual inspection, voltage testing, or troubleshooting of a circuit. However, the worker shall still follow all requirements for entering the electrical approach boundaries.

14.2 Electrical Lockout (LOTO) and Grounding

14.2.1 Establishing an Electrically Safe Work Condition

14.2.2 An electrically safe work condition shall be achieved when performed in accordance with the VAWT Control of Hazardous Energy Program and verified by the following process:

14.2.2.1 Determine all possible sources of electrical supply to the specific equipment. Check applicable up-to-date drawings, diagrams, and identification tags.

14.2.2.2 After properly interrupting the load current, open the disconnecting device(s) for each source.

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14.2.2.3 Wherever possible, visually verify that all blades of the disconnecting devices are fully open or that draw out-types circuit breakers are withdrawn to the fully disconnected position.

14.2.2.4 Apply lockout/tagout devices in accordance with the VAWT Control of Hazardous Energy Program.

14.2.2.5 Use an adequately rated voltage detector to test each phase conductor or circuit part to verify they are deenergized. Follow the Test-Verify-Test three-point test and test before touch methods. Arc rated clothing that is required on the line side of the isolation must be worn while verifying absence of voltage.

14.2.2.6 If the line side of the isolation point is deenergized by an upstream disconnect, *e.g.* a breaker is opened to access the cabinet, perform a continuity check through all three phases of the isolation point disconnect. Whenever a continuity check is to be performed a voltage test must be performed first to verify no voltage is present on any of the phases.

14.2.2.7 Where the possibility of induced voltages or stored electrical energy exists, ground the phase conductors or circuit parts before touching them. Where it could be reasonably anticipated that the conductors or circuit parts being deenergized could contact other exposed energized conductors or circuit parts, apply ground connecting devices rated for the available fault duty.

14.2.2.8 The individual performing the work must also perform Test-Before-Touch.

14.2.3 Electrical requirements for proper lockout points

14.2.3.1 All lockout points must consist of positive energy isolation devices such as disconnect switches and circuit breakers.

14.2.3.2 All isolating devices used as lockout points must be capable of accepting an approved lockout device that physically prevents the actuation of the isolating device.

14.2.3.3 Fuses are not an acceptable lockout point.

14.2.3.4 Exception: Certain conditions may require the removal of fuses as the only available lockout point. This requires the approval of the Electrical Safety Team, who will also determine additional steps required to safely remove the fuses and place a lockout device on the fuse holder or cabinet.

14.2.3.5 Where the lockout point requires disconnection of wires, the wire ends must be electrically taped (insulated) and tagged out in such a way that prevents the reconnection of the wires. Electrical tape or insulating caps, *e.g.* wire nuts, must be rated for the phase-to-phase equipment voltage.

14.2.3.6 All lockout points must have a safe and accessible way to verify deenergization. There can be no circuit breakers, fuses, interlocks, contactors, diodes, or automatically controlled devices between the isolation device and the test point.

14.2.4 Grounding requirements

14.2.4.1 High voltage equipment

14.2.4.1.1 All work performed within the limited approach boundary of equipment rated above 1000 VAC or above 1500 VDC will require the application of personal protective grounds. Ground straps must be rated to withstand the maximum short-circuit current available at the point of grounding for the time necessary to clear the fault. This rating shall be identified in conjunction with the Arc Flash Hazard Analysis.

14.2.4.2 Possibility of induced voltages

14.2.4.2.1 Where deenergized lines are run next to high-voltage energized

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lines, the magnetic fields may induce a build-up of static charge in the deenergized conductor. When this is found, (through experience) a suitable shorting ground device shall be applied to the deenergized conductors. This could be short lengths of bare stranded copper wire connecting the lines to ground.

14.2.4.2.2 Where capacitor banks may build up a charge, the deenergized capacitor bank shall be shorted out with an approved shorting ground device.

14.2.4.3 Possibility of reenergization

14.2.4.3.1 Deenergized equipment might become energized through the following causes:

14.2.4.3.1.1 Overhead lines fall on bare deenergized conductors.

14.2.4.3.1.2 Temporary generator is installed inadvertently on a locked out circuit.

14.2.4.3.1.3 Miscommunication of control between customer and contractor at a common lockout point.

14.2.4.3.2 If these cases are reasonably possible, then grounds must be applied to the circuit that is locked out. Ground straps must be rated to withstand the maximum short-circuit current available at the point of grounding for the time necessary to clear the fault. This rating shall be identified in conjunction with the Arc Flash Hazard Analysis.

14.2.5 Voltage testing at the equipment:

14.2.5.1 In addition to placing the equipment in an electrically safe work condition, the individual shall also verify absence of voltage after opening the electrical enclosure for the equipment to be worked upon.

14.2.5.2 The voltage test shall follow the test-verify-test.

14.3 Voltage Testing

14.3.1 Purpose of Voltage Testing

14.3.1.1 The voltage test performed in conjunction with the lockout procedure is intended to identify remaining system voltage present under the following conditions:

14.3.1.1.1 Selection of wrong isolation point - In the case where Circuit A is to be isolated, and the device for Circuit B is inadvertently selected as the isolation point.

14.3.1.1.2 Mechanical or electrical failure of isolation device - The isolation device may fail internally. One or all of the phases may still be closed even though the device shows all external indications of being open.

14.3.1.1.3 Circuit back feed or alternate power source - Another source of energy may still be energizing the circuit. This could be a UPS, a temporary generator, incorrect wiring, or other source of energy.

14.3.1.1.4 Residual charge - A circuit may retain a built-up capacitive charge, or may be powered from a DC supply.

14.3.2 Selection Point of Voltage Testing

14.3.2.1 Each lockout isolation disconnect shall be tested for voltage as close as possible to the circuit disconnect.

14.3.3 Selection of Voltage Detector

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14.3.3.1 Only Vestas approved voltage detectors may be used to measure voltage.

14.3.3.2 Selection of test probes - Test probes must be selected to match the physical requirements of the test point. Some test points are shielded, and the exposed portion of the test leads must be long enough to reach the conductors.

14.3.3.3 Contact versus Non-Contact - All equipment rated above 1000 V shall only be tested with a non-contact, proximity type voltage detector attached to a live-line tool.

14.3.3.4 Solenoid-type voltage detectors shall not be used.

14.3.4 Selection of PPE

14.3.4.1 Shock Protection

14.3.4.1.1 Rubber insulated gloves with leather protectors shall be worn for the voltage test. The voltage glove rating shall exceed the rated line-to-line voltage of the equipment to be tested.

14.3.4.2 Arc Flash Protection

14.3.4.2.1 Arc flash clothing shall be worn for the voltage test. The arc flash level classification shall exceed the line-side arc flash energy of the device to be tested.

14.3.5 Test-Verify-Test (Three-Point Test Method)

14.3.5.1 Whenever verifying the absence of voltage, the voltage detector shall be functionally tested before and after verification. The functional test is called the test, while the absence of voltage test on the circuit of interest is called the verification.

14.3.5.2 Voltage testing requires following the proper procedures for entering electrical approach boundaries, including donning the arc flash and shock protection PPE appropriate for the circuits to be tested.

14.3.6 Test, Low Voltage:

14.3.6.1 The test shall consist of measuring voltage on a known energized circuit. The known energized circuit can be:

14.3.6.1.1 A 24 VDC circuit

14.3.6.1.2 A 110 VAC lighting circuit

14.3.6.1.3 A 230 VAC circuit

14.3.6.1.4 The line side power of the disconnect

14.3.6.1.5 A handheld portable device specifically designed for this application

NOTE: If measuring a ≤24VDC circuit it is acceptable to use a DC battery to verify the meter and leads are functional.

14.3.7 Test, High Voltage

14.3.7.1 Non-contact voltage detectors shall be tested before and after each use. The test shall consist of detecting energized voltage on a known energized circuit. The known live circuit can be:

14.3.7.1.1 Rubbing on clothing to generate static electricity

14.3.7.1.2 An energized fluorescent light fixture

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14.3.7.1.3 A handheld portable device specifically designed for this application

14.3.8 Verification

14.3.8.1 Verification shall consist of the following steps, in order:

14.3.8.1.1 Check voltage on each phase, phase-to-ground

14.3.8.1.2 Check voltage on each phase, phase-to-phase

NOTE: The phase-to-phase check is not possible when using the non-contact voltage detector on high voltage circuits. However, the phase-to-ground voltage check on high voltage circuits is always followed by the application of temporary personal protective grounds.

15 Grid outage

A grid outage occurs whenever, power to a turbine transformer high voltage disconnect is lost. This can be isolated to a single string or for the entire wind farm. This presents a problem with standard lockout points, as a voltage test is not valid when there is no voltage on the line side of the intended lockout point.

15.1 Planned Grid Outage

15.1.1 When a grid outage is planned, a Qualified Electrical Person shall establish the electrical lockout and grounding plan in conjunction with the customer. All individuals working on turbines within the grid outage boundary shall lockout at the point of isolation where there is still voltage on the line side of the disconnect. The Person in Charge may elect to set up a group lockout to facilitate the logistics of locking out on the customer's equipment.

15.1.2 Once the lockout is established at the point of isolation, individuals may prepare for grid reenergization and lockout at isolation points on the turbines. At the turbine lockout points, individuals shall perform a continuity check through all three phases of the isolation point disconnect(s) in addition to the voltage test. Once disconnect(s) has (have) been verified open, disconnect(s) can be locked out.

15.1.2.1 When the customer is ready to reenergize the grid, the Person in Charge shall require all individuals to exit the towers (or take a position on the yaw deck) and clear their lockout of the grid. All individuals shall remain clear of the turbines (or on the yaw deck) until the grid is reenergized. Once the grid is reenergized, all electrical lockout points at the turbines shall be retested for absence of voltage. Individuals may then resume work inside the turbines.

15.2 Unplanned Grid Outage

15.2.1 An unplanned grid outage can occur at any time while individuals are performing electrical work. In the event of an unplanned grid outage, all individuals shall immediately exit the tower or go to the yaw deck. Communications with the customer shall be established to determine the cause of the outage and the proper procedure for resuming work.

15.2.2 If the unplanned grid outage will be extended, then the Person in Charge shall follow the instructions for a Planned Grid Outage above.

15.2.3 Individuals shall not reenter the turbine or nacelle until cleared by site management.

16 Job Manning Requirements

16.1 Minimum Requirement

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16.1.1 Electrical work shall never be performed alone. The minimum manning requirement for electrical work is at least one Qualified Electrical Person and at least one other person who has completed (at a minimum) basic safety training or an approved contractor possessing a current First aid/CPR certification.

16.1.2 The second individual shall be in the immediate vicinity of the individual performing electrical work and positioned just outside of the arc flash boundary or the limited approach boundary, whichever is farther.

16.1.3 One Qualified Electrical Person and one technician who have completed Basic Safety shall be required to ground the high-voltage transformer.

16.1.4 A contractor may act as the second person, provided they have CPR certification, LOTO 1 or LOTO 2 training and are trained on and able to activate the site Emergency Response Plan.

16.1.5 The requirement to never perform electrical work alone does not apply to equipment which has been placed in an electrically safe work condition.

16.1.6 When electrical work requires two qualified workers inside an arc flash boundary a third person is required as a standby person. (i.e., Working under an Energized Work Permit).

16.2 Requirements of a Standby Person

16.2.1 A standby person shall be required for the following electrical work conditions:

16.2.1.1 De-energizing/reenergizing high voltage equipment where remote operation is not possible

16.2.1.2 Work requiring an Electrical Energized Work Permit.

16.2.1.3 Work requiring the use of a Class 4 Arc Flash Suit.

16.2.2 The Standby Person cannot be used for simultaneous jobs in more than one turbine.

16.2.3 Standby Person shall:

16.2.3.1 Remain out of harm's way and to initiate the Emergency Response Plan in case of an electrical incident.

16.2.3.2 Have no other duties.

16.2.3.3 Not observe the electrical work being performed.

16.2.3.4 Have completed Basic Safety and have a current Cardio-Pulmonary Resuscitation (CPR) certification.

16.2.3.5 Be positioned immediately outside the Arc Flash Boundary and the Limited Approach Boundary for the duration of the work requiring a standby person.

16.2.3.6 Participate in the Job Safety Analysis and shall be fully briefed on the specifics of the job.

16.2.3.7 Be given and know how to use an insulated rescue device if a shock hazard is present.

16.2.3.8 Have a reliable means to immediately initiate the Emergency Response Plan, either by radio or cell phone.

16.2.3.9 Be trained in contact release.

16.2.4 In the event of an incident, the Standby Person shall:

16.2.4.1 Initiate the Emergency Response Plan.

16.2.4.2 Assist walking workers in exiting the tower.

16.2.4.3 Assist conscious workers by administering first aid.

16.2.4.4 Not approach an unconscious victim, but may use an insulated rescue device to remove the victim from potentially energized gear.

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16.2.4.5 Administer CPR to unconscious victims after they have been removed from potentially energized gear.

16.3 Requirement for Two Qualified Electrical Persons

16.3.1 Two qualified technicians shall be required to perform work under an Electrical Energized Work Permit. At least one shall be qualified for Advanced Electrical Work.

16.3.2 Two qualified technicians shall be required to perform troubleshooting work. At least one shall be qualified for Advanced Electrical Work.

16.4 Working Under the Instruction of a Qualified Electrical Person

16.4.1 An individual, who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified technician shall be considered to be a qualified technician for the performance of those duties.

16.4.2 An individual working under instruction shall not be considered the Standby Person.

17 Basic Electrical Work Practices

17.1 Safe Work Approach

17.1.1 In accordance with the Safe Work Approach program a Job Safety Analysis (JSA) will be conducted prior to performing electrical work. If determined during the JSA that there is no safe work instruction, individuals are not familiar with the safety hazards, or there is a high risk situation, the individual must prepare a Pre-Task Plan (PTP). The PTP must be approved by the site management or his/her designated delegate. In any event all safety concerns shall be mitigated prior to commencing the task.

17.1.2 Knowledge in the specifics of the Job Safety Analysis in itself does not make an individual qualified to work on or near energized or potentially energized exposed electrical parts. Work practices shall be established for each work area, which will include, at a minimum, the specific electrical safety concerns/activities referenced by the JSA. The content and quality of informal and formal field training (On-the-Job-Training or OJT) and classroom training, as well as, establishing levels of experience in electrical safe work practices, shall be consistent with the requirements of the Job Safety Analysis and the specific electrical hazard prevention of any operation being performed.

17.2 Alertness

17.2.1 Individuals must remain alert at all times when working near exposed electrical parts or in situations where electrical hazards may exist. If alertness appears to be recognizably impaired due to illness, fatigue, or other reasons, that individual is not permitted to work on or near areas containing electrical hazards.

17.3 Bare Hand Method Prohibited

17.3.1 The bare-hand work method, where persons are raised to the equipment voltage but are isolated from their surroundings in order to deliberately touch energized conductors with bare hands, is prohibited.

17.4 Disconnection/reconnection of wires

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17.4.1 Wires shall not be disconnected or reconnected without first being in an Electrically Safe Work Condition.

17.4.2 Disconnected wires shall not be reenergized.

17.4.3 Permanently disconnected wires shall be disconnected at the power supply end and tagged out at the power supply end in accordance with the Control of Hazardous Energy Program.

17.4.4 Temporarily disconnected wires may be disconnected at the load end only, provided that their power supply remains locked out for the duration. If the power supply isolation for the wires needs to be closed to power up other loads, then the wires need to be disconnected at both ends, and tagged out at the power supply end in accordance with the Control of Hazardous Energy Program.

17.4.5 The phase wires shall be disconnected first, followed by the neutral wire, followed by the earth wire.

17.4.6 All disconnected wire ends shall be electrically insulated, using electrician's tape, wire nuts, or another suitable insulator.

17.4.7 Any wires that are discovered bare shall be treated as energized. A Qualified Electrical Person shall be called to investigate and make the condition safe.

17.5 Blind Reaching

17.5.1 Individuals must never reach blindly into areas that may contain live circuits.

17.6 Illumination & Light Fixtures

17.6.1 Individuals shall not enter the area containing exposed electrical circuits unless adequate illumination is provided.

17.6.2 Individuals shall not penetrate the Limited Approach Boundary of any piece of equipment containing exposed electrical circuits unless adequate illumination is provided to light the inside of the equipment. This illumination may be in the form of existing lighting, droplights or temporary lighting.

17.6.3 When obstructions or lack of illumination prevent proper visibility, the individual is not permitted to perform the task if there is a possibility that exposed parts may be contacted.

17.6.4 Light fixtures that are designed to allow bulb replacement while preventing incidental contact with exposed energized circuit parts are not required to be placed in an Electrically Safe Work Condition to replace the light bulbs.

17.6.5 Replacement of the ballasts or of the light fixture itself shall require that the fixture be placed in an Electrically Safe Work condition. Energized replacement of these items is prohibited and is not justified under an Energized Electrical Work Permit.

17.7 Return to work

17.7.1 Qualified workers who leave a worksite unattended must perform a voltage check upon returning to the worksite prior to resuming work.

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17.8 Body Positioning

17.8.1 The worker shall consider how to position his or her body to minimize the chance of incidental contact with exposed energized conductors. The worker shall always position his or her body in such a way as to prevent slipping, tripping or falling into energized equipment.

17.8.2 The worker shall not bend over at the waist to perform electrical work, as this could lead to falling into energized gear. Instead, the worker shall get down on the knees at some distance away from the cabinet, then approach the cabinet to perform the work from a kneeling or sitting position.

17.8.3 When accessing a cabinet above the worker's eye level, the worker shall use an approved fiberglass step-stool or step-ladder to provide adequate access. Non-approved items such as toolboxes, buckets, or miscellaneous parts are not allowed for access to electrical equipment.

17.8.4 When operating a load-rated switch, circuit breaker, or other device specifically designed as a means to disconnect; the worker should also consider his or her body position. The worker should position his or her body to the side of the circuit breaker to minimize the exposure to the body should an arc blast occur during the operation.

17.8.5 Doors, hinged panels, and the like shall be secured to prevent their swinging into an individual and causing the individual to contact exposed energized electrical conductors or circuit parts.

17.9 Handling of tools

17.9.1 A tool often slips when force is applied. When a tool slips, the worker who is providing the force cannot stop the tool (and his or her hand) from moving in an unintended direction. When selecting a body position, the worker should consider what his or her hand would contact if the tool should slip.

17.9.2 Conductive materials, tools, and equipment that are in contact with any part of an individual's body shall be handled in a manner that prevents accidental contact with energized electrical conductors or circuit parts. Such materials and equipment include, but are not limited to, long conductive objects, such as ducts, pipes and tubes, conductive hose and rope, metal-lined rules and scales, steel tapes, pulling lines, metal scaffold parts, structural members, and chains.

17.9.3 Choose only tools that are designed for the task to be performed.

17.10 Cabinet Enclosures

17.10.1 All electrical cabinet covers shall be closed and fully bolted or latched when not opened for inspection or work.

17.10.2 When temporary cables are required to be placed through a cover opening, the cabinet shall be treated as if it were opened. All electrical approach boundaries and PPE requirements shall be in effect.

17.11 Housekeeping

17.11.1 Cleaning inside electrical cabinets shall not be performed unless the cabinet has been placed in an electrically safe work condition.

17.11.2 Personnel performing cleaning around the exterior of cabinets that have not been placed in an electrically safe work condition shall be mindful to prevent foreign debris, sprays and dusts from entering the cabinet.

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17.11.3 Flammable materials shall not be left around energized electrical equipment. Where flammable materials are used, they shall be removed from the nacelle prior to energizing any electrical equipment.

17.11.4 Combustible materials shall not be stored around electrical equipment. Oily rags shall be removed each time workers leave the turbine.

17.11.5 A clear working space shall be maintained in the front of electrical enclosures rated above 50 VAC (120 VDC). This floor space shall measure 1 meter by 1 meter (36 inch by 36 inch) square at a minimum, either centered or offset in front of the equipment. The height of the clear working space shall be clear from the floor to the top of the cabinet or 2 meters (6 feet), whichever is higher. Where space is not available due to the design constraints, the available workspace shall be kept clear.

17.12 Deranged Equipment

17.12.1 Whenever a piece of electrical equipment has been subjected to a severe electrical failure, it is considered deranged equipment until its electrical integrity can be verified by testing and inspection. The normal means of deenergization may not be sufficient. Indications of severe electrical failure include but are not limited to:

17.12.1.1 Smoke, charring or fire

17.12.1.2 Arcing, arc flash or arc blast

17.12.1.3 Severe physical damage or deformation

17.12.1.4 Report of sparking

17.12.1.5 Report of electric shock

17.12.2 Determining if equipment is deranged is a judgment call. Deranged equipment must be treated with more caution than equipment in normal operating condition. Normal LOTO and deenergization procedures may not be sufficient to provide adequate safety.

17.12.3 Prior to beginning work on deranged equipment, a Pre-Task Plan (PTP) must be conducted with a Level 3 Qualified Technician.

17.12.4 Any work will begin with extensive voltage tests that include testing of the cabinet external casing and other normally grounded metal surfaces.

17.12.5 Before approaching deranged equipment carefully consider, maximum voltage possible and employ shock protective PPE and until proven to be absent of voltage.

17.13 Equipment Out of Service

17.13.1 Equipment (turbines, machinery, tools, etc.,) that are designated “out of service”: awaiting parts, pending repair, or that in any way could become a hazard to other employees shall be locked and tagged in a conspicuous location to prevent inadvertent reenergization.

17.13.2 Equipment taken out of service shall be locked and/or tagged with tags other than LOTO tags and should state “equipment out of service” or words to that affect.

17.13.3 Equipment out of service tags should be placed in a prominent location to alert personnel.

17.13.4 Equipment out of service tags may only be removed by the person who attached the tag or an authorized person responsible for the repair and ensuring the equipment is safe to return to service.

17.13.5 Equipment taken out of service should be placed in a quarantined area.

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17.13.6 In addition to the lock and tag on the equipment the controlling site office will annotate the equipment under LOTO on a visual system to alert employees the equipment is out of service. For WTGs with SCADA a note will be added to the WTG to identify the turbine is out of service.

17.13.7 Under no circumstances will the equipment be used if tagged out of service.

17.14 Operation of Disconnecting Means

17.14.1 Routine Operation

17.14.1.1 Only load-rated switches, circuit breakers, or other devices specifically designed as disconnecting means shall be used for the opening, reversing, or closing of circuits under load conditions. Cable connectors not of the load-break type, fuses, terminal lugs, and cable splice connections shall not be permitted to be used for such purposes, except in an emergency.

17.14.2 Reclosing Circuits after Protective Device Operation

17.14.2.1 After a circuit is deenergized by a circuit protective device, the circuit shall not be manually reenergized until it has been determined that the equipment and circuit can be safely energized. The repetitive manual reclosing of circuit breakers or reenergizing circuits through replaced fuses shall be prohibited. When it is determined from the design of the circuit and the overcurrent devices involved that the automatic operation of a device was caused by an overload (such as; pump time run too long, mechanical binding, etc.) rather than a short circuit condition, examination of the circuit or connected equipment shall not be required before the circuit is reenergized.

17.14.3 Remote Operating Switching Units

17.14.3.1 Where available, a remote operating switching unit shall be used to open or close an electrical disconnect.

17.14.3.2 Where the available arc flash energy is calculated to be greater than 40 cal/cm^2 at the working distance required for manual switching, a remote operating switching unit or remote mechanical device shall be used to open or close an electrical disconnect from outside the arc flash boundary. If a remote operating device is not available, then another isolation point must be identified to allow workers to disconnect safely.

17.15 Visual Inspection

17.15.1 There is often a requirement to visually inspect energized gear without performing any work. The following guidelines summarize the requirements for visual inspection.

17.15.2 Energized electrical equipment may be visually inspected without placing it in an electrically safe work condition under the following conditions:

17.15.2.1 The exposed energized circuits are not more than 1000 Volts.

17.15.2.2 Cover panels are hinged or can be removed without risking breaking the plane of the opening.

17.15.2.3 The equipment is not deranged.

17.15.3 Only Level 2 qualified technicians, qualified supervisors, or qualified engineers may perform the visual inspection.

17.15.4 Non-qualified personnel must stay at distance no less than 10 feet.

17.15.5 The worker must wear the arc flash PPE required by the cabinet label.

17.15.6 The worker must wear Class 0 (1000 V) voltage gloves.

17.15.7 No part of any tool or body may enter:

17.15.7.1 For circuits less than 300 Volts: do not cross the plane of the opening.

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17.15.7.2 For circuits 300-1000 Volts: do not enter the Restricted Approach Boundary.

17.15.8 The worker must position his/her body in such a way as to preclude inadvertent movement that would break the plane of the opening or the Restricted Approach Boundary.

17.15.9 An Energized Electrical Work Permit is not required for a visual inspection.

17.16 Overhead Energized Lines

17.16.1 Individuals must maintain a minimum 11 foot distance from energized overhead lines with any body part, a conductive material, a tool, or piece of equipment unless qualified to perform the work.

17.16.2 If contact with energized overhead lines is possible, the lines should be deenergized and visibly earthed near the working location. These precautions must be taken before work in the area begins.

17.16.3 If the lines cannot be deenergized, individuals must maintain a safe distance from the conductors. Individuals working in elevated positions must avoid contact with energized conductors, unless they are qualified, protected, and authorized to do so.

17.16.4 If protective measures (e.g. guarding, isolating, or insulating) are provided, these precautions shall prevent the individual from contacting such lines directly with any part of the body or indirectly through conductive materials, tools, or equipment.

17.17 Mechanical Equipment Operations Near Overhead Energized Lines

17.17.1 A spotter must be used if equipment operations take place near overhead energized lines. The spotter must not contact the mobile equipment.

17.17.2 A qualified and authorized individual shall cover the overhead energized lines with an insulating material that can withstand the type of contact that might be made during the operation. (See Crane Safety Program 0049-0574).

17.18 Battery Storage and Transportation

17.18.1 Uninterruptable Power Supply (UPS) batteries can be a source of fire if incorrectly handled. All UPS batteries shall be stored with the terminals protected from shorting against other components or objects.

17.18.2 When raising, lowering or transporting UPS batteries; the terminals must be electrically insulated to protect and against shorting against other components or objects.

18 Electrical Troubleshooting

18.1 Definition

The process of fault isolation when working within the Limited Approach Boundary of an energized circuit.

18.1.1 Troubleshooting includes:

18.1.1.1 Voltage measurement

18.1.1.2 Current measurement

18.1.1.3 Operation of circuit breakers or disconnects

18.1.1.4 Operation of automatic control devices though interaction with the turbine processor

18.1.2 The following tasks may not be performed during testing and troubleshooting:

18.1.2.1 Component replacement

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18.1.2.2 Installation of wire jumpers
18.1.2.3 Manual operation of motor contactors
18.1.2.4 Disconnecting a wire from its termination point
18.1.2.5 Voltage testing at a motor terminal box
18.1.2.6 Motor testing shall be performed in an electrically safe work condition with the use of meggering instruments.

18.2 Safe Work Approach requirement

18.2.1 When troubleshooting is required specific written work instructions must be included in the formal job safety analyses to address the increased risk

18.3 Component replacement

18.3.1 When the troubleshooting process indicates components need replaced, the circuit must be placed in an electrically safe work condition. Once the component is replaced or the circuit is modified, the circuit can be reenergized and troubleshooting can resume.

19 Energized Electrical Work

19.1 Requirements

19.1.1 When working on energized electrical conductors or circuit parts that are not placed in an electrically safe work condition (i.e., for the reasons of increased or additional hazards or infeasibility per the Electrical Safe Work Practices section), work to be performed shall be considered energized electrical work and shall be performed by written permit only.

19.2 Elements of Work Permit

19.2.1 The Energized Electrical Work Permit (0049-2058) shall include, but not be limited to, the following items:

19.2.1.1 A description of the circuit and equipment to be worked on and their location
19.2.1.2 Justification for why the work must be performed in an energized condition
19.2.1.3 A description of the safe work practices to be employed
19.2.1.4 Results of the shock hazard analysis
19.2.1.5 Determination of shock protection boundaries
19.2.1.6 Results of the arc flash hazard analysis
19.2.1.7 The arc flash protection boundary
19.2.1.8 The necessary personal protective equipment to safely perform the assigned task
19.2.1.9 Means employed to restrict the access of unqualified persons from the work area
19.2.1.10 Evidence of completion of a job briefing, including a discussion of any job-specific hazards
19.2.1.11 Energized work approval (authorizing or responsible management, safety officer, or owner, etc.) signature(s)

19.3 Authority

19.3.1 The Energized Electrical Work Permit must be completed by a Qualified Electrical Person.

19.3.2 The Energized Electrical Work Permit must be reviewed and approved by the Energy Control Coordinator.

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19.3.3 Permission to perform work under an Energized Electrical Work Permit must be granted by the Vestas Offsite Manager.

20 Special Tasks

20.1 Infrared inspections

20.1.1 All infrared scans are performed with equipment and/or systems in an energized state due to load current requirements in order to have a successful scan.

20.1.2 During an infrared scan no individual or contractor will break the Restricted Approach Boundary of the electrical equipment that has the doors open or covers removed.

20.1.3 Individuals shall wear the personal protective clothing specified by the Arc Flash Hazard Label on the piece of equipment.

20.1.4 Infrared inspections on low-voltage equipment shall follow the requirements of Visual Inspection section above.

20.1.5 Infrared inspections on high-voltage equipment shall require an Energized Electrical Work Permit.

20.2 Portable generator connection and operation

NOTE: All temporary generators placed into service shall be documented on the JSA to ensure proper placement and removal.

Caution: Consult the Operator Manual for the portable generator.

Caution: Use of portable generators significantly increases risk; therefore extra precautions must be taken.

20.2.1 When portable generators will be used, the Energy Control Coordinator shall coordinate with the customer and all contractors to ensure that everyone knows of the possibility of electrical back feed.

20.2.2 A LOTO Procedure shall be established in accordance with the VAWT Control of Hazardous Energy Program (0049-0580) to prevent electrical back feed prior to wiring in the portable generator.

20.2.3 The Energy Control Coordinator shall review all existing LOTO Instructions and verify that they are adequate and take into consideration the possibility of electrical back feed. Rated ground straps shall be installed where required.

20.2.4 Equipment powered from a portable generator rated at less than 240 Volts, 125 kVA, shall be treated as having the potential of a Class 0 arc flash (< 1.2 cal/cm2). When required to install a larger portable generator, contact the VAWT Electrical Engineering department for assistance in determining the required arc flash PPE.

20.2.5 The generator neutral shall be securely bonded to the generator earth bar. The generator earth bar shall be securely bonded to a reliable earthing point, preferably to an available building earth or turbine foundation earth.

20.2.6 Where a reliable building or turbine earth is not available, an earthing rod shall be driven into the ground next to the generator.

Note: Locate services shall be used to ensure an earthing rod driven into the ground will not penetrate any underground electrical utilities to the turbine or other underground utilities in or around facilities.

20.2.7 All temporary electrical installations connected to the portable generator shall require an equipment protection earth conductor from the generator to the final utilization equipment.

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20.2.8 All utilization equipment powered from temporary electrical installations shall be protected with GFCI's (Ground Fault Current Interrupters) or RCD's (Residual Current Devices).The portable generator wires must be completely removed from the turbine prior to allowing restoration of normal grid power to the turbine.

21 Arc Flash Hazard Analysis

21.1 Description of an Arc Flash

21.1.1 Arc flash hazards are present in most electrical systems and this includes many areas within Vestas wind turbines. An arc flash event presents a dangerous, potentially fatal or life-altering hazard to the individual in three distinct ways:

21.1.2 An arc can produce enough flash energy to ignite clothing, burn skin and cause permanent eye damage. The flash is powerful enough to penetrate standard clothing and burn the skin directly. Arc flashes with incident energy above 1.2 cal/cm2 will cause a second-degree burn to unprotected skin. When the clothing ignites, the fire continues to burn the victim. Synthetic fabrics such as polypropylene, fleece and acrylics will melt into the skin and significantly aggravate the burn injuries.

21.1.3 The arc can produce extremely high temperatures (35,000 degrees F) that vaporize the electrical components. Copper bus bar expands over 67,000 times in volume as it transitions from a solid to a gas. This can result in a blast force that propels the individual against obstacles in the background.

21.1.4 The blast can also release a burning cloud of copper fragments and smoke. The individual can inhale the cloud, resulting in severe throat and lung injuries. The blast also releases high-velocity projectiles that can seriously injure or kill the individual.

21.2 Causes of an Arc Flash

21.2.1 An arc flash is most often initiated by human interaction with electrical equipment. This includes switching a breaker, or performing a voltage test. Sometimes it could be as simple as a loose piece of hardware within the cabinet. As the cabinet is bumped, nudged or otherwise shaken, the hardware can fall onto the bus work and initiate a flash.

21.2.2 An arc flash may also be the result of improper installation of the electrical equipment and could include, but not limited to:

21.2.2.1 Improper torque of buss bars, terminals, etc.

21.2.2.2 Improper routing or unsecure cable runs within the cabinet.

21.2.2.3 Improper stripping and termination of HV cables.

21.2.2.4 Incorrect reassembly of bus bar cabinets after component replacement.

21.3 Other Hazards

21.3.1 It is important to remember that individuals are exposed to many hazards, including rotating machinery, confined spaces, physical exertion, fall from heights, and more. Arc flash is another hazard that needs to be addressed. However, at no point should arc flash concerns override other precautions that should be considered. Sound judgment, proper evaluation of hazards, and good work planning should always prevail.

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21.4 What is an Arc Flash Hazard Analysis

21.4.1 The available arc flash energy is different from turbine to turbine, and from site to site. The arc flash energy is determined by performing an arc flash hazard analysis (AFHA). The analysis uses sophisticated computer software with turbine and grid specific parameters as inputs to calculate short circuit currents and tripping times.

21.4.2 The amount of arc flash energy available at the point of fault depends on several factors. Primarily, the energy is related to the available short-circuit current and the amount of time until the protective device interrupts the fault.

21.5 Short-Circuit Current

21.5.1 This is the maximum current supplied to the equipment under a fault condition. It is limited only by upstream system characteristics and is normally measured in thousands of amperes.

21.6 Arc Clearing Time

21.6.1 This is the total time from sensing the overcurrent to extinguishing the arc. Protective devices typically rely on an inverse-time sensing of current. This means that if the current is low enough, it will take longer to trip, and in some cases, the total released arc flash energy will be greater.

21.6.2 Where arc flash detectors are installed, this is the total time from sensing the arc to extinguishing the arc. The trip is instantaneous and does not have an inverse-time characteristic. The time to extinguish the arc is determined only by the reaction time of relays and the mechanical characteristic of the breakers.

21.6.3 In a low-voltage arcing fault, the arc impedance also limits the short-circuit current. The current may be low enough to delay the tripping of protective devices, resulting in a more severe arc flash. This can also happen at the far end of a collection circuit, where long feeder lines contribute a significant amount of line impedance.

21.6.4 Changing the model or setting of an overcurrent protective device will have a direct effect on arc flash energies.

21.7 Expectation of where an Arc Flash Hazard will exist

21.7.1 Voltage Level

21.7.1.1 Arc flash energy is only partly dependent on system voltage. However, arc flash hazards are not expected on systems whose rated voltage is 240 VAC or less and that are supplied from a transformer rated at less than 125 KVA.

21.7.2 DC Circuits

21.7.2.1 Although DC circuits can be very energetic and sustain powerful arcs, current standards cannot calculate the arc flash energy related to DC faults. In wind turbines, DC circuits less than 110 VDC are not considered an arc flash hazard.

21.7.3 Inverter Systems

21.7.3.1 Turbine rotor current control systems contain power electronic circuits that operate at variable frequencies, currents and voltages that fall outside of the normal parameters where arc flash calculations are useful.

21.7.3.2 All power electronics cabinets used for rotor current control shall be marked for Class 2 arc flash PPE.

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21.8 Requirements

21.8.1 Customer Responsibility

21.8.1.1 The AFHA must take into account the entire contribution from the collection grid. For this reason, the AFHA will be performed by the customer or the customer's preferred electrical engineering contractor. At a minimum prior to submission to Vestas the AFHA report must be reviewed and approved by a licensed professional engineer with significant experience in electric power engineering.

21.8.2 VAWT Engineering Responsibility

21.8.2.1 VAWT shall provide an Arc Flash Information Packet (AFIP) to the customer in order to accurately model the turbine for the AFHA. The AFIP shall be prepared by the VAWT Electrical Engineering department.

21.9 Review and Acceptance

21.9.1 Once the AFHA is complete, the customer shall submit a report to the VAWT Regional Manager who then forwards to VAWT Technology. The VAWT Technology representative (Electrical Safety Engineer) will review the report and provide comments back to the Regional Manager who shall provide these to the customer. This process will repeat until the study results are agreed upon by all parties.

21.9.2 The Electrical Safety Engineer cannot approve the report as he or she does not have the required site information. However, the Electrical Safety Engineer shall verify that the results are consistent with expectations and that anomalies are corrected or satisfactorily explained.

21.9.3 Once the AFHA has been reviewed and determined satisfactory, the Electrical Safety Engineer shall:

21.9.3.1 Log a copy of the original and any revisions of the AFHA, for record keeping.

21.9.3.2 Inform Regional Manager that study results are accepted.

21.9.4 The Customer shall:

21.9.4.1 Use the data in the AFHA to print out arc flash labels for all cabinets and turbines at the site and supply to Site Manager.

21.9.4.2 Communicate the results of the AFHA to the Site Manager /Construction Manager/Authorized Supervisor for new construction sites.

21.9.5 Vestas Operations shall:

21.9.5.1 Create the necessary Work Order(s) in SAP to affix the arc flash labels on all the turbines at the site.

21.10 Arc Flash Energy Greater Than 40 cal/cm²

21.10.1 Incident energies greater than 40 cal/cm² are classified "Dangerous". Any task on the electrical equipment greater than 40 cal/cm² is prohibited. In cases like this, it is recommended that the upstream electrical equipment be turned off before servicing the electrical equipment or modify the electric equipment in order to reduce the incident range so that the equipment can be safely serviced.

21.11 Arc Flash Hazard Labeling

21.11.1 There are multiple styles of Arc Flash Hazard labels used within the electrical industry. Two common types of Arc Flash Hazard Labels that are used at VAWT are shown below. The first is an Arc Flash Hazard Label with a heading of "WARNING" (Figure 20.1) and the second is an Arc Flash Hazard Label with a heading of "DANGER" (Figure 20.1).

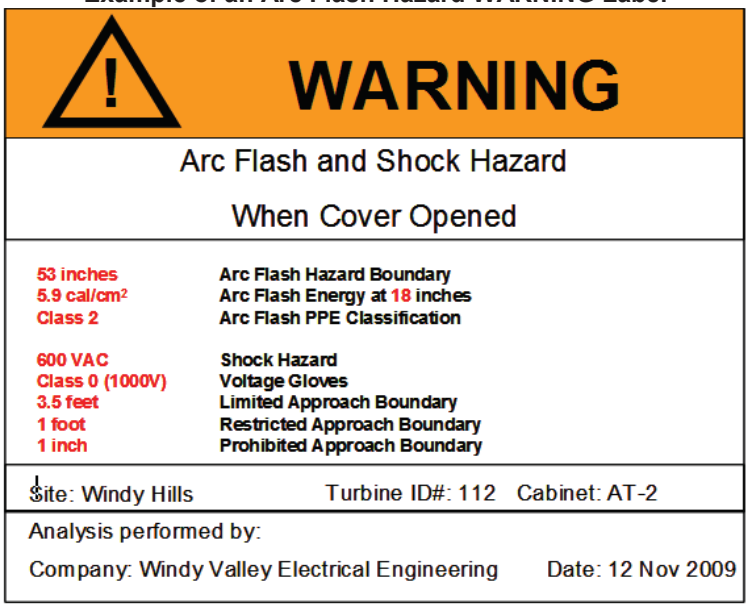
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21.11.1.1 WARNING – Arc Flash Hazard Labels

21.11.1.1.1 Individuals or contractors shall follow the instructions and requirements on the Arc Flash Hazard Label to protect themselves from electrical hazards.

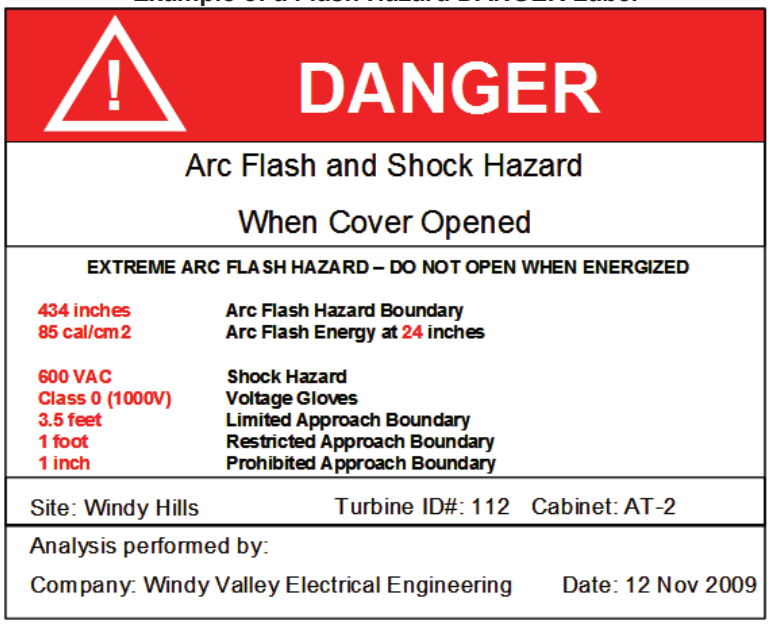
Figure 21.1
Example of an Arc Flash Hazard WARNING Label



21.11.1.2 DANGER – Arc Flash Hazard Label

21.11.1.2.1 Individuals or contractors shall NOT perform any task on these pieces of equipment while energized due to arc flash energy level exceeds 40 cal/cm^2.

Figure 21.2
Example of a Flash Hazard DANGER Label



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21.12 Periodicity

21.12.1 The AFHA shall be redone or reviewed every five years to account for changes in the grid configuration and evolving standards.

21.12.2 Additionally, the AFHA shall be redone every time the basic assumptions for the study are modified, including:

21.12.2.1 Phased expansion to the wind farm

21.12.2.2 Wind turbine generator replacement with different generator parameters

21.12.2.3 Change to overcurrent protective device settings

21.12.2.4 Transformer replacement with different impedance or power rating

21.12.2.5 Any other change in the collection grid which may impact the results of the arc flash study.

22 Tools

22.1 Test Instruments

22.1.1 General

22.1.1.1 Test instruments and equipment and all associated test leads, cables, power cords, probes, and connectors shall be visually inspected before each use for external defects and damage.

22.1.1.2 If there is a defect or evidence of damage that might expose an individual to injury, the defective or damaged item shall be removed from service, and no individual may use it until necessary repairs and tests to render the equipment safe have been completed.

22.1.1.3 Test instruments and equipment and their accessories shall be rated for the circuits and equipment to which they will be connected.

22.1.2 Voltage Meters

22.1.2.1 A voltage meter is a device which physically contacts the circuit to measure voltage. This is also called a contact voltage meter.

22.1.2.2 Voltage meters shall be voltage-rated for the circuits and equipment to which they will be connected.

22.1.2.3 The minimum IEC 61010-1 Measurement Category for all voltage meters is Category III at 1000V, Category IV at 600V.

22.1.2.4 Voltage meters shall be listed with UL and/or CSA.

22.1.2.5 Voltage meters shall be calibrated by a certified independent laboratory.

22.1.2.6 All voltage measuring tools will be visually inspected daily before use for the following:

22.1.2.7 Valid calibration dates

22.1.2.8 Integrity of test leads, cables, probes, and connectors, external defects/damage

22.1.2.9 If the voltage measuring tool shows defects or damage it shall be removed from service and no individual shall use it until repairs and tests necessary to render the equipment safe have been made.

22.1.3 Contact Voltage Detector

22.1.3.1 A contact voltage detector is a device which physically contacts the circuit to detect voltage. It does not provide a precise measurement of voltage, although in some cases it may indicate the nominal voltage level.

22.1.3.2 A contact voltage detector does not require periodic recalibration.

22.1.3.3 Contact voltage detectors shall be voltage-rated for the circuits and equipment to which they will be connected.

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22.1.3.4 The minimum IEC 61010-1 Measurement Category for all contact voltage detectors is Category III at 1000V, Category IV at 600V.

22.1.3.5 Voltage detectors shall be listed with UL and CSA.

22.1.3.6 All contact voltage detectors will be visually inspected daily before use for the integrity of test leads, cables, probes, connectors, and external defects or damage. If the contact voltage detector shows defects or damage it shall be removed from service and no individual shall use it until repairs and tests necessary to render the equipment safe have been made.

22.1.4 Non-Contact (Capacitive type) Voltage Detector

22.1.4.1 A detector that measures high and/or low voltage without physically contacting the circuit being tested. Instead it detects the induced field in the proximity of an energized conductor.

22.1.4.2 Non-contact voltage detectors are required for use on high voltage circuits.

22.1.4.3 Non-contact voltage detectors are permitted to be used on low voltage circuits, but shall not be the means to verify deenergization for LOTO.

22.1.4.4 Capacitive type voltage detectors shall be listed with the appropriate local listing agency, such as UL, CSA, VDE and CE.

22.1.5 High Voltage:

22.1.5.1 Detectors shall only be used by attaching the detector to a live line tool, so that the individual does not penetrate the Restricted Approach Boundary.

22.1.5.2 Detectors shall be calibrated according to the manufacturer's requirement or at least every two years by a certified laboratory.

22.1.5.3 Detectors shall have a self-test feature, and a visual indication that the detector is ready for use.

22.1.6 Low Voltage:

22.1.6.1 Measurement Category for all low voltage capacitive type voltage detectors is Category III at 1000V, Category IV at 600V.

22.1.6.2 Detector (fluke, pencil type testers) does not require periodic recalibration.

22.2 Live-line tool (Hot-stick/Shotgun)

22.2.1 A live-line tool is required for entering the Restricted Approach Boundary of any system rated above 1000VAC/1500VDC.

22.2.2 Live line tools shall be only used with rubber insulating gloves that are rated for the system voltage.

22.2.3 The clamp-type hot stick, also called a shotgun, shall be used to apply temporary personal protective grounds. Proper use of the hot stick requires practice.

22.2.4 Live line tools shall be inspected prior to use.

22.2.5 Live line tools shall be tested every two years unless an inspection determines a need.

23 Temporary Static Grounds

23.1 Purpose

23.1.1 The installation of Static Grounds at the work location protects individuals from the following hazards:

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23.1.1.1 Electrostatic Induction

23.1.1.1.1 A deenergized line may pick up a static charge from parallel energized circuits in the area. The amount of charge depends on such things as the length of the parallel, the distance between the lines, atmospheric condition, etc., and can reach values that are hazardous to individuals.

23.1.1.2 Electromagnetic Induction

23.1.1.2.1 When a deenergized line parallels a line carrying either load or fault current, the deenergized line may have a voltage induced on it in the same manner as the secondary of a transformer.

NOTE: Temporary Static Grounds shall not be used where Temporary Personal Protective Grounds are required.

23.1.2 Rating of Temporary Static Grounds

23.1.2.1 Temporary Static Grounds do not need to be sized to carry the maximum fault current that could appear at the point of grounding for the time necessary to clear the fault. However, static grounds must meet all other requirements of personal protective grounds.

23.1.2.2 Temporary Static grounds shall be constructed of #6 stranded copper insulated cable, colored green and yellow, with booted clamp connections. They shall be permanently marked with “Temporary Static Ground” on the ground lead.

24 Temporary Personal Protective Grounds

24.1 Purpose

24.1.1 The installation of Temporary Personal Protective Grounds at the work location protects individuals from the following hazards:

24.1.1.1 Accidental closing

24.1.1.1.1 Although all potential feeds for a deenergized circuit are required to be visibly open and tagged out prior to the commencement of work, the possibility of someone inadvertently energizing the circuit still remains.

24.1.1.2 Accidental Contact

24.1.1.2.1 A deenergized circuit could come in contact with another energized circuit or the deenergized circuit could be energized through human error.

24.1.1.3 Equipment Failure

24.1.1.3.1 The insulation of the switching devices opened to de-energize the circuit could either break down or track over, and energize the line on which work is being done.

24.1.1.4 Back feed

24.1.1.4.1 In addition to the primary sources, there are several secondary sources that can cause current to flow in a deenergized circuit. Some examples of these sources include parallel transformers, instrument transformers, metering installations and auxiliary generators.

24.2 Requirements of Temporary Personal Protective Grounds

NOTE: All temporary personal protective grounds placed into service shall be documented on the JSA to insure proper placement and removal.

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24.2.1 When a worker encounters a grounded line, the worker is in parallel with the protective grounds. The voltage the worker is exposed to should the line/equipment become energized would depend on the resistance of the protective grounds and the distance between the grounds and the worker. For proper protection, protective grounds must fulfill the following requirements:

24.2.1.1 Low Resistance

24.2.1.1.1 Personal Protective Grounds must conduct virtually all faults current and provide low enough resistance to cause all protective devices to operate in a timely manner. In order to facilitate this, protective grounds need:

24.2.1.1.2 Clean connections

24.2.1.1.3 Tight connections

24.2.1.1.4 Adequate capacity to clear the fault current in the circuit

24.2.1.2 Inspection and Testing

24.2.1.2.1 Protective grounds and grounding equipment shall be inspected and tested at least annually. In addition, protective grounds shall be given a visual inspection before each use.

24.2.1.3 Connection at Proper Points

24.2.1.3.1 The resistance of the conductors and the earth between the work location and the grounds are part of the total resistance of the protective grounding circuit. For this reason, grounds should be placed at the work location, if possible. This is known as “single point grounding” and this method is the most effective method of protective grounding. When a grounded neutral conductor is available, it should be connected to the protective grounding circuit.

24.2.2 Movement of Personal Protective Grounds

24.2.2.1 The electric fields produced when large currents flow through grounding cables will cause the cables to whip violently. For this reason, grounding cables should be kept as short as possible and placed such that workers are not injured should whipping of cables occur.

24.2.3 Applying Personal Protective Grounds

24.2.3.1 All grounding clamps shall be placed on conductors rated 1000V or less with approved rubber insulating gloves.

24.2.3.2 All grounding clamps shall be placed on primary conductors rated over 1000VAC/1500VDC with approved rubber insulating gloves and approved company standard live-line tool.

24.2.3.3 Only approved grounding cables and clamps shall be used for personal protective grounding.

24.2.3.4 Before applying grounds to any conductor, the conductor must be tested for the absence of voltage with an approved detector, to verify the conductor is in fact deenergized. The voltage test shall follow the test-verify-test method described above.

24.2.3.5 The surfaces of all grounding connections must be cleaned, free of corrosion, grease and debris at the point where ground clamps are to be applied.

24.2.3.6 For most locations, a ball type connection with a protective rubber boot has been installed at the line and ground point.

24.2.3.7 On structures, special grounding clamps that can be attached to angle iron are required.

24.2.3.8 Some structures are equipped with grounding pads. In these cases, the

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normal grounding clamp must be removed and the cable attached via a bolted connection.

24.2.3.9 Grounding clamps shall not be installed over cable termination paddles.

24.2.3.10 When applying Personal Protective Grounds to deenergized equipment, the grounding cables shall be connected to the ground before being brought near the conductor that is to be grounded.

24.2.3.11 All grounding connections should be made so they do not interfere with the work.

24.2.3.12 Personal Protective Grounds should be carefully laid out, and if necessary, tied securely so as not to present a hazard to the workers.

24.2.3.13 Workers should avoid standing near earth grounds, to which protective grounding systems are attached.

24.2.3.14 Personal Protective Grounds shall never be installed in series with a fuse or switch.

24.2.3.15 When removing grounds, the grounding cable to each conductor shall be first removed before the ground connection point is removed.

24.2.4 Rating of Personal Protective Grounds

24.2.4.1 Personal Protective Grounds shall be rated and tested in accordance with ASTM F 855-09 or EN/IEC 61230:2008.

24.2.4.2 Personal Protective Grounds shall be of sufficient size to carry the maximum fault current that could appear at the point of grounding for the time necessary to clear the fault.

24.2.4.3 The phase-to-ground fault current can sometimes be larger than the phase-to-phase fault current. Therefore the ground conductor shall be sized the same as the phase conductors.

24.2.4.4 The connectors shall be suited for the intended connection.

24.2.4.5 Incompatible connections render the temporary grounding ineffective and dangerous to the worker.

24.2.4.6 Only certified grounding kits shall be utilized. Homemade grounding kits that are not conformant to these requirements shall not be used.

24.2.5 Grounding Breaker Assemblies

24.2.5.1 Not permitted as they typically cannot withstand the actual forces of a three-phase short circuit to ground. Additionally, it is too easy to mistakenly insert the wrong type of grounding breaker (line-side grounding, load-side grounding, or both line- and load-side grounding) into an energized circuit.

25 Voltage-Rated Hand Tools

25.1 General

When working within the Restricted Approach Boundary of exposed energized conductors or electrical parts, workers shall only use voltage-rated hand tools

25.1.1 The term “voltage-rated hand tools” refers to both insulated and insulating hand tools.

25.1.2 Insulated hand tools are constructed from conductive material or components and have electrical insulation applied on the exterior surface.

25.1.3 Insulating hand tools are constructed from nonconductive material. Insulating hand tools might have metal or other conductive inserts for reinforcement but, essentially, the tool must be constructed of nonconductive material.

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25.1.4 Voltage-rated hand tools are not intended to serve as primary protection from shock or electrocution. Although insulated hand tools might provide adequate shock protection for circuits below 1000 VAC, workers must select and wear PPE that provides protection from shock and arc flash without considering the hand tool rating. The primary function of the insulation is to reduce the risk of initiating an arcing fault.

25.1.5 The insulating coating of insulated hand tools may consist of a single layer, but normally it consists of two layers of contrasting colors. The interior layer provides 100 percent protection from shock to the full rating of the tool. The contrasting color of the exterior layer provides a method for inspecting the tool for damage.

25.2 Requirements

25.2.1 Any cut or abrasion that exposes any of the inner layers constitutes significant damage and suggests that the tool shall not be used. The damaged tool should be replaced with a new tool.

25.2.2 Workers shall visually inspect each voltage-rated tool before each use. If the interior layer is visible, the tool shall be discarded.

25.2.3 The manufacturer must mark voltage-rated hand tools as follows:

25.2.4 Manufacturer's name or trademark

25.2.5 Type or product reference

25.2.6 Double triangle symbol (International 1000 V symbol)

25.2.7 The marking "1000 V"

25.2.8 Year of manufacture



25.2.9 Only hand tools that meet the requirements of ASTM F1505 shall be purchased. A storage toolbox shall be purchased with the tools. The tools shall be kept in the storage toolbox when not in use. The toolbox, with the tools, shall be stored in a location that is clean and dry.

26 Portable Power Tools and Extension Cords

26.1 Portable power tools

26.1.1 Portable power tools shall be properly stored when not in use.

26.1.2 Power tools shall never be suspended by the cord.

26.1.3 Electrical power tools shall be visually inspected before each day's use for external defects, such as deformed or missing pins or insulation damage, and for indications of possible internal damage.

26.1.4 Ground prongs shall not be removed. Power tools whose ground prong is found to have been removed shall not be used. The grounding conductor is an integral part of the safety system built into equipment by manufacturers for tools and devices that are not double insulated. The integrity of the grounding-conductor is paramount to minimizing the chances that a worker becomes a part of the electrical circuit providing power to the tool.

26.1.5 Tools found damaged or defective, shall be tagged "out-of-service," by the user and not used until repaired and tested in accordance with the manufactures recommendations.

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26.1.6 Electrical portable power tools (except for battery-powered or double-insulated types) shall be grounded by a grounding conductor, which is contained within the same cable or cord as the circuit conductors.

26.1.7 Electrical portable power tools without a grounding conductor contained in the same cord must be clearly labeled as double-insulated.

26.1.8 When used outside or in wet and damp location, or when the user is well grounded, portable electric power tools shall be connected to ground-fault circuit interrupters (GFCI's).

26.1.9 Tools shall be cleaned and maintained in accordance with the manufacturer's instructions.

26.2 Extension Cords and Multiple Outlet Boxes

26.2.1 Extension Cords shall be three wires and inspected before each day's use by the individual utilizing the extension cord. A Ground Fault Circuit Interrupter (GFCI) should be used in conjunction with extension cords whenever possible.

26.2.2 This inspection will include the jacket and the ground pin.

26.2.3 Extension Cords shall be adequate for the intended purpose and not to be used in wet locations unless designed for the purpose or GFCI protected.

26.2.4 Ground prongs must be in place. Extension cords whose ground prong is found to have been removed shall not be used.

26.2.5 Extension Cords connected to equipment may not be used for raising or lowering the equipment and placed so they do not present a trip hazard.

26.2.6 Extension Cords may not be fastened with staples or otherwise hung in such a fashion that could damage the outer jacket or insulation.

26.2.7 Extension cords cannot be used in lieu of permanent wiring, cords in place to operate fixed equipment or lighting. If needed for more than 30 days permanent wiring shall be installed.

26.2.8 Use of multiple extension cords or Power strips (multiple outlet boxes) is referred to as daisy chaining. This configuration will increase resistance in an electrical circuit which in turn will increase heating of conductors, receptacles, and plugs and is prohibited.

26.2.9 Power strips (multiple outlet boxes) shall not be used to provide power to loads greater than 10 Amperes (i.e. space heaters, hot plates, coffee pots, or other high-current loads).

26.2.10 Adapters that interrupt the continuity of the equipment grounding connection may not be used.

26.2.11 Individuals' hands must not be wet when plugging and unplugging extension cords and cord-and-plug connected equipment if energized equipment is involved.

26.3 Equipment Assured Grounding Program

26.3.1 Inspection of each cord set attachment cap, plug, and receptacle, and any equipment connected by cord and plug to prevent potential electrocution from external defects, such as deformed or missing pins or insulation damage, and for indications of possible internal damage.

26.3.2 The Equipment Assured Grounding Program applies to all Portable Power Tools, Extension Cords and Multiple Outlet Boxes that are in use or available for use. Power tools and cords that are in stock and not available for use are exempt. The assured grounding program does not apply to office and kitchen equipment such as computers, photocopiers, coffee makers and refrigerators.

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26.3.3 Each site or project must designate one or more competent individuals to implement the program.

26.3.4 Each cord set, attachment cap, plug, and receptacle of cord sets, and any equipment connected by cord and plug, except cord sets and receptacles shall be visually inspected before each day's use for adequacy of purpose, external defects, such as deformed or missing pins or insulation damage, and for indications of possible internal damage.

26.3.5 For receptacles connected to circuits with different voltages, frequencies, or current (ac or dc) on the same premises, use a design such that the attachment plugs on the circuits are not interchangeable.

26.3.6 All grounded portable electrical power tools and extension cords shall be:

26.3.6.1 Three-wire extension cords and cables that conform to: rating, grounding, and non- interchangeability requirements.

26.3.6.2 Tested in accordance with manufacturers' recommendation: before initial use, after purchase and at least quarterly thereafter.

26.3.6.3 Tested before returned to service following repairs.

26.3.6.4 Tested before returned to service after any incident that can reasonably be suspected to have caused damage.

26.3.7 The following tests shall be performed on all grounded portable electric power tools:

26.3.7.1 All grounded conductors shall be tested for resistance with the multimeter selected to ohms. Measured resistance must not exceed 1.0 ohms.

26.3.7.2 Test resistance on conductor insulation, minimum 1.0 megaohms.

26.3.7.3 Both tests shall be performed using an approved multimeter or equivalent device. The insulation resistance test shall not exceed the voltage rating of the wires in the cord

26.3.8 Tests performed shall be recorded.

26.3.8.1 This test record shall identify each receptacle, cord set, and cord- and plug-connected equipment that passed the test and shall indicate the last date it was tested or the interval for which it was tested.

26.3.8.2 This record shall be kept in the Assured Grounding Test Log (0049-0601). Each log shall be maintained until replaced by a more current record.

26.3.8.3 Each quarter shall be designated by a different color tape on the plug end of the cord for easy recognition.

26.3.8.4 Q1 – White (Jan-Mar),

26.3.8.5 Q2 – Green (Apr-Jun),

26.3.8.6 Q3 – Yellow (Jul-Sep),

26.3.8.7 Q4 – Orange (Oct-Dec)

27 Fiberglass Ladders

27.1 Requirements

27.1.1 Only fiberglass portable ladders shall be used in wind turbines.

27.1.2 Fiberglass ladders shall be duty rated to at least Type 1 (250 pounds) according to the ANSI A14.5-2000 standard for fiberglass ladders. Where the combined weight of the person using the ladder and tools or equipment exceeds 250 pounds a higher duty rating shall be used (Type 1A – 300 pounds or Type 1AA – 375 pounds).

27.1.3 A uniform step spacing shall be employed which shall be not more than 12 inches. Steps shall be parallel and level when the ladder is in position for use.

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27.1.4 The minimum width between side rails at the top, inside to inside, shall be not less than 11 1/2 inches. From top to bottom, the side rails shall spread at least 1 inch for each foot of length of stepladder.

27.1.5 Fiberglass ladders shall be inspected before each day's use by the individual utilizing the ladder.

27.1.6 Fiberglass ladders found damaged or defective shall be tagged "out-of-service," reported to the immediate manager and not used until repaired.

28 APPENDIX: version history

Version No.	Date	Description of Changes
01	2009.10.22	New document
02	2009.12.22	Initial Release
03	2010.05.07	Line revision 2.2
04	2010.10.01	Updated Links
05	N/A	SAP Error
06	2011.03.14	Annual review and revision, removed references to employee(s) and replaced with individual(s) inserted Control of Hazardous Energy for LOTO, revised assured grounding
07	2012.01.01	Annual review and revision: Changes are highlighted in gray Changed "FR" to "arc-rated" due to changes in NFPA 70E-2012. Added definition "access" to replace ESN 020. Added definition "Test before Touch" Deleted table "required Electrical Safety Training Topics" as training requirements are determined by Vestas Standard Electrical Safety Changed audit periodicity from quarterly to 'periodic' to ensure all individuals are audited during the calendar year. Changed statement to reflect managers shall qualify to a 'minimum' of Level 1. Deleted Refresher Training paragraph. Modified "requirements for a Standby Person" to align with Vestas Standard Electrical Safety Modified "requirements for two qualified technicians" to reflect "one Level 2 Qualified Technician and one technician who has completed Basic Safety" to reduce burden on manpower. Added further clarification on possible causes of an arc flash
08	2013.01.25	Revised Sections: 4.2, 4.3, 4.6,6, 7, 8, 9.2, 9.4, 9.5, 9.6, 10.2, 10.3, 10.4, 11, 12.1, 13.1, 13.4, 14.1, 14.2, 15.2, 15.3, 16.1, 16.2, 17.1, 17.3, 18.3, 18.4, 18.6, 18.9, 18.12, 18.13, 19.1, 19.2, 20.3, 21.2, 22.9, 22.10, 22.11, 23.1, 25.2, 27.1, 27.3,
09	2014.01.15	Revised Sections 4.2,7,8,10.3,10.4,12.2,15.2,17.1,17.3, 18.17,21.2,23.2,25.2,27,28.1 (see grey highlighted text)
00	2014.12.22	Approved in DMS before updating the references to the forms
01	2015.01.13	• Converted to T03 from T09 document. Original 0008-7990 • All changes highlighted in grey • Removed HRC category and changed to PPE Category to align with NFPA 70E-2015 • Added clarification to Equipment out of service

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Site Electrical Audit

RESTRICTED

Site: _____ **Date:** _____

Site Supervisor: _____

Notes: Complete ALL applicable checklist items, All "NO" answers will require corrective action.

Category	Item #	Description	Yes	No
Electrical		Ensure that the electrical equipment and other energy sources in your workplace are safe and inspected and maintained regularly.		
	6.1	Are circuit breaker panels accessible and free of obstacles? (Minimum 36" directly in front; warehouse, shop & O&M building)		
	6.2	Is portable electrical equipment protected by safety switches (GFCI)? (mandatory for construction work)		
	6.3	Are all receptacles, fittings and switches properly mounted and free of obvious defects? (no exposed wires, broken covers or signs of overheating)?		
	6.4	Are all panels, circuit breakers, main and isolating switches clearly labeled and accessible?		
	6.5	Are corded devices (vacuums, drills, grinders, etc.) properly inspected and tagged in accordance with assured grounding program (US 0049-0995 CAN 0049-0678)?		
	6.6	Are extension cords and power boards routed safely to prevent mechanical, chemical or other damage?		
	6.7	Is permanent wiring adequate to preclude using extension cords for installed equipment? (extension cords shall not be used for greater than 30 days)		
	6.8	Are the electrical fittings and electrical equipment, including portable power tools, regularly inspected and maintained?		
	6.9	Are portable electrical tools and equipment properly grounded or labeled double insulated?		
	6.10	Are building earthing/grounding systems intact, clean and secure? Does the site have a method of verifying that the earthing/grounding systems are intact?		
	6.11	Are computer and electrical equipment cords secure to prevent strain and prevent trip hazards?		
	6.12	Are extension cords and power strips properly utilized and not daisy chained together?		
	6.13	Are extension cords free of taped splices and unprotected wires?		
	6.14	Are contact voltage testers within calibration cycle?		
	6.15	Are electrically insulated tools free of nicks, gouges, scrapes?		
	6.16	Do all Level 2 technician's possess a non-contact tester (Fluke pens) or have access to one?		
	6.17	Is defective electrical equipment properly quarantined? (grinders, cords, vacuums, etc.)		
ESP/CHE		Ensure the Electrical Safety Plan (ESP) and the Control of Hazardous Energy (CHE) program requirements are being met.	Yes	No
	7.1	Is training documentation available verifying initial and annual refresher completion for all Qualified Workers? (LOTO Level 2 & 3)		
	7.2	Are new employees trained to ESP/CHE Level 1 within 30 days of hire?		
	7.3	Are all site technicians qualified level 2 or higher?		
	7.4	Is CoHE program level 0 & 1 training being conducted for guests and visitors?		
	7.5	Are electrically qualified workers TBC 200 qualified (Electrical Safety Programs)?		
	7.6	Does the site have at least one Energy Control Coordinator (ECC) for each platform?		
	7.7	Are LOTO Instructions correctly filled out and returned to ECC in a timely manner? Does LOTO boundary match task?		
	7.8	Does the site have sufficient quantities of Arc Flash clothing? (Class 4 - two per site 1 per 10 technicians)?		
	7.9	Does arc flash clothing show signs of inspections? (No holes, tears, free of grease or oils, Visors free from deep scratches and extreme warpage)		
	7.10	Are electrical safety gloves safe for use and in certification date?		
	7.11	Are electrical safety gloves properly stored in a way to keep them safe from damage?		
	7.12	Is defective electrical safety equipment properly quarantined? (Gloves, blankets, hot sticks)?		
	7.13	Are Group lockout kits available, properly marked, and correctly used?		
	7.14	Are personal LOTO sets (blue locks, hasp & tags) issued to each employee, properly marked with Technician picture and Contact information?		
	7.15	Does site have a centrally located, controlled, and inventoried LOTO center for guests, visitors, and traveling technicians? (Blue locks and generic tags)		
	7.16	Is there a process for issuing and tracking temporary Blue personal locks?		
	7.17	Are LOTO devices being used in accordance with OSHA or Provincial/Territorial OHS regulations? (personal or control locks not used for other purposes)		
	7.18	Are turbine single line and plant outlines available, current, and posted (if possible)? Can a technician locate and explain them?		
	7.19	Can a level 3 or ECC qualified technician demonstrate locating a schematic on the tech doc disk or on the HUB.?		
	7.20	Are Personal Work Practice audits being performed by the Site Manger or designee for every qualified worker at least annually?		
	7.21	Are site electrical audits being completed by the Site Manager (or designee) on a quarterly basis?		
	7.22	Have all tools on site requiring ground checking been identified and tested per assured grounding program on a quarterly basis?		
	7.23	Has a medical assessment been complete on individual's involved in an electrical shock incident (if applicable)?		
	7.24	Is training documentation available verifying initial and annual refresher completion for all (authorized and affected) contract employees? (LOTO Level 0 & 1)		
	7.25	Is training documentation available verifying initial and annual refresher completion for all (Qualified Workers) contract employees? (LOTO Level 2)		
	7.26	Have all external audit action items identified by the Electrical Safety Team or QSE been complete within 30 days of receiving the audit report?		
	7.27	Are turbines properly labeled with Danger and Warning signs?		
	7.28	Have Rubber insulating blankets been tested within the last 12 months (6 month in Oregon)?		
	7.29	Have all VAME Energized Work Permits been properly completed (if applicable)?		
	7.30	Are fiberglass non-conductive ladders available for work on electrical systems?		
	7.31	Are voltage detectors within calibration dates?		

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Site Electrical Audit

RESTRICTED

NOTES (*"NO" answers will require Corrective Action)* :

Concern or Issue	Corrective Action	Assigned to (int.)	Due Date

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Rev. No.	Date
00	2011.2.24
01	2011.4.1
02	2013.8.19
00	2014.12.22
01	2015.03.25

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RESTRICTED

Energized Electrical Work Permit

DMS # 0049-0997 R00
Date: 23 Oct 2012

Site Location/Name:		Turbine/Pad Location:		

PART 1: TO BE COMPLETED BY THE REQUESTER

(1) Description of Circuit /Equipment/Job Location:

(2) Description of work to be done:

(3) Justification for why the work must be performed in an energized condition:

(4) Requester/Title:		Date:	

PART 2: TO BE COMPLETED BY ELECTRCALLY QUALIFIED PERSON DOING THE WORK

(5) Detailed job procedure to be used in performing the above work: (Reference WI, SWI, TSI, etc)

a. Personal protective grounds required (Y/N)		Location(s):	
b. Temporary Generator in use (Y/N)		Connection Point:	

(6) Results of Hazard Analysis: (Shock/Arc Flash)

a. Highest voltage to be tested de-energized:				
b. Highest voltage to be worked on energized:				
c. Other voltages within workspace:				
d. Restricted Approach Boundary:		feet		inches
e. Limited Approach Boundary:		feet		inches
f. Maximum exposure level:		cal/cm^2 at		inches
g. Arc Flash Boundary (> 1.2 cal/cm^2):		feet		inches

(7) Necessary PPE to safely perform the task: (check all that apply)

	Leather safety Shoes		Voltage gloves, Class 0, 4 w/leather outers (Circle one)
	Safety Glasses		FR Clothing, Class 0, 2, 4 (Circle one)
	Arc-Flash hood, Class2		Arc-Flash hood, Class 2, 4 (Circle one)
	Class E Hard Hat		Hearing Protection

(8) Tools and Equipment to safely perform the task: (check all that apply)

	Voltage Rated Tools		Voltage Rated Meter
	Voltage Rated Blanket		Voltage Rated Megger

(9) Means employed to restrict the access of unqualified persons from the work area:

a. Caution tape barricade minimum boundary distance:		Feet		inches
b. Standby Person briefed on job tasks and Emergency Response Plan:				
c. JSA/PTP complete:				

Qualified Workers (General)	Qualified Workers (Advanced)

Standby Person: I have been briefed on work tasks and I understand my role as the Standby Person.

Standby Person Print	Standby Person Signiture	Date

PART 3: TO BE COMPLETED BY ENERGY CONTROL COORDINATOR

JSA has been verified and completed:		PTP has been verified and completed:			
Energy Control Coordinator		Check if phone approval:		Date:	
Vestas Offsite Manager		Check if phone approval:		Date:	

*Completed form must be placed in turbine during work

*Form shall be retained by Energy Control Coordinator following job completion

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Rev No	Date
0	22-12-2014

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Electrical Safety/Control of Hazardous Energy Training Matrix				Document ID: 0049-0599 INS SUS-MET-ELS Training Matrix
Owner(s): BPO Del. SUS	Author(s): JATYL	Valid from: 2015.11.02		Version: 02

Version history

Version No.	Date	Description of Changes
01	2015.10.29	

Table of Contents

1 Purpose 1
2 References 1
3 Equivalency Matrix 2
4 APPENDIX: version history 3

1 Purpose

This training matrix summarizes the roles and training requirements in the Electrical Safety and Control of Hazardous Energy programs.

2 References

Document No.	Title
0049-0580	VAWT Control of Hazardous Energy Program
0049-0602	ESP / CoHE Equivalency Matrix
0049-0678	VCWT Electrical Safety
0049-0677	VCWT Control of Hazardous Energy
0049-0995	VAWT Electrical Safety
0049-0678	VCWT Electrical Safety

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3 Equivalency Matrix

Electrically Unqualified Workers			
Role	**Employee Group**	**Role Restrictions**	**Minimum Training Requirements**
Level 0	Escorted visitors	• Affected Person • Must perform lockout under the direct supervision of an electrically qualified escort • Not authorized to perform electrical work or enter within the Limited Approach Boundary or Arc Flash Boundary of any electrical system	• General site orientation
Level 1	New Vestas Technicians Non-Technicians Frequent Climbers Sub-Contractors	• Authorized Electrical Person • Authorized to apply personal lockout locks to a system that has been locked out by a Qualified Person • Not authorized to perform electrical work or enter within the Limited Approach Boundary or Arc Flash Boundary of any electrical system • New Vestas Technicians may perform electrical work as part of “on the job training” under the direct supervision of a Qualified Electrical Person	• Basic Safety (or equivalent approved documentation for contractors) • Vestas Technicians: • D-Service Course (or equivalent merit certificate) • LOTO Level 1 • Electrical Safety for Ordinary Workers • Lessons Learned from previous year (annually)
Electrically Qualified Workers			
Role	**Employee Group**	**Role Restrictions**	**Minimum Training Requirements**
Level 2	Vestas Technicians Approved Electrical Contractors General Electrical Work	• Qualified Electrical Person • Authorized to place turbine equipment in a safe working condition, establishing a lockout, in accordance with an approved LOTO Instruction • May perform electrical troubleshooting under the direct supervision of a LOTO Level 3 as part of the on-the-job training • Authorized to perform electrical work and to enter within the Limited Approach Boundary or Arc Flash Boundary of any electrical system for which they have been made aware of specific hazardous energy sources, the type and the magnitude, and the method necessary to isolate and control those energies. • Perform mechanical lockout.	• All requirements from Level 1, and: • Vestas Technicians: (or equivalent approved documentation for contractors) • C-Service Course (or equivalent merit certificate) • Electrical Safety for Qualified Workers (or equivalent qualifications for contractors) • LOTO Level 2 • TBC 200 • Contact release (initial/annual) • Lessons Learned from previous year (annually)

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Level 3	Senior Vestas Technicians Advanced Electrical Work	• LOTO Specialist • Authorized to design and approve equipment LOTO Instructions • Authorized to perform electrical troubleshooting, interlock bypassing, and work requiring an energized electrical work permit	• All requirements from Level 2, and: • B-Advanced Troubleshooting or Theory Course • Electrical Safety for Qualified Workers • LOTO Level 3 • Contact release (initial/annual) • Lessons Learned from previous year (annually)
ECC	Senior Vestas Technicians Advanced Electrical Work	• LOTO Specialist • Authorized to design and approve equipment LOTO Instructions • Authorized to perform electrical troubleshooting, interlock bypassing, and work requiring an energized electrical work permit • Performs general on-site ESP and CoHE programs training	• Must maintain the same qualifications as the LOTO Level 3 • Content of ECC courses is set by Course Outline as determined by Technical Training Center

Note: Subcontractors can become qualified as mechanical LOTO Level 2 via the local ECC

4 APPENDIX: version history

Version No.	Date	Description of Changes
00	2014.01.05	New document
00	2015.03.02	Converted from document T09 (0019-2635) to T03. Updated references. Added requirement for contact release training, annual lessons learned, reference table and ECC to matrix. All changes are highlighted in grey.

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DMS 0049-0600 R00
Valid from 2015.03.06

Personnel Work Practice Audit

Name of Auditor: | Date of Audit: | Turbine space being entered:

Name of worker to be audited: | Description of work task:

State: | City: | Windfarm: | Cost Center:

Electrical Portion:

Level Select... qualification.

Safety Work Procedure Questions:	Yes	No
1. Does this work require an Energized Work Permit?	☐	☐
1a. If Yes, was it completed correctly?	☐	☐
2. Is the worker qualified to perform this task?	☐	☐
3. Is the JSA filled out accurate and completely?	☐	☐
4. Have the hazards been identified correctly?	☐	☐
5. Has the worker removed prohibited articles of clothing and jewelry?	☐	☐
6. Has the proper PPE been selected?	☐	☐
7. Is the worker's PPE in satisfactory condition?	☐	☐
8. Have the worker's gloves been tested in the last 6 months (3 months in Oregon)?	☐	☐
9. Is the worker's equipment in satisfactory condition?	☐	☐
10. Has the worker's Voltage Tester been calibrated within the last year?	☐	☐
11. Is the worker using the 3-point (Test-Verify-Test) test method?	☐	☐
12. Has the equipment been locked out in accordance with VAME ESP?	☐	☐
13. Is there a written procedure for this task?	☐	☐
13a. If yes, is the worker following the written procedure?	☐	☐

Qualification Questions/Responses:

Confined Space Portion:

Auditor Initials: RIREG

T03 0049-0600 Ver 00 - Approved - Exported from DMS: 2016-06-08 by RIREG

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Assured Grounding Test Log

Document ID: 0049-0601
INS SUS-ENV-MVR (AME US & CAN)
Grounding Test Log

Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.03.02		Version: 00

ID No.	Item Description	Q1-Date	Tech	Status	Q2-Date	Tech	Status	Q3-Date	Tech	Status	Q4-Date	Tech	Status

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Electrical Safety / Control of Hazardous Energy Equivalency Matrix System Instruction				Document ID: 0049-0602 INS SUS-IEM-EMR Equivalency Matrix
Owner(s): BPO Del. SUS	Author(s): JATYL	Valid from: 2015.03.02		Version: 00

Version history

Version No.	Date	Description of Changes
00	2015.03.02	Converted T09 document (0035-8895) to T03

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1 Purpose

To reduce the confusion and standardize between the various standards and regulations facing VAME employees.

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2 Electrical Safety/Control of Hazardous Energy Equivalency Matrix

Equivalency	Vestas Standards Electrical Safety	Vestas Standards Control of Hazardous Energy	VAME Electrical Safety Program	VAME Control of Hazardous Energy Program	OSHA 1910.147	OSHA 1910.333	NFPA 70E-2015	Canadian Electrical Code	Z462
Level 0	Ordinary Persons	Escorted Visitor	Unqualified Person	Escorted Visitor Affected Person	Affected Employee	Unqualified Persons	Unqualified Persons		Unqualified Person
Level 1		Basic Lockout User	Authorized Person	Authorized Person				Qualified Person[1]	
Level 2	Qualified Persons	Person-in-Charge (Level 2)	Qualified Person Platform Specific	Qualified Person Person-in-Charge	Authorized Employee	Qualified Persons	Qualified Persons	Qualified Person 1	
Level 3	Instructed Electrical Worker	Lockout Specialist (Level 3)		Lockout Specialist (Level 3)				Authorized Person	Qualified Person
ECC		ECC		ECC					

[1] Canadian Electrical Code defines a qualified person is one who is familiar with the construction and operation of the apparatus and the hazards involved. An authorized person is a qualified person who, in his or her duties or occupation, is obliges to approach or handle electrical equipment; or a person who, having been warned of the hazards involved, has been instructed or authorize to do so be someone having authority to give instruction or authorization.

3 APPENDIX: version history

Version No.	Date	Description of Changes
00	2012.12.14	• New document
01	2013.02.05	• Changed Level 3 to ECC, Skilled to Instructed
02	2013.06.04	• Split level 0 and 1, changed Level 1 to Authorized Person in COHE, added document history

VESTAS PROPRIETARY NOTICE

T03 0049-0022 Ver 00 - Approved - Exported from DMS: 2016-06-03 by RIREG

SF6 Containing Switchgear Fault Response System Instruction

Document ID:0049-0603
INS SUS-IEM-EMR(AME US/CAN)
Switchgear Fault Response

Owner(s):	Author(s):	Valid from:		Version:
BPO Del. SUS	JATYL	2015.03.06		00

Version history

Version No.	Date	Description of Changes
00	2015.01.16	Converted T09 document (0037-9441) to T03 Updated sections: 3, 6, 9.

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(L5 Document Template V02)

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1 Purpose

Vestas-American Wind Technology will ensure that all affected personnel are apprised of the procedure for responding to a switchgear fault involving switchgear that contain Sulfur Hexafluoride (SF_6)arc blast interruption (suppression) systems.

2 Scope

This standard practice instruction applies to all wind turbine generators that have switchgear containing an SF_6 arc blast interruption (suppression) system.

3 Terms and Abbreviations

Term or Abbreviation	Definition
Arc Blast	Type of electrical explosion resulting from a low-impedance connection to ground or another voltage phase in an electrical system.
CO	Carbon monoxide is a colorless, odorless, tasteless gas that is slightly lighter than air and is toxic to humans in higher concentrations
GHG	Greenhouse Gas is a gas in an atmosphere that absorbs and emits radiation within the thermal infrared range.
QSE	Quality, Safety and Environment
SF_6	Sulfur hexafluoride gas that is chemically inert, non-flammable and non-toxic in its gaseous state. It is, however, a highly potent greenhouse gas that is highly effective at trapping infrared radiation in the atmosphere.
OSHA	Occupational Safety and Health Administration
VAWT	Vestas American Wind Technology
VCWT	Vestas Canadian Wind Technology

4 Basis

Serious injury or death can be the result of improper response to faulty switchgear containing SF_6 gas arc blast interruption (suppression) systems. This poses a serious problem for exposed workers as well as the employer. The OSHA Hazard Communication safety standards establish uniform requirements to ensure that the hazards associated with the workplace are identified and evaluated, that safety procedures are implemented, and that the proper hazard information is transmitted to all affected workers.

5 Responsibility

QSE department is authorized to amend these instructions. Any personnel are authorized to halt any operation of the company where there is danger of serious personal illness or injury.

6 References

Document No.	Title
0049-2063	Vestas Hazard Communication Plan
0049-0648	VCWT Workplace Chemicals
0049-0584	VAWT Confined Space Program
0049-0626	VCWT Confined Space Program
0049-0679	Ontario Confined Space Alternate Entry
0049-2070	Vestas Personal Protective Equipment Plan
0049-0702	VCWT PPE Plan

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Document No.	Title
0049-0696	VAWT Respiratory Protection Plan
0049-0700	VCWT Respiratory Protection Plan
0049-0580	Vestas Standards Control of Hazardous Energy Program
0049-0677	VCWT Control of Hazardous Energy Program
0049-0995	Vestas Standards Electrical Safety Program
0049-0678	VCWT Electrical Safety Program
US Dept. of Interior	Management and Safe Handling Procedures for Sulfur Hexafluoride (SF_6) Gas
Electric Power Research Institute	Practical Guide to SF_6 Handling Practices – Technical Report
Pyrostop 6 SDS	Inventec Performance Chemicals

7 Chemical Characteristics

- Colorless, odorless, liquefied compressed gas;
- Chemically inert gas, nonflammable and nontoxic in gaseous state;
- 5-6X heavier than air;
- Can displace oxygen in confined spaces;
- Highly potent greenhouse gas that is not detrimental to the ozone layer, but is highly effective at trapping infrared radiation in the atmosphere;
- Toxic byproducts released when interrupting the arc plasma in a circuit breaker, are of concern. Decomposition products in the form of metallic fluoride powders and sulfurous gases can be the result;
- Fluoride powders are toxic to humans through breathing and/or skin contact;
- Sulfur gas compounds such as sulfur dioxide (SO_2) can cause respiratory paralysis; and
- Contact with liquid / liquefied gas can cause frostbite.

8 Initial Training

8.1 General

Training shall be conducted prior to job assignment. The employer shall provide hazard communication training to ensure that all critical information to prevent injury and illness regarding SF_6 gas and has been conveyed to affected personnel. This standard practice instruction shall be provided to, and read by, all employees receiving training. The training shall include, at a minimum, the following:

8.1.1 Classification of SF_6
8.1.2 Composition / Information on ingredients
8.1.3 First Aid Measures
8.1.4 Fire-Fighting Measures
8.1.5 Accidental Release Measures
8.1.6 Handling and Storage Procedures
8.1.7 Personal Protection / Exposure Controls
8.1.8 Physical and Chemical Properties
8.1.9 Stability and Reactivity
8.1.10 Toxicological Information
8.1.11 Regulatory Information
8.1.12 Disposal Considerations
8.1.13 How to verify the SF_6 system has or has not been discharged

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9 Safe Operating Practices for Responding to Switchgear Faults

NOTE: When responding to a switchgear fault or switchgear with known damage and it has been verified the SF_6 gas has been expelled through utilizing the SF_6 gauge; Vestas personnel shall stop and not proceed any further until notifying the site manager /construction manager and the customer.

9.1 Investigation Requirements

Whenever responding to any switchgear fault, the following safe practices (at a minimum) shall be observed:

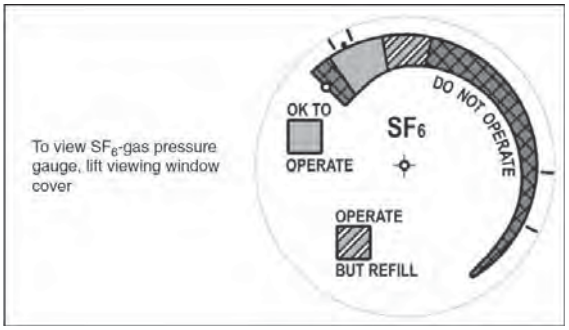
9.1.1 Always treat the switchgear as deranged equipment. Normal means of deenergization and lockout procedures may not be sufficient to safely inspect the equipment.

9.1.2 Prior to beginning work, a Pre-Task Plan (PTP) must be developed with a Qualified Electrical Person.

9.1.3 Upon initial entry into the turbine for voltage testing, etc., in response to a switchgear fault or known failure, an approved multi-gas detector must be used to verify an acceptable atmosphere for entry.

9.1.4 Any work will begin with extensive voltage tests that include testing of the cabinet external casing and other normally grounded metal surfaces.

9.1.5 Once the equipment is verified to be de-energized, check the SF_6 gauge on the control panel of the switchgear to verify whether the SF_6 gas has been expelled. In the case where the gauge may not be legible or visible due to a powder residue, it shall be assumed the SF_6 gas has been expelled.



9.1.6 Before entering the tower basement, the atmosphere must be verified through monitoring with an approved multi-gas detector. Atmosphere samples shall be taken starting at the floor of the basement and monitoring at ~3 foot levels from the floor up to the switchgear platform. Sampling can be achieved either through direct diffusion with the approved multi-gas detector or through a sampling pump and tubing placed on the multi-gas detector. When using a sampling pump and tubing the user must allow 45 seconds for the monitor to stabilize plus an additional 1 second for every 1 foot of tubing at each level of the basement. If not using a pump and tubing, a rope shall be used to lower the monitor to the lowest level, provide enough time for the monitor to stabilize and slowly bring the monitor up toward the platform, pausing approximately every 3 feet to sample the various levels of the basement.

9.1.7 SF_6 gas will displace oxygen, thus the main focus should be on the oxygen sensor. In addition, CO and sulfurous gases (rotten egg odor) may also be present based upon the level of decomposition of the SF_6 gas during the event.

9.1.8 If low oxygen or increased CO levels or are detected, or there is a detected sulfurous odor in the tower basement, forced ventilation will need to be set up to completely evacuate the accumulated SF_6 gas in the tower basement. This procedure may require supplied air respirators if entry into the tower basement is required to set up the ventilation. If this is the case, this procedure shall be completed by trained hazmat response personnel.

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9.1.9 Once the atmosphere has been verified, only then can any personnel be allowed to enter the turbine basement. Entry into the basement will require continuous monitoring while personnel are in the basement after responding to a switchgear fault or known event. At any time, if an odor of rotten eggs is noted or the approved multi-gas detector begins to pick up oxygen depleted or increased CO atmosphere, all entrants must immediately evacuate the tower basement and quarantine the turbine.

9.1.10 If, after responding to a switchgear fault or switchgear with known damage, it is verified the SF_6 gauge is indicating that the SF_6 gas has been expelled, Vestas personnel shall stop and not proceed any further until notifying the site manager /construction manager and the customer. In superheated situations, the SF_6 gas can decompose into sulfur gas compounds and metallic fluoride powder. This metallic fluoride powder may or may not be visible. Vestas personnel are not trained to respond to fluoride powder tainted equipment and shall not be exposed to this equipment. Response, inspection, clean up, removal and disposal of switchgear exposed to SF_6 gas shall be the responsibility of the customer and / or the switchgear manufacturer.

9.1.11 In all situations where it is verified that the SF_6 gas has been expelled in a switchgear, the turbine shall be quarantined until the equipment and tower can be inspected and cleaned up and deemed safe for entry by properly trained personnel.

10 Personal Protective Equipment

Response to clean up or handle failed switchgear exposed to SF_6 gas and its by-products shall only be performed by trained hazmat response personnel. Personnel protective equipment for response shall be as follows:

10.1.1 Tyvek suits shall be worn to protect from exposure to any metallic fluoride dusts.

10.1.2 Gloves made of rubber, PVC or neoprene

10.1.3 Sealed safety goggles

10.1.4 Full face respirator with acid vapor cartridges for fluoride powder response. Supplied air for response to an oxygen deficient or unknown atmosphere.

10.1.5 Powder residue shall be removed by use of a high efficiency particulate air (HEPA) vacuum cleaner equipped with single use filters and disposable bags.

11 Preventive Measures

If personnel are exposed to SF_6 gas, or its by-products, the following measures shall be taken to ensure the correct treatment is provided to reverse the effects of the exposure:

11.1.1 If exposed to an oxygen deficient atmosphere, slowly developing characteristics such as poor muscle coordination difficulty in breathing, rapid pulse, disorientation, fatigue, nausea, vomiting and loss of consciousness may result. Seek immediate medical attention.

11.1.2 If exposed to a sulfur gas (rotten egg) containing atmosphere, symptoms such as eye irritation, sore throat, chest tightness, and possible skin irritation may result. Seek immediate medical attention.

11.1.3 If exposed to metallic fluoride powder, even in trace amounts, skin irritation including a burning sensation, rash and/or blisters may result. Treatment involves washing the affected skin with an alkaline solution (i.e., baking soda and water). If there is a chance the powder may have been inhaled, oxygen should be administered by a qualified person. Seek immediate medical attention in either situation.

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12 Emissions Reporting

As of November 8, 2010, the Administrator of the Environmental Protection Agency signed a final rule amending the Greenhouse Gas Reporting Program requirements for the Petroleum, Natural Gas and Electronics industry. The gases covered include fluorinated GHGs including sulfur hexafluoride (SF_6) as defined by the final Mandatory Reporting of GHGs Rule (74 FR 56260; October 30, 2009).

It is the responsibility of the owner to report any releases of SF_6 as defined by local, state and/or federal permitting requirements. It is Vestas' responsibility to report the discovery of any SF_6 system release to the customer, per site reporting protocol, as soon as possible after discovery.

13 APPENDIX: version history

Version No.	Date	Description of Changes
00	2013.04.21	New document

(L5 Document Template V02)

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VESTAS PROPRIETARY NOTICE

# VAWT Control of Hazardous Energy System Instruction				Document ID: 0049-0580 INS SUS-SAF OPC [AME US] Hazardous Energy
Owner(s): BPO Del. SUS	Author(s): JATYL	Valid from: 2016.03.22		Version: 02

Version history

Version No.	Date	Description of Changes
02	2016.03.22	Updated Sections: 2.2, 2.5, 3.0, 5.0, 6.0, 7.4, 7.5, 7.8.5, 7.9, 7.16, 7.17, highlighted in grey.

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1 Purpose

The purpose of the CONTROL OF HAZARDOUS ENERGY Program (COHE) is to ensure that all persons performing work on Vestas wind turbines are fully protected from unexpected energization, startup or the uncontrolled release of energy, which could cause injury to those persons and/or damage to equipment.

WARNING: The procedures covered by this document must be carried out only by persons who are knowledgeable in the operation and maintenance of wind turbines and in the practice of CONTROL OF HAZARDOUS ENERGY procedures and who have been trained by Vestas as a Person in Charge and/or LOTO Specialist. These instructions are intended only for such persons. They are NOT intended to be a substitute for adequate training and experience in safety procedures for this type of equipment. Failure to obtain the proper training and certification and to observe the precautions described in this COHE may result in serious injury or death.

This program outlines the methods, responsibilities and required employee training for the Lockout/Tagout energy control program for VESTAS AMERICAS (VAWT), hereinafter called the CONTROL OF HAZARDOUS ENERGY Program. The requirements of this program may exceed safety precautions in other work instructions.

2 Responsibility

2.1 Senior Management

2.1.1 Ensure effective program development and implementation.

2.1.2 Provide Site/Construction Management with adequate resources and support to carry out program responsibilities and obligations.

2.1.3 Require adherence to all policies, procedures, practices and rules related to the use and care of PPE.

2.1.4 Oversee and evaluate site supervisor performance.

2.2 Site/Construction Manager/Authorized Supervisor

2.2.1 Ensure all personnel under Vestas supervision adhere to all policies, procedures and rules related to the Control of Hazardous Energy Program.

2.2.2 Ensure all personnel under Vestas supervision have received training from a competent person and have adequate knowledge and skills to perform their duties.

2.2.3 Appoint one or more LOTO Level 3 Specialist(s) to act as the Energy Control Coordinator at the site if there are no qualified ECC's available.

2.2.4 Ensure all contractors under Vestas supervision:

2.2.4.1 Have received training from a competent person and have adequate knowledge and skills to perform their duties; and

2.2.4.2 Follow the COHE program by hanging locks and tags.

2.2.5 Maintain written plans or procedures that, at a minimum, comply with all local, state, provincial and federal laws and regulations that apply to the facility

2.2.6 Comply with the most stringent requirement established either by local law or by this program.

2.2.7 Initiate a near-miss safety investigation whenever a discrepancy in a lockout has been discovered after work has commenced.

2.2.8 Perform a monthly audit of lockout practices, as part of Personal Work Practice Audits, and maintain a record of these audits.

2.2.9 Ensure that all newly trained Qualified Persons performs a LOTO procedure practical evaluation DMS 0049-0682.

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2.2.10 Verify and document, at least annually, that CoHE training for each qualified individual is complete and up-to-date. The documentation must contain the content of the training, the employee's name, and dates of training.

2.2.11 Ensure lockout locks and tags are used only for LOTO purposes:

2.2.11.1 Locks and tags may not be used on personal lockers, totes, or in any place not meant for controlling hazardous energies.

2.2.12 Ensure LOTO Level 2 qualified personnel who are required to perform electrical lockouts meet the Qualified Electrical Person requirements outlined in the Electrical Safety Program.

2.3 Quality, Safety and Environmental (QSE)

2.3.1 Develop and monitor implementation of the COHE.

2.3.2 Ensure efficient and effective COHE instruction and training are conducted.

2.3.3 Conduct workplace inspections and audits.

2.3.4 Conduct a program review annually in conjunction with the Electrical Safety Team.

2.3.5 Review program within 90 days of the release of any revision to the referenced standards.

2.3.6 Propose and implement improvements to the COHE.

2.4 Energy Control Coordinator (ECC)

2.4.1 Shall perform the following CONTROL OF HAZARDOUS ENERGY duties:

2.4.1.1 Maintain the sets of lockboxes and control locks for use at the site.

2.4.1.2 Assist Qualified Persons in establishing the correct lockout instruction as necessary.

2.4.1.3 Deliver training to Escorted Visitors and task specific training for Vestas and non Vestas personnel.

2.4.1.4 Designate a Qualified Person for every complex or group lockout.

2.4.1.5 Deliver retraining/refresher training as required.

2.5 Person in Charge (PIC) of the lockout

2.5.1 The Person in Charge of the lockout is responsible for a particular lockout and will:

2.5.1.1 Perform the lockout and verification of deenergization for each isolation point on the LOTO Instruction.

NOTE: All electrical equipment and systems shall be treated as energized until tested and proven dead.

2.5.1.2 Hang a control lock and tag (or tag only if criteria in the Tag out section is met) at each lockout point.

2.5.1.3 Brief all personnel locking out on the lockout boundary.

2.5.1.4 Ensure all personnel who will be in the shock protection or arc flash boundary apply their personal lock and tags to the points of isolation or the lockbox.

2.5.1.5 Stop work anytime work progresses to a point outside the LOTO boundary or anytime the scope of work changes from the JSA.

2.5.1.6 At the conclusion of the work walk down the equipment to verify the equipment is ready for reenergization which includes, but not limited to:

2.5.1.6.1 Verifying all tools, foreign debris objects, and parts have been properly removed;

2.5.1.6.2 Ensuring all bolted electrical connections are performed in accordance with applicable work instructions;

2.5.1.6.3 Ensuring all enclosures, cabinets, mechanical and hydraulic systems are properly restored to the design intent; and

2.5.1.6.4 Closing and securing electrical panel doors.

2.5.1.7 Verify that all personal locks and/or tags have been removed.

2.5.1.8 Ensure that all personnel are outside the shock approach and arc flash boundary, all slip, trip and fall hazards have been removed or mitigated.

2.5.1.9 Remove the control locks and/or tags, restore the equipment, and make it ready for operation.

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NOTE: A Qualified Person (LOTO Level 2 trained) can only establish a mechanical lockout. In order to establish an electrical lockout the individual also needs to meet the requirements of the Electrical Safety Program as a Qualified Electrical Person.

2.6 Authorized Person

2.6.1 Shall perform the following control of hazardous energy duties:

2.6.1.1 Request that equipment be locked out by a Person in Charge of the lockout when needed. In no case shall any Authorized Person attempt to establish the lockout by himself.

2.6.1.2 Review all Lockout Instructions prior to hanging locks and/or tags and ensure (to the best of their ability) that the task to be performed can be done safely within the Lockout Boundary established by the Lockout Instructions.

2.6.1.3 Question the Person in Charge of the lockout about any perceived discrepancy or technical feature of the task or lockout.

2.6.1.4 Follow approved Lockout Instructions and put personal locks and/or tags on isolation devices or lock box(s) that have already been locked out and verified de-energized by a Person in Charge of the lockout.

2.6.1.5 Remove all personal locks when work is complete or at end of shift.

2.6.1.6 Inform the Person in Charge of the lockout after removing personal locks and/or tags.

2.6.1.7 Inform the Person in Charge of the lockout if the equipment is left out of service.

2.7 Escorted Visitor

2.7.1 Apply his or her lock and/or tag at locations as instructed by the escorting Qualified Person.

2.8 Affected Personnel

2.8.1 Comply with the requirements of the COHE.

2.8.2 Report hazardous conditions and practices in the workplace.

2.8.3 Perform specific responsibilities as designated to certain positions under the COHE.

2.8.4 Report incidents of misuse while working with COHE.

2.9 Contractors

2.9.1 All contractors are expected to comply with the requirements of this section and shall perform all tasks in a manner that assures the safety of the contractor's individuals and the safety of VAWT individuals.

2.9.2 Upon request, the contractor shall provide full disclosure regarding any regulatory citations that have been issued against the company and contracted subcontractors during the previous five years, the resolution of those citations, and any pending regulatory action(s) against the company.

2.9.3 All equipment necessary for contractor and sub-contract individuals to perform work in a safe manner, including personal protective equipment, tools and instruments, warning signs, barriers and barricades, and insulated tools shall be furnished by the contractor to his individuals and used as prescribed.

2.9.4 VAWT reserves the right to immediately stop any work that is deemed unsafe by VAWT until the contractor or sub-contractor corrects the deficiencies.

2.9.5 Repeated instances of unsafe conduct, conditions, and violations of applicable regulatory standards or VAWT policy may result in cessation of the project, termination of the contract, and potential removal from consideration for future work.

2.9.6 Contractors are expected to perform lockout when working on any equipment that is locked out. Contractors may use their own locks and tags provided they meet minimum criteria established by OSHA 1910.147.

2.10 Electrical Safety Team

2.10.1 Electrical Safety Program Review

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2.10.1.1 The Electrical Safety Team shall lead the annual review of the Control of Hazardous Energy Program.

2.10.1.2 The Electrical Safety Team shall be responsible for ensuring that the Electrical Safety Program remains up to date with new turbine technologies, electrical work tasks and electrical safety standards.

2.11 Issue Resolution

2.11.1 The Electrical Safety Team shall be the VAWT authority in resolving technical or program interpretation questions.

2.11.2 As a result of technical interpretations, the Electrical Safety Team will draft an Electrical Safety Notice, or applicable document, for issues that merit dissemination and forward to Sustainability. Some technical interpretations may require a revision of the Electrical Safety Manual outside of the normal annual revision cycle.

2.11.3 All interpretations or revisions shall be communicated in writing to the following groups:

2.11.3.1 Technology/Electrical Engineering

2.11.3.2 Technician Training

2.11.3.3 QSE

2.11.3.4 Technical Support

2.11.3.5 Operations

2.12 Technical Training Center (TTC)

2.12.1 Shall be responsible for establishing a training curriculum that teaches all levels of the CONTROL OF HAZARDOUS ENERGY program:

2.12.1.1 Escorted Visitor (Level 0)

2.12.1.2 Authorized Person (Level 1)

2.12.1.3 Qualified Person (Level 2)

2.12.1.4 LOTO Specialist (Level 3)

2.12.1.5 Energy Control Coordinator

2.12.1.6 Annual Control of Hazardous Energy Program refresher training

3 References

Document No.	Title
1910.147	Control of Hazardous Energy
1910.333	Selection and Use of Electrical Work Practices
1910.269	Electric Power Generation, Transmission, and Distribution
NFPA 70E	Electrical Safety in the Workplace
0049-0995	VAWT Electrical Safety Program
0029-6855	Vestas LOTO Instruction Process
0049-0602	Electrical Safety/Control of Hazardous Energy Equivalency Matrix
Cal/OSHA T8CCR, Chapter 4, Subchapter 5 Sections 2229-2989	Electrical Safety Orders

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4 Terms and Abbreviations

Term or Abbreviation	Definition
CFR	Code of Federal Regulations
CoHE	Control of Hazardous Energy Program
ECC	Energy Control Coordinator
JSA	Job Safety Analysis
LOTO	Lockout/Tagout
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
PIC	Person in Charge
TTC	Technical Training Center

5 Forms

Document No.	Title
0029-6855	LOTO Instruction Process
0049-2060	Non-Owner Lock Removal
0049-2059	Interlock Bypass
0049-0597	Site Electrical Audit
0029-6849	Vestas LOTO Instruction Template
0049-0682	LOTO Evaluation Form

6 Definitions

Affected Employee: An employee whose job requires operation or use of a machine or equipment on which service or maintenance is performed under lockout/tagout or whose job requires him/her to work in an area in which servicing or maintenance is performed.
Authorized Person: A trained person who can perform lockout in accordance with this program. An Authorized Person can hang his/her personal locks and/or tags on equipment that has already been locked out by the Person in Charge of the lockout/Qualified Person.
Control Of Hazardous Energy Procedure: A written instruction that describes the safe shutdown, lockout, verification, unlocking, and startup of the equipment.
Control Lock: A non-conductive red lock applied by the Person in Charge of the lockout at the energy-isolating device. The control lock is the first lock applied and the last lock removed. The control lock is applied to a hasp if necessary. The purpose of the control lock is to signal to the authorized person that the equipment was locked out by a Person in Charge of the lockout in accordance with this CONTROL OF HAZARDOUS ENERGY Program.
Danger Zone: The immediate vicinity of a piece of equipment or machinery in which a person could be in danger if said equipment or machinery was to become energized.
Energized: The state of being connected to an energy source or containing residual or stored energy.
Energy Control Coordinator: A LOTO Specialist who has been designated by the Site Manager/Construction Manager to be the person responsible for the administration of the CONTROL OF HAZARDOUS ENERGY Program at the site location.
Energy-Isolating Device: A mechanical device that physically prevents the transmission or release of energy. These include manually operated circuit breakers, disconnect switches, blind flanges, blocks, valves, chains, and similar devices used to block or isolate energy. An Energy Isolation Device that is designed to accept more than one lock is considered to be a hasp.

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Escorted Visitor: Unqualified worker. Must receive a site visitor orientation, cannot perform electrical work and cannot enter into the arc flash or shock boundaries.
Hazardous Energy: Any energy (electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational force…) that could cause injuries to personnel.
Lockout: The placement of a Lockout Device, Lock and associated tag on an Energy-Isolating Device, in accordance with energy control procedures, ensuring that the Energy-Isolating Device and equipment being controlled cannot be operated until the Lockout Device is removed.
Lockout, Group: Requires a written Lockout Instruction that lists all lockout points. Use of Red control locks for equipment and keys to the control locks are secured within the lock box. All workers must place their personal blue lock on the lockbox prior to performing work.
Lockout Boundary: The safe limits of a given Lockout/Tagout as determined by the lockout points for the equipment and systems to be worked on. All the equipment within the Lockout Boundary is safe to work on.
Lockout Device: A locking mechanism that provides a positive means for rendering an Energy-Isolating Device inoperable. The device may be a padlock alone, or a padlock in combination with a restraining bar, chain, hasp, or any device that positively prevents the Energy-Isolating Device from being actuated. A Lockout Device that is designed to accept more than one lock is considered to be a hasp.
Lockout, Individual: Individual Control is only allowed for plug-in equipment with power cords. A lockout is not required as long as the plug is within arm's reach of the individual performing work on the equipment. Where the plug is not within arm's reach of the individual performing work, the plug will be locked out with a suitable device.
LOTO: Lockout – Tagout
LOTO Instruction: The LOTO Instruction template (DMS# 0029-6849) which lists all lockout and tagout points is where the Person in Charge of the lockout signs off that the lockout is completed.
LOTO Specialist: A Qualified Person who has received special training in this program, and who is qualified to determine the appropriate Lockout isolation points and Lockout Boundaries for tasks performed on Vestas managed wind turbines. A LOTO Specialist can create and approve LOTO Instructions for platforms knowledgeable in.
Partial Energy Reduction: A partial reduction of hazardous energies to minimize the exposure when complete deenergization is not possible or feasible. Partial energy reduction can apply to electrical and hydraulic systems.
Person in Charge (PIC): A Qualified Person designated to be in charge of a particular lockout.
Qualified Person: Individual who has been trained in the construction, operation, recognition and avoidance of hazards for equipment required to be locked out.
NOTE: A Qualified Person (LOTO Level 2 trained) can only establish a mechanical lockout. In order to establish an electrical lockout the individual also needs to meet the requirements of the Electrical Safety Program as a Qualified Electrical Person.
Tagout: The placement of only a tag on an Energy-Isolating Device, where it is not physically possible to place a lock. Restrictions apply.
Testing or positioning of machines, equipment or components: Temporarily removing locks and/or tags from energy isolating devices in order to re-energize the equipment for testing or repositioning.
Vestas Senior Manager: The Site/Construction Manager/Authorized Supervisor. Their permission is required for certain activities.
Zero Energy State: The state in which all possible energy sources have been disconnected and/or otherwise rendered inoperable, including stored energy within the piece of equipment or machinery.

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7 CONTROL OF HAZARDOUS ENERGY Program

7.1 Compliance

7.1.1 ANY PERSON WHO OPERATES A VALVE, SWITCH OR OTHER ENERGY ISOLATING DEVICE TO WHICH A LOCK OR “DO NOT OPERATE” TAG IS ATTACHED WILL BE SUBJECT TO DISCIPLINARY ACTION UP TO AND INCLUDING IMMEDIATE TERMINATION, AND MAY BE SUBJECT TO CRIMINAL PROSECUTION.

7.1.2 The CONTROL OF HAZARDOUS ENERGY Program applies to all personnel, including employees, customers, contractors, inspectors and visitors.

7.1.3 Personnel working where the unexpected energization, start-up, or release of stored energy could occur and cause injury is required to comply with the restrictions and limitations imposed on them during the use of this lockout/tagout procedure. Energy sources include, but are not limited to, electrical, mechanical, pneumatic, and hydraulic.

7.2 Energy Control Coordinator

7.2.1 Each site shall have at least one person designated and trained as Energy Control Coordinator.

7.2.2 The Energy Control Coordinator must be selected for his or her attention to detail and superior knowledge of the turbine platform(s) at his or her site and ability to train others.

7.2.3 The Energy Control Coordinator must be a Vestas Technician certified to LOTO Level 3 Specialist.

7.2.4 The Energy Control Coordinator shall ensure that ESP/CONTROL OF HAZARDOUS ENERGY training has been provided to all individuals so they understand the purpose and function of the energy control program, and that the knowledge and skills required for the safe application, usage and removal of the energy controls are acquired by all individuals.

7.2.5 The Energy Control Coordinator shall certify that all ESP/CONTROL OF HAZARDOUS ENERGY training has been provided and is being kept up to date. The certification shall contain the topic of the training, each employee’s name, and the dates of training.

7.3 Basic Lockout Rules

7.3.1 LOTO Procedures can be developed by a LOTO Level 2 qualified person or above.

7.3.2 Approval of LOTO procedures must be done by a LOTO Specialist (Level 3) or an ECC knowledgeable in that platform; whenever possible the development and the approval of LOTO instructions shall be done by two different personnel.

NOTE: When troubleshooting situations arise while in a turbine, a LOTO Specialist can create and approve LOTO Instructions but should strive to get confirmation from another LOTO Specialist or ECC that the LOTO Instruction is adequate for the task.

7.3.3 There may be no deviation from a written LOTO Instruction. If the LOTO Instruction cannot be performed in its entirety the LOTO Instruction must be re-written and approved by an ECC or LOTO Specialist.

7.3.4 Do not attempt to operate any switch, valve, or other energy-isolating device when it is locked out other than during the initial check for a zero energy condition.

7.3.5 Prior to performing work, the employee must determine all sources of energy that potentially supply the equipment to be worked on. All sources of energy must be isolated and locked out.

Exception: Electrical troubleshooting will require the equipment to remain energized in whole or in part. In this case, work must be completed by a Qualified Electrical Person and a specific written work instruction must be included in the formal job safety analyses to address the increased risk.

7.3.6 Anyone working on the equipment must work under his or her personal lock and tag. Under no condition is anyone ever authorized to apply another person’s lock and tag.

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7.3.7 Personnel who are not touching the locked out equipment, but are required to enter into a lockout boundary to perform an inspection or walk-through, shall add their locks and/or tags to the equipment lockout as if they were performing work on the equipment.

7.3.8 It is not permissible to rely on communications only (verbal, visual, mobile phone text, written or radio) to perform a lockout. All persons must apply their own lock and/or tag prior to work. In cases where accessibility is hampered, a portable lockbox system may be prepared so that all personnel may apply their lock.

7.3.8.1 Up and down tower lockout procedures may be performed using only real-time (live) video with the Electrical Safety Team and QSE approval.

7.3.9 All lockout locks with tags will be applied to a locking device, lockout hasp, or lock box. Never put your lock through the last hole in the lockout hasp or lock box. Instead, insert a hasp and put your lock through the new hasp. It is acceptable to daisy chain lockout hasps.

7.3.10 When opening the door defeats the LOTO applied to breakers with door-mounted handles an additional lockout is not required, inside the cabinet or at an upstream isolation point, provided all the following apply:

7.3.10.1 The Qualified Person performing the servicing or maintenance activity has the authority to and continuously remains at the enclosure opening preventing other individuals from re-energizing the machine or equipment

7.3.10.2 Tagout is applied inside the cabinet on the identified breaker as a visual identifier of the lockout point. (Tagout approval by Vestas Senior Manager or ECC is not required)

7.3.10.3 If work moves outside of the cabinet or if it is necessary to leave the cabinet for any reason prior to the work being completed, the door must be closed and the lockout applied or re-engaged

7.4 Verification of Zero Energy State

7.4.1 This requires a Test-Verify-Test procedure to ensure zero energy for electrical systems (Electrically Safe Work Condition) and verification by a gauge or system controller for any system under pressure.

7.4.1.1 If no pressurized system remains to post-test a gauge it is acceptable to watch the pressure reading drop to zero on an permanently mounted pressure gauge or system controller as pressure is relieved.

NOTE: In some cases, hydraulic pressure may be trapped in the system and pressure may not read on direct reading gauges. This condition must be included on the LOTO Instruction as a “Warning” under the ‘comments’ section during LOTO Instruction creation and listed on the JSA

7.4.2 Wherever possible, the employee performing the lockout must operate the controls after the circuit is locked out, to verify that the equipment cannot be restarted.

7.4.3 Accumulated or stored energy sources that could supply a system that is locked out must be identified and dissipated by an appropriate means.

7.4.4 If there is a possibility of the equipment accumulating energy over time after the application of the lockout, then the lockout must:

7.4.4.1 Include an energy-dissipating device capable of continuously dissipating the energy without the buildup of hazardous conditions. Examples: open vent valve, temporary personal static grounds.

-OR-

7.4.4.2 Be capable of completely isolating the source of energy in all cases where work is performed. Examples: double block and bleed (pressurized hydraulics), substantial blocking mechanism (rotor lock) with maximum wind speed.

7.4.5 All energy sources that are locked out must be verified as being completely de-energized by an appropriate means.

7.4.6 Always assume the electrical system is energized until proven dead. Test-Before-Touch is mandatory and is critical to personal safety when the start test method is used.

7.5 Lockout Point Requirements

7.5.1 All lockout points must consist of positive energy isolation devices such as disconnect switches, circuit breakers, block valves, and blocking pins.

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7.5.2 All isolating devices used as lockout points must be capable of accepting an approved lockout device that physically prevents the actuation of the isolating device.

7.5.3 There can be no interlocks, contactors, diodes, check valves, or automatically controlled devices between the isolation device and the test point.

7.5.4 All lockout points susceptible to electrical shock shall be locked out with approved non-conductive lockout devices.

7.5.5 Refer to the VAWT Electrical Safety Program for requirements for proper lockout procedure of electrical devices or circuits.

7.5.6 Controller panels do not qualify as an isolation point and a caution tag should be placed on the service key to notify personnel that the key should not be operated. The controller key should not be listed as an isolation point on the Lockout Instruction.

7.6 Locks and Tags

7.6.1 All lockout locks and tags will be issued by the employer to the Authorized Person(s) who may be required to work on machinery or equipment.

7.6.2 All lockout locks will all be keyed differently, and the keys will be kept by the employee who owns the locks. No one else shall have a key.

7.6.3 Locks shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

7.6.4 All locks may have only one (1) key. If the lockout locks come from the supplier with two (2) keys the second key shall be destroyed and discarded.

7.6.5 Personal locks

7.6.5.1 Shall be blue in color;

7.6.5.2 May be metal or non-conductive; and

7.6.5.3 Must always be accompanied with a tag stating “DANGER – DO NOT OPERATE”. The tag shall include the company name, personal photo, first and last name identifying the worker and a contact phone number permanently printed on the tag.

7.6.5.4 Vestas sites shall maintain a small supply of uniquely keyed locks for visitors. Visitor locks shall be managed by the site’s Energy Control Coordinator.

7.6.6 Control locks

7.6.6.1 Must all be keyed differently, and the keys will be kept either by the Person in Charge of the lockout or locked in a lockbox.

7.6.6.2 Shall be non-conductive and red in color.

7.6.6.3 Shall always be labeled with “DANGER – DO NOT OPERATE” and shall include the permanent marking “VESTAS CONTROL LOCK”.

7.6.6.4 Must always be accompanied with a tag stating “DANGER – DO NOT OPERATE”. The tag shall include the company name permanently printed on the tag

7.6.7 Tags

7.6.7.1 VAWT employees’ tags shall have the first and last name of the employee, a personal photo of the employee, and a contact phone number permanently printed on the tag;

7.6.7.2 Tags and their means of attachment must be made of materials which will withstand the environmental conditions;

7.6.7.3 Tags must be legible and understandable; and

7.6.7.4 Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

7.6.8 Vendors and contractors

7.6.8.1 Shall supply their own locks and tags;

7.6.8.2 Each lock must have a key that is unique to the worker using the locks.

7.6.8.3 Markings shall include the word “DANGER”, their name, their company name, and a phone number.

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7.7 Lockout Boundary

7.7.1 The Lockout Boundary encloses the entire zone where it is safe to work. It is defined by the lockout points selected for the Lockout Instruction.

7.7.2 In all cases, the Lockout Boundary shall include the area where work is required.

7.7.3 Determining the proper Lockout Boundary requires a careful examination of the tasks to be performed and the surrounding equipment. Some tasks introduce greater risk and therefore must have a more expansive Lockout Boundary.

7.7.4 A Lockout Boundary can be made to include several work areas in one Lockout Instruction.

7.7.5 When the work area expands to an area outside the Lockout Boundary, the work must stop until the JSA and Lockout Instruction is updated to include the new work area.

7.7.6 All personnel performing work under a lockout must clearly understand the extent of the particular Lockout Boundary.

7.7.7 A Lockout Boundary may not rely on any process interlock, contactor, diode, or emergency stop.

7.7.8 A Lockout Boundary may not rely on any check valve, automatic control valve, or pressure relief valve.

7.8 Lockout Methods

7.8.1 All lockout procedures will follow one of the established methods in this section:

7.8.1.1 Individual control

7.8.1.2 Single point lockout

7.8.1.3 Complex lockout

7.8.1.4 Group lockout (also known as Lockbox Lockout)

7.8.2 Lockout, Individual Control

7.8.2.1 Allowed for equipment that plugs-in with a power cord; In this case, a lockout is not required as long as the plug or controller is within arm's reach and in visual contact of the individual performing work on the equipment and no one else could plug it in or operate the equipment.

7.8.3 Single Point Lockout

7.8.3.1 An individual need not document the required procedure for a particular machine or equipment **when all of the following elements exist**:

7.8.3.1.1 The machine or equipment has no potential for stored or residual energy or re-accumulation of stored energy after shut down which could endanger employees;

7.8.3.1.2 The machine or equipment has a single energy source which can be readily identified and isolated;

7.8.3.1.3 The isolation and locking out of that energy source will completely de-energize and deactivate the machine or equipment;

7.8.3.1.4 The machine or equipment is isolated from that energy source and locked out during servicing or maintenance;

7.8.3.1.5 A single lockout device will achieve a lock-out condition;

7.8.3.1.6 The lockout device is under the exclusive control of the Qualified Person performing the servicing or maintenance;

7.8.3.1.7 The servicing or maintenance does not create hazards for other individuals;

7.8.3.1.8 Any person entering the LOTO Boundary must apply personal locks and tags and maintain possession of their individual key; and

7.8.3.1.9 The employer, in utilizing this exception, has had no accidents involving the unexpected activation or re-energizing of the machine or equipment during servicing or maintenance.

7.8.4 Complex Lockout

7.8.4.1 The Complex lockout method may be used whenever the individual control or single point lockout methods cannot be applied.

7.8.4.2 Requires the use of control locks.

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7.8.4.3 In all cases, a Complex Lockout will require a written Lockout Instruction that identifies every isolation point the sequence for the safe shutdown, lockout, verification, clearing of lockout, and startup of the system. If the written instruction is a Pre-Task Plan then the sequence will be documented on the Lockout Instruction rather than on the Pre-Task Plan.

7.8.4.4 The Lockout Instructions shall be approved by a LOTO Specialist (Level 3) or ECC knowledgeable on that platform.

7.8.4.5 The Lockout Instruction must include the sequence for the safe shutdown, lockout, verification, clearing of lockout and startup of the system and must include every isolation point. Isolation points cannot be grouped together (e.g. Blade A, B and C cannot be placed on a single line.)

7.8.4.6 The Person in Charge of the lockout shall establish the lockout in accordance with the lockout instruction, using control locks. The Person in Charge of the lockout keeps possession of the control lock keys.

7.8.4.7 Authorized Person(s) must hang personal locks and tags at every isolation point in accordance with the Lockout Instruction.

7.8.4.8 Certain frequently used lockout instructions may be kept in electronic format and printed for use as required.

7.8.4.9 Lockout Instruction that have been prepared by someone offsite shall be reviewed by a Level 3 LOTO Specialist or Energy Control Coordinator knowledgeable on that platform before use at the site. The reviewer shall verify that the Lockout Instruction is completely sufficient for the turbine models, mark versions, and local modifications applicable for the site.

7.8.4.10 A complex lockout can be converted to a group lockout at any time. The Person in Charge of the lockout is responsible for guiding all personnel through the transition.

7.8.4.11 After the complex Lockout has been broken down, the Lockout Instruction shall be returned to the ECC for record-keeping.

7.8.5 Group Lockout (Lockbox)

7.8.5.1 The Group Lockout or Lockbox method may be used whenever the individual control or single point lockout cannot be applied. A Group Lockout requires the use of control locks and a lockbox.

7.8.5.2 In all cases, a Group Lockout will require a written Lockout Instruction that identifies every isolation point the sequence for the safe shutdown, lockout, verification, clearing of lockout, and startup of the system.

7.8.5.3 The Lockout Instruction shall be approved by a LOTO Specialist (Level 3) or ECC knowledgeable on that platform.

7.8.5.4 Frequently used Lockout Instructions may be kept in electronic format and printed for use. An ECC or LOTO Specialist (Level 3) must verify and approve the procedure prior to use.

7.8.5.5 Lockout Instructions that have been prepared by someone offsite shall be reviewed by a Level 3 LOTO specialist or Energy Control Coordinator knowledgeable on that platform before use at the site. The reviewer shall verify that the Lockout Instruction is completely sufficient for the turbine models, mark versions, and local modifications applicable for the site.

7.8.5.6 All lockboxes will be substantial in construction to prevent tampering and to withstand the rigors of transport without breaking.

7.8.5.7 The completed Lockout Instructions shall be securely attached to the lockbox in a weatherproof, clear plastic jacket, so that all personnel locking on the lockbox may clearly read the Lockout Instruction.

7.8.5.8 Establishing a Group Lockout:

Step	Action
1.	The Energy Control Coordinator ensures a Person in Charge of the lockout is appointed for the coordination of the Group Lockout.
2.	The equipment is locked out by the Person in Charge of the lockout using the control locks and tags.
3.	The Person in Charge of the lockout completes the Lockout Instruction, then inserts the Lockout Instruction into the clear plastic jacket and attached to the lockbox.
4.	The Person in Charge of the lockout puts the keys to the control locks into the lockbox.

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5.	The Person in Charge of the lockout then locks the lockbox with his/her personal lock.
6.	All employees performing work under the Group Lockout will review the Lockout Instruction and apply their personal lockout lock to the lockbox. A hasp is required if the last hole is used.

7.8.5.9 Breaking down a Group Lockout:

Step	Action
1.	The Person in Charge of the lockout verifies that work is complete, that the turbine or circuit is ready for energization and that the Group Lockout can be broken down.
2.	Person-in-Charge must ensure that personnel are out of harm's way, that all slip, trip, and fall hazards have been cleared from the area, and guards have been replaced.
3.	All employees who performed work under the Group Lockout remove their personal locks.
4.	Person in Charge of lockout removes his/her personal lock from the lockbox; retrieves keys to control locks and the Lockout Instruction.
5.	Person in Charge of lockout removes all control locks, restores equipment to service following the Lockout Instruction.

7.8.5.10 It is permissible to nest a group lockout within another group lockout.

7.8.5.11 Any person (employee, vendor, or contractor) can request to put his or her personal lockout locks on each of the lockout points of the Group Lockout, instead of just one lock on the lockbox, provided their lock conforms to this program.

7.8.5.12 Upon request, the requesting person shall be given an additional copy of the Lockout Instructions.

7.8.5.13 The Person in Charge of the lockout will assist the person in locating all of the lockout points.

7.8.5.14 The person must lockout every lockout point identified in the Lockout Instruction.

7.8.5.15 After the Group Lockout has been broken down, the Lockout Instruction shall be returned to the Energy Control Coordinator for record-keeping.

7.9 Testing or Re-positioning of Locked Out equipment /components

7.9.1 Temporary Lifting the LOTO

Step	Action
1.	Clear the machine or equipment of tools and materials.
2.	Notify all affected personnel of intent to test or reposition
3.	Person-in-Charge of the lockout instructs all personnel on the LOTO to remove personal locks and enter into a safe zone.
4.	Person-in-Charge of the lockout notifies other personnel that the control locks and/or tags are being removed and he removes only the lockout or tagout devices required to perform the test.
5.	Person–in-Charge will perform the test or repositioning
6.	The Person-in-Charge of the lockout verifies once again the absence of energy. Continue with servicing and/or maintenance.

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7.9.2 Re-Establishing LOTO

Step	Action
1.	When test or repositioning is complete the Person-in-Charge of the lockout shall deenergize the equipment or components.
2.	Release any hazardous energy that may be present.
3.	Re-isolate the equipment or components with control locks and tags and place keys in lockbox.
4.	Person-in-Charge shall re-verify zero energy state and place a personal lock on the lockbox.
5.	Person-in-Charge of the lockout instructs all personnel working in the LOTO boundary to place personal locks on the lockbox.

7.10 Tag out

WARNING: TAGS ARE NEVER TO BE REMOVED BY ANYONE EXCEPT THE QUALIFIED PERSON THAT INITIATED THE LOCKOUT/TAGOUT PROCEDURE.

7.10.1 Where possible, a lockout shall be used instead of a tag out.

7.10.2 A tag out is acceptable as a substitute for a lockout if all of the following conditions apply:

7.10.2.1 There is no physical means of attaching a lock to the isolating device; and

7.10.2.2 The equipment cannot be properly isolated with a lock at some other upstream isolating device; and

7.10.2.3 The use of a tag out is specifically approved by the Vestas Senior Manager or ECC.

7.10.3 When the tag out method is used, it shall be supplemented by at least one additional safety measure that will provide a level of safety equivalent to that of a lockout program. The particular measure that is used must be documented in the Lockout Instruction.

7.10.4 All tag out points will be recorded as line items in the Lockout Instruction. In addition, the line item will be marked with “TAGOUT”.

7.10.5 Examples of additional required safety measures include:

7.10.5.1 Removing an isolating circuit element.

7.10.5.2 Application of grounding devices.

7.10.5.3 Blocking a controlling switch.

7.10.5.4 Opening an extra disconnecting device.

7.10.5.5 Closing an additional in-line valve.

7.10.5.6 Removal of a valve handle after closing valve.

7.10.6 Tags, including their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal.

7.10.7 Tag attachment means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable (like a nylon cable tie) with a minimum unlocking strength of no less than 50 pounds.

7.10.8 Tags shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.

7.10.9 Tags shall include first and last name of the employee, a color picture of the employee (if available), and a contact phone number.

7.10.10 Tags shall be attached on or as close to the device to be unquestionably apparent that that device is not to be activated.

7.10.11 Where used without a lockbox, every person working on the equipment shall attach a personal tag out tag to the isolation device, just as they would attach their personal lockout lock.

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VESTAS PROPRIETARY NOTICE

7.10.12 Where possible, the tag attachment means shall impede the activation of the device.

7.11 Interlock Bypass

7.11.1 No interlock shall be bypassed without written authorization from the Energy Control Coordinator and the Site/Construction Manager/Authorized Supervisor.

7.11.2 No interlock shall be bypassed without establishing a method to provide equal or greater protection. This method can consist of prohibiting access, prohibiting operation, or allowing such access or operation while following a special procedure written for the tasks required. The written procedure will establish safe boundaries and constraints such that the level of protection provided is equivalent to that provided by the interlock

7.11.3 The Interlock bypass form shall be used and requires the following entries:

7.11.3.1 Reason the interlock bypass is required.

7.11.3.2 A list and description of all disabled devices, their purpose, the impact of disabling the interlock to equipment, and the impact of disabling the interlock to personal safety.

7.11.3.3 Method used to provide equal or greater protection while the interlock is bypassed.

7.11.4 While an interlock is bypassed, the interlock bypass form shall be posted in a conspicuous location.

7.11.5 Exception Mechanical Interlock:

7.11.5.1 When a cabinet with door-mounted breaker handles is opened by defeating the mechanical interlock while the breaker is closed and where the interlock will re-engage when the door is closed. This is not considered an Interlock Bypass and does not require written authorization.

7.11.5.1.1 All persons working on the equipment must be qualified for the task.

7.11.5.1.2 The hazards presented by working on the equipment must be addressed under Safe Work Approach in the Job Safety Analysis or Pre-Task Plan.

7.12 Extended Shutdown

7.12.1 A Group Lockout is the Standard method lockout for extended shut down situations.

7.12.2 In circumstances where equipment is taken out of service for extended time periods (more than one shift change), the equipment shall remain locked out with the control locks. The Person-In-Charge of the lockout shall maintain their personal lock attached to the lockbox. This requirement applies in any of the following circumstances:

7.12.2.1 The equipment is left in a state where it should not be operated or started.

7.12.2.2 Starting the equipment could present a danger to persons nearby.

7.12.2.3 Starting the equipment could cause damage to the environment (e.g. oil spill).

7.12.2.4 Starting the equipment could cause equipment damage.

7.12.3 When personnel are not working on the system, any established lockout procedure and lockbox shall be left at the turbine control panel down-tower. The lockbox may be brought back to the office to facilitate turnover to a new Person in Charge of the lockout, or in case of a tower evacuation.

7.12.4 When a Person in Charge of the lockout needs to turn over responsibility of a lockbox, the new Person in Charge of the lockout must place their lock directly on the lockbox without a hasp before the old Person in Charge of the lockout removes their lock.

7.12.5 At the beginning of each shift, prior to starting work, the Person in Charge of the lockout on the oncoming shift shall confirm that the isolation of the equipment is still effective by physically examining each control lock and lockout device. Verification of deenergization is not required unless a lockout device has been compromised.

7.12.6 All personnel performing work on the equipment shall first report to the Person in Charge of the lockout of the lockout each day on each shift. Upon request, the Person in Charge of the lockout shall provide a new copy of the lockout procedure to the workers.

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7.13 Subcontractors

7.13.1 Whenever outside servicing personnel are to be engaged in activities covered by the scope and application of this procedure, the on-site employer and the outside employer shall inform each other of their respective lockout and/or tag out procedures.

7.13.2 VAWT QSE must review and approve all subcontractor lockout and/or tag out programs and procedures.

7.13.3 Whenever Subcontractor's personnel are engaged in activities covered by this procedure, both the Subcontractor, and Site/Construction Manager/Authorized Supervisor, shall ensure that his/her employees understand and comply with the restrictions and prohibitions of this CONTROL OF HAZARDOUS ENERGY Program.

7.14 Customers

7.14.1 The Site/Construction Manager/Authorized Supervisor shall establish a proper understanding with the customer to ensure that there is consistent administration between the VAWT CONTROL OF HAZARDOUS ENERGY Program and the Customer's CONTROL OF HAZARDOUS ENERGY Program. A written Memorandum of Understanding shall document this agreement and shall be kept on file as a site-specific addendum to this CONTROL OF HAZARDOUS ENERGY Program.

7.14.1.1 When locks are required at the substation the Site/Construction Manager/Authorized Supervisor shall minimize substation access requirements by setting up a Group Lockout.

7.15 Non-Owner Lock/Tag Removal

7.15.1 In the event that an individual is not available to remove their lockout/tag out device, the Energy Control Coordinator may remove (by following this procedure) the lockout/tag out device for them.

7.15.2 If the Energy Control Coordinator is not available, the Site/Construction Manager/Authorized Supervisor shall designate a senior technician qualified as LOTO Specialist to perform this function.

7.15.3 Permission must be obtained from the Vestas Senior Manager.

7.15.4 Permission must also be obtained from the customer, in accordance with the customer's CONTROL OF HAZARDOUS ENERGY Program.

7.15.5 When possible, it is preferable to cut the lockout hasp rather than the lock.

7.15.6 If tags are used instead of locks they are subject to the same removal restrictions as personal lock removal.

7.15.7 The Non-Owner Lock Removal Form must be completed prior to removing any locks and these basic steps must be followed:

Step	Action
1.	Verify that the individual who applied the locking device is not present at the facility.
2.	Make all reasonable efforts to contact the individual and inform them that their lockout or tag out device is being removed.
3.	Make all reasonable efforts to contact the individual's supervisor and inform them that their employee's lockout or tag out device is being removed.
4.	Contact the Vestas Senior Manager and obtain permission prior to removing individual's lockout or tag out device.
5.	Contact the Customer Site Manager or other designated representative and obtain permission prior to removing an individual's lockout or tag out device.
6.	Ensure the individual is informed, before resuming work at the facility, that the lockout or tag out device has been removed.

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7.16 Shift or personnel changes

7.16.1 An orderly transfer of the LOTO between shifts or personnel changes must include:

7.16.1.1 The new Person-in-Charge applying his/her locks before the off-going Person-in-Charge's locks are removed

7.16.1.2 The off-going Person-in-Charge describing to the new Person-in-Charge what is locked and where

7.16.2 Whenever there is a Person-in-Charge turnover, the new Person-in-Charge is responsible to ensure the equipment is properly shut down and hazardous energies are controlled.

7.16.3 The oncoming Person-in-Charge or the crew leader must brief all personnel working under the LOTO Instruction:

7.16.3.1 What equipment is under LOTO and where the LOTO is applied

7.16.3.2 Oncoming personnel must apply their locks/tags either directly to the installed locks or the lockbox

7.16.4 Test-before-touch is still required for shift or personnel changes

7.17 Training

7.17.1 Escorted Visitor (LOTO Level 0)

7.17.1.1 Escorted Visitor shall be trained on site by an ECC on the CONTROL OF HAZARDOUS ENERGY requirements as part of general site orientation.

7.17.1.2 Each Affected Person shall be instructed in the purpose and use of the energy control procedure and about the prohibition relating to attempts to restart or reenergize machines or equipment that is locked out or tagged out.

7.17.2 Authorized Person (LOTO Level 1)

7.17.2.1 Each Authorized Person shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.

7.17.2.2 Authorized Person training shall be provided to all personnel who are required to perform work on equipment that has been locked out.

7.17.2.3 TTC will cover Authorized Person CONTROL OF HAZARDOUS ENERGY training as part of Basic Safety Training.

7.17.2.4 The Energy Control Coordinator can provide Authorized Person CONTROL OF HAZARDOUS ENERGY training at the site.

7.17.3 Qualified Person (LOTO Level 2)

7.17.3.1 Qualified Person training shall be provided to all Vestas Technicians.

7.17.3.2 TTC will provide Qualified Person training as part of its standard curriculum.

7.17.3.3 The Energy Control Coordinator can provide task specific Qualified Person CONTROL OF HAZARDOUS ENERGY training at the site.

NOTE: Attending C-service does not qualify technicians as LOTO 2

7.17.4 Qualified Person (LOTO Level 3 Specialist)

7.17.4.1 LOTO Level 3 Specialist training shall be provided to Vestas Technicians.

7.17.4.2 TTC will deliver LOTO Level 3 training which fulfills the requirements of this program.

7.17.5 Energy Control Coordinator (ECC)

7.17.5.1 Energy Control Coordinator training shall be provided to Vestas Technicians that have been selected by his/her own immediate supervisor.

7.17.5.2 Energy Control Coordinators must be Vestas Technicians certified to LOTO 3 Specialist.

7.17.5.3 TTC will train all Energy Control Coordinators.

7.17.5.4 Training shall include administrative duties and responsibilities and relevant complex work scenarios.

NOTE: A Qualified Person (LOTO Level 2 trained) can only establish a mechanical lockout. In order to establish an electrical lockout the individual also needs to meet the requirements of the Electrical Safety Program as a Qualified Electrical Person.

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7.17.6 Qualified Contractor

7.17.6.1 Contractors who can provide proof of control of hazardous energy training documentation and who can demonstrate competencies commensurate with this program can be considered a LOTO Level 2 for Mechanical Lockout only. QSE will ensure documentation review

7.17.7 Retraining/Refresher Training

7.17.7.1 The TTC and the Electrical Safety Team shall coordinate in the development of annual refresher training. The refresher training will be augmented with lessons learned from electrical safety and Control of Hazardous Energy incidents from the previous year.

7.17.7.2 Lessons learned from the previous year must be delivered to all personnel training in LOTO, regardless of level, annually.

7.17.7.3 Retraining of personnel on this program shall be conducted following any electrical incident unless VAWT determines the incident requires the termination of employment.

7.17.7.4 An individual shall receive additional training (or retraining) under any of the following conditions:

7.17.7.4.1 If the supervision or annual inspections indicate that the individual is not complying with the safety-related work practices.

7.17.7.4.2 If new technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices.

7.17.7.4.3 Tasks that are performed less often than once per year shall require retraining before the performance of the work practices involved.

7.18 Periodic Assessments

7.18.1 The Site/Construction Manager/Authorized Supervisor or his/her delegate shall coordinate periodic assessments:

7.18.1.1 Personal Work Practices Audit on each Qualified Person during the calendar year. The assessment shall be performed by a Qualified Person other than the employee who performed the lockout.

7.18.1.2 The COHE periodic assessment shall be accomplished monthly using the Site Electrical Audit Form or the QSE Site Inspection Checklist. The assessment shall be performed by a Qualified Person other than the employee who performed the lockout.

8 APPENDIX: version history

Version No.	Date	Description of Changes
01	--	New document (Old AWT Number: 31030)
02	--	Record of changes not available (Old AWT Number: 31030 R2)
03	2002.10.15	Change to new document numbering convention;
04	2009.10.22	Complete LOTO Program revamp (for reference use only)
05	2009.12.22	Initial release of revamped 2009 document
06	2010.05.07	Addition of Warning to Section 2.1.
07	2010.09.08	Complete process revamp.
08	2010.08.10	Error correction (section 3.7.5 (c)).
09	2010.10.10	Error correction (section 3.7.5 (e)).
10	2011.01.01	Revised HECC Appendix A
11	2011.03.03	Revised Table of Contents, 3.7.4.i, and 3.7.5.a
12	2012.01.15	Reformed document to HSE Manual template, Revised sections:2.0, 5.0, 6.0, 7.0, 8.3.6, 8.6.3,8.8.4, 8.9, 8.10, 8.16
13	2012.12.15	Revised sections: 2.2, 2.4, 2.5, 2.7, 2.10, 2.11, 3, 4, 5, 7. 8.3, 8.6, 8.8, 8.9, 8.10, 8.11, 8.14, 8.15, 8.16, 8.17
14	2014.01.13	Revised sections 1,2.2,2.5,7,8.3,8.4,8.8,8.11,8.15,8.16 (see grey highlighted text)
00	2015.02.04	Converted T09 document. (0008-7997) to T03 Changes are highlighted in grey.
01	2015.11.16	Updated Sections: 2.2, 2.5, 5, 6, 7.3, 7.13, 7.16 highlighted in grey.

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Original Instruction: T09 0029-6849 VER 03

NOTE: See 0029-6855 Vestas standard LOTO instruction process for guidance about this document

Version no.	Date	Description of changes

Scope of the LOTO Instruction	
Equipment	
Conditions that must be met before the LOTO can take place	
Description of the LOTO boundary	
Reference drawings or documents (including risk assessment)	
Comments	

Purpose of LOTO			
Description of task			
Locations where work will be done			
Section to be applied			

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T09 0029-6849 Ver 03 - Approved - Exported from DMS: 2016-06-03 by RIREG

Original Instruction: T09 0029-6849 VER 03

Isolation procedure

Sequence	Isolation ID and description Location ID and description		Type and magnitude of energy	Isolation position
	Method to verify de-energisation	Location to verify de-energisation	Method to dissipate stored energy	Isolation completed
1				
				Person in charge initials and time
2				
				Person in charge initials and time
3				
				Person in charge initials and time

NO FURTHER ISOLATION STEPS

Person in charge of the LOTO

LOTO **established** by:		LOTO **transferred** to:		LOTO **transferred** to:	
Signature		Signature		Signature	
Name		Name		Name	
Company		Company		Company	
Date/Time	___/___/___ :	Date/Time	___/___/___ :	Date/Time	___/___/___ :
LOTO **transferred** to:		LOTO **transferred** to:		LOTO **transferred** to:	
Signature		Signature		Signature	
Name		Name		Name	
Company		Company		Company	
Date/Time	___/___/___ :	Date/Time	___/___/___ :	Date/Time	___/___/___ :

Partial re-energisation of LOTO

Isolation ID	Remove	Re-apply	Remove	Re-apply	Remove	Re-apply

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Original Instruction: T09 0029-6849 VER 03

Restoration procedure			
Sequence	Isolation ID	Restore position	Restoration completed
1			Person in charge initials and time
2			Person in charge initials and time
3			Person in charge initials and time
NO FURTHER RESTORATION STEPS			

Clearing the LOTO (person in charge)				
LOTO **cleared** by:	Signature		Name	
			Company	
			Date/Time	___/___/___ :

T09 0029-6849 Ver 03 - Approved - Exported from DMS: 2016-06-03 by RIREG

VESTAS PROPRIETARY NOTICE

Non-Owner Lock Removal Form				Document ID: 0049-2060 INS SUS-SAF-OPC (AME US/CAN) Lock Removal
Owner(s): BPO.Del.SUS	Author(s):JATYL	Valid from: 2015.02.06		Version: 00

Date	
Requestor Name	
Lock Owner/Company	
Lock Owner phone	
Number of locks to remove	
Affected Equipment	
Reason why equipment was locked out	
Actions taken to ensure equipment is safe to remove lock(s)	

The lock owner was called and:

- ☐ Left a voicemail
- ☐ Talked with the owner
- ☐ Permission granted to remove locks

The Customer's Manager was contacted and:

- ☐ Permission granted to remove locks
- ☐ Permission not granted
- ☐ Permission granted, Customer will remove lock

The lock owner's supervisor was called and:

- ☐ Left a voicemail
- ☐ Talked with the supervisor
- ☐ Permission granted to remove locks

The Vestas Senior Manager was contacted and

- ☐ Permission granted to remove locks
- ☐ Permission not granted
- ☐ Permission granted, Customer will remove lock

The owner's lock(s) may not be removed without contacting either the owner or the owner's supervisor in a live conversation, and gaining verbal permission from the owner or the owner's supervisor.

Where possible, cut the lockout hasp(s) instead of the locks.

Vestas Site/Construction Manager: **(Print name/date/time)**	
Lock(s) removed by: **(Print name/date/time)**	

T03 0049-2060 Ver 00 - Approved - Exported from DMS: 2016-06-05 by RIREG

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Owner: BPO.DEL.SUS
Valid from: 2015.03.12
Version:00

Interlock Bypass Permit

Document ID: 0049-2059
INS SUS-SAF-OPC (AME US/CAN)
Interlock Bypass

Site Name		WTG ID	
Interlock Bypass to be established by		Date	

The interlock may not be bypassed without the authorization from both the ECC and the Vestas Senior Manager

Description (name) of interlock being bypassed

Purpose of bypassing the interlock

Describe the impact to personnel safety if the interlock is bypassed

Describe the impact to equipment if the interlock is bypassed

Describe the steps required to bypass the interlock

How long (estimated) will the interlock be bypassed?	Duration

Describe the steps to restore the interlock

Describe methods to ensure employee (subcontractors) safety while the interlock is bypassed

List steps to ensure all personnel in the area are notified of the bypassed interlock(s)

Attach work instruction, risk assessment, PTP or supporting documentation for performing interlock bypass

Authorization

Verification ECC/LOTO 3		Date	

I have verified work instructions, JSA and/or PTP is sufficient for performing interlock bypass and there is a demonstrable need.

Vestas Senior Manager		Date	

I have verified there is a demonstrable need to perform interlock bypass and that I have discussed with the work crew the actual and potential risks of bypassing this interlock.

LOTO 3/ECC signature		Date	

I certify the interlock bypass has been removed the normal equipment/personnel protection has been restored.

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Original Instruction: T09 0029-6855 VER 04

History of this Document

Version no.	Date	Description of changes
02	19/02/2014	Added Instructions about how to the handle the document when opening it Added explanation about new “Comments” section LOTO Specialist changed by LOTO Level 3 for consistency Date and time added as required input in some fields Other minor changes
03	14/05/2014	Minor Corrections done in header
04	xx/xx/2015	Changes to reflect new version of VSCHE 0017-5309 (V02) - Lockout Instructions can only be approved by the local ECC (not LOTO Level 3 anymore) - “Person in Charge” replaced by “Person in Charge of the lockout” Added clarification about isolation points Other minor typographical errors

1 Purpose

The purpose of the LOTO Instruction Process is to establish standardized formats and requirements for LOTO Instructions under the Vestas Business Units (BU) Control of Hazardous Energy Program.

2 General

BU’s are expected to use a format that is substantially similar to the format in the “Vestas LOTO Instruction Template” (DMS 0029-6849).
However, necessary variations are allowed to accommodate local languages, local legal requirements, customer demands, and BU documentation control processes.

3 When opening the Template

When opening the document in Word for creating a Lockout Instruction please be aware of the following:

a. Click “Enable Content” button at the top of the screen if this pops up (yellow box), so the content of the document works without problems.

b. Follow the procedure below to ensure some text is not printed on paper, but you can see it on your computer screen.

- Go to the “File” menu
- Click on “Options”
- Click on “Display” on the left Menu
- In the second group “Always show this formatting marks on the screen” activate “Hidden text”
- In the third group “Printing options” deactivate “Print hidden text”

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4 Components

This section breaks down the LOTO Instruction Template sections into required components and the descriptions for how to understand and complete each section.

4.1 Header

4.1.1 Left side *(to be filled by the person developing the LOTO Instruction)*

a. Doc: DMS Document number and version number

If the LOTO Instruction is developed at a site level this field should be left blank.

b. Developed By: LOTO Instruction developer initials.

This person should be contacted immediately if detected any problem with the LOTO Instruction.

c. Date: Date this document is developed.

4.1.2 Centre: Document Title.

The Document Title is limited to 40 characters and must be done in the following way:
LOTO-“Turbine type” “50 or 60 Hz” “MK number”-“System of the equipment being Locked out”
If LOTO Instruction relates to equipment not located in a turbine then leave out “Turbine type” “50 or 60 Hz” “MK number”
Examples:
LOTO-V90 3MW VCS 50HZ Mk9-Rotor Lock
LOTO-Crane Gate 3 Nº3 10 Villafranca

Important: If the document is uploaded into DMS the document title must be used as the “DMS document title” to facilitate LOTO instructions search into the DMS system.

4.1.3 Right side *(to be filled by the local ECC approving the LI to be used on site)*

a. Site Doc: “Name of the site”, “LI” (LOTO Instruction), “correlative number” starting from 001 (meaning the number of LOTO Instruction at the site) “.version” of LOTO Instruction.

Example:
Site Doc: Horns Rev – LI - 005.00
So this is the Horns Rev LOTO Instruction number 5 initial version.

b. Approved by: The ECC at the site approving the LOTO Instruction for being used in that site.

c. Date: Date of approval by the local ECC.

4.2 Footer

4.2.1 Danger: Check validity of this document with your ECC.

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Original Instruction: T09 0029-6855 VER 04

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This message is to emphasize the requirement of the local approval of the LOTO Instruction, before it can be used on site and the importance of using the last approved version.

4.2.2 Actual page and total number of pages of the document.

4.3 Scope of the LOTO Instruction

This Section should be filled by the LOTO Instruction developer.

4.3.1 Equipment: this is a general header categorizing what type of equipment the LOTO instruction is related to. As a minimum it has to contain the information about the equipment provided in the document title (see 4.1.2). This field can be used to complement whatever information doesn´t fit in the document title due to the limit of characters.

Examples:
"V90 – 3.0 MW VCS 50Hz Mk 9 - Rotor Lock"
"Overhead Travelling Crane Gate 3 Nº3 10 Tn - Villafranca del Penedés Spare Parts & Repairs factory"

4.3.2 Conditions that must be met before the LOTO can take place: Describe in what condition the equipment should be before starting the LOTO process, so that the LOTO Instruction remains valid.

Examples:
"No external Generator connected"
"Nacelle 90º respect to wind direction"

4.3.3 Description of the LOTO Boundary: This block describes what is the LOTO Boundary established by the LOTO Instruction as defined in the Vestas Standard for Control of Hazardous Energy. It is important the LOTO Boundary is accurate and as detailed as possible, so the LOTO Instruction can be used for any work that could be done safely inside the boundary.

The Person in Charge of the lockout of the LOTO must ensure all locations where works will be performed are inside the LOTO Boundary.

4.3.4 Reference drawings or documents (including Risk Assessment): List any document relevant for the application of this LOTO Instruction.

Examples:
"Electrical Drawings"
"Hydraulic Drawings"

4.3.5 Comments: Add any relevant information that can be needed for the Person in Charge of the lockout establishing the Lockout.

Examples:
"After isolation point 2, valve 2V3 needs to be opened to relieve pressure to tank"
"For isolation point 1, disconnect the cables in this order: Phases, Neutral, Earth"
"After isolation points 1, 2 and 3, DC link has to be checked to be discharged"

Original Instruction: T09 0029-6855 VER 04

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4.4 Purpose of LOTO

This Section should be filled by the Person in Charge of the lockout prior to establishing the LOTO.

4.4.1 Description of task: This block describes the task to be performed under this LOTO Instruction. This can be a single task, a group of tasks or a reference to a work instruction or procedure.

4.4.2 Location where works will be performed: Detailed list of physical locations where work will be performed.

4.5 Isolation Procedure

This Section should be filled by the LOTO Instruction developer. Only the field "Isolation Completed (Person in Charge of the lockout Initials and time)" should be filled by the Person in Charge of the lockout establishing the LOTO

4.5.1 Sequence: the step by step procedure is always listed in sequence as it should be performed. The restore sequence is usually different than the isolation sequence.

a. Each isolation step must be listed as a separate isolation step (e.g. do not group Blade A, B and C on one line as each of these are distinct isolation points and will have a lock and/or tag on each blade lock).

4.5.2 Isolation ID: Record the name and/or number identification of the isolation device. This ID must be labelled clearly and uniquely in the isolation device.

4.5.3 Type & Magnitude of Energy: This block details the kind of energy to be expected by the Person in Charge of the lockout.

Examples:
"Electrical / 480 VAC"
"Mechanical Rotation"

This helps the Person in Charge of the lockout determine what safety precautions should be taken when performing the isolation.

4.5.4 Isolation Position: Record the position that the isolation device should be placed in, and whether it is locked or tagged.

Examples:
"LOCKED OPEN" for a circuit breaker
"LOCKED CLOSED" or "LOCKED OPEN" for a valve
"LOCKED PINNED" for a mechanical block
"TAGGED OPEN" for a circuit breaker
"TAGGED CLOSED" or "TAGGED OPEN" for a valve
"TAGGED PINNED" for a mechanical block

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4.5.5 Method to verify deenergisation: This block specifies how the Person in Charge of the lockout is supposed to perform the verification.

Examples:
"3 point method Voltage test"
"Visually verify no rotation"
"Pressure measurement"

4.5.6 Location to verify deenergisation: This block specifies all points where the Person in Charge of the lockout has to perform the verification of absence of energy.

4.5.7 Method to dissipate stored energy: This block specifies how the Person in Charge of the lockout is meant to dissipate any stored energy. If there is no possibility of stored energy, then enter "N/A". Otherwise, describe the method.

Examples:
"Wait 5 minutes"
"Slowly open drain valve"
"Test port drain to waste bucket"

4.5.8 Isolation Completed: Here the Person in Charge of the lockout writes his/her initials and the time of the line item once the isolation point is completed. The isolation is in position, the verification of deenergisation is complete and LOTO devices are in place.

4.5.9 Create as many Isolation Points blocks as needed in order to establish the LOTO by clicking the button "Add Isolation Point". This will automatically create one more point both in the "Isolation Procedure" section and the "Restoration Procedure" section. When printing the LOTO Instruction the button will not appear.

4.5.10 After last Isolation Point block the text "NO FURTHER ISOLATION STEPS" must show to ensure the Person in Charge of the lockout has done all Isolation Points.

4.6 Person in Charge of the lockout

This Section should be filled by the Person in Charge of the lockout .

4.6.1 LOTO Established by: This entry is used to record the Person in Charge of the lockout that establishes the LOTO. The Name and the Company should be filled when starting the LOTO. The signature and Date/Time should be filled when the lockout has been applied and the Lockout Boundary has been checked for Absence of any Hazardous Energy.

4.6.2 LOTO Transferred to: When the responsibility for the LOTO is transferred to another Person in Charge of the lockout this transfer is recorded in subsequent blocks by the new Person in Charge of the lockout.

4.6.3 Each entry shall be recorded with signature, printed name (or Vestas initials in case of Vestas employee), company (in case of Vestas employee can be left blank), date and time.

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4.7 Partial re-energisation of LOTO

If needed, this section should be filled by the Person In Charge of the Lockout .

4.7.1 This section is meant to be used for testing purposes or as part of a troubleshooting process where partial re-energisation of the equipment is temporarily needed.

4.7.2 Employees restoring part of the isolations in this step must fully understand its extend the intent and use the necessary precautions and PPE.

4.7.3 As soon as other works, that do not require this partial re-energisation of the LOTO, are needed to be carried out the LOTO must be re-applied by all personnel involved.

4.7.4 Each partial removal and re-application of the LOTO must be recorded in following fields with the isolation ID, printed name or Vestas initials, date and time.

4.8 Restoration Procedure

This section should be filled by the LOTO Instruction Developer. Only the field "Restoration Completed (Person in Charge of the lockout Initials and time)" should be filled by the person in Charge of the lockout establishing the LOTO.

4.8.1 This section lists, in order of restoration, the steps to return the system to normal operation.

4.8.2 Before restoring each isolation point, the Person in Charge of the lockout of the LOTO must ensure the equipment is safe to be re-energised, so neither employees nor the equipment are put at risk.

4.8.3 Sequence: the step by step procedure is always listed in sequence. The Restoration Sequence is usually different than the isolation sequence, but must contain exactly the same Isolation IDs.

4.8.4 Isolation ID: Record the name and/or number identification of the isolation device.

4.8.5 Restore Position: Record the position that the isolation device should be placed in.

Examples are:
"CLOSED" for a circuit breaker
"OPEN" or "CLOSED" for a valve
"UNPINNED" for a mechanical block

4.8.6 Restoration Completed: After each isolation point is restored into operation the Person in Charge of the lockout will write his/her initials in the line item.

4.9 Clearing the LOTO (Person in Charge of the lockout)

This Section should be filled by the Person in Charge of the lockout after clearing the LOTO.

4.9.1 The entry shall be recorded with signature, printed name (or Vestas initials in case of Vestas

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employee), company (in case of Vestas employee can be left blank), date and time.

5 Template

The LOTO Instruction template is found in the “Vestas LOTO Instruction Template” document (DMS 0029-6849).

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LOTO Performance Evaluation Form				Document ID: 0049-0682 INS SUS-IEM-IMA (AME US/CAN) LOTO Performance Evaluation
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2016.05.25		Version: 01

Employee Name: _____ Date: _____

WTG Type and MK Version _____ WTG ID: _____

LOTO Task _____

LOTO Training Level (Circle 1) 1 2 3 ECC

Evaluation:	Satisfactory	Comments
Can choose the appropriate PPE	☐	_____
Can choose appropriate test equipment	☐	_____
Identifies all hazards	☐	_____
Can state arc flash hazard category	☐	_____
Can state Shock protection approach boundaries	☐	_____
Can identify and establish the lockout boundary	☐	_____
Properly notifies employees to isolate	☐	_____
Properly isolates energies	☐	_____
Properly verifies isolations	☐	_____
Can interpret test equipment readings	☐	_____
Properly establishes group LOTO	☐	_____
Inspects for completeness of work	☐	_____
Ensures all work areas are ready to reenergize	☐	_____
Inspects and Locks all cabinet doors	☐	_____
Properly notifies employees to re-energize	☐	_____
Properly breaks down group LOTO	☐	_____
Properly restores equipment	☐	_____
Properly completes the required paperwork	☐	_____

Evaluator

_____	_____	_____
Print Name	Signature	Date

Trainee

_____	_____	_____
Print Name	Signature	Date

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VAWT Confined Space Entry Program Vestas System Instruction				Document ID: 0049-0584 INS SUS-SAF-OPC [AME-US] Confined Space
BPO Del. SUS	Author(s): JATYL	2016.04.13		Version: 01

Version history

Version No.	Date	Description of Changes
01	2016.04.13	Revised sections: 3.4, 3.5, 4.8, 4.12, 4.16, 4.18, 4.21, 4.23, 5.0, 7.2, 10.1 (See grey highlighted text)

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VESTAS PROPRIETARY NOTICE

1 Purpose

Vestas-American Wind Technology, Inc.'s (VAWT) Confined Space Entry Program is designed to provide for the identification, evaluation, and control of confined space hazards, and to ensure that individuals who must enter such locations are trained and apprised of the program.
If adverse conditions develop during a confined space entry despite control measures already in effect, it is a requirement of this program that the space be evacuated and further entry prohibited until the hazardous condition can be determined and fully controlled.

This program applies to all Vestas employees, contractors, sub-contractors and customer employees working with Vestas employees in Confined Spaces at any site in the U.S.
Vestas-Canadian Wind Technology, Inc.'s (VCWT) employees working in Canada should refer to the VCWT Confined Space Entry Program (0049-0626). Ontario locations should refer to Ontario Confined Space Program (0049-0679).

2 Abbreviations

Term or Abbreviation	Definition
AED	Automated External Defibrillator
DMS	Document Management System
ERE	Emergency Rescue Equipment
IDLH	Immediate Danger to Life or Health
JSA	Job Safety Analysis
LFL	Lower Flammable Limit
SDS	Safety Data Sheet
NPRCS	Non-Permit Required Confined Space
PPE	Personal Protective Equipment
PRCS	Permit-Required Confined Space
TTC	Technical Training Center
QSE	Quality, Safety and Environment
VAWT	Vestas-America Wind Technology, Inc.
VCWT	Vestas-Canadian Wind Technology, Inc.

3 Responsibility

3.1 Senior Management

3.1.1 Ensure effective program development and implementation.

3.1.2 Provide Site/Construction Management with adequate resources and support to carry out program responsibilities and obligations.

3.1.3 Require adherence to all policies, procedures, practices and rules related to site hazards.

3.1.4 Oversee and evaluate Site/Construction Management and Authorized Supervisor performance.

3.2 Site/Construction Managers, Authorized Supervisors

3.2.1 Assume responsibility for compliance with this program, including Confined Space Entry Program training and practicing of the Emergency Response Plan;

3.2.2 Shall ensure the use of safe work practices for entry and work in confined spaces as well as the rescue of employees from such spaces;

3.2.3 Conduct, or delegate to a qualified person, Personal Work Practice Audits if there are suspected deviations, misunderstandings, or deficiencies in personnel performance regarding Confined Space or Alternate Entry procedures;

3.2.4 Provide adequate communication equipment for personnel entering Confined Spaces;

3.2.5 Provide appropriate air monitoring instruments and all other safety equipment;

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3.2.6 Maintain instrument reliability verification records for reading of portable gas detector equipment (e.g. data is maintained and viewable via gas detector software and applicable docking station.)

3.2.7 Review all Confined Space Entry Permits after work completion;

3.2.8 Retain all Confined Space Entry Permits for at least one year to evaluate;

3.2.8.1 The permit program; and

3.2.8.2 The protection provided to employees entering permit spaces.

3.2.9 Serve as Entry Supervisor on Confined Space entries if qualified;

3.2.10 Authorize Confined Space entries performed after regular work hours and on weekends for emergency notification purposes;

3.2.11 Shall ensure no worker enters or remains in a space unless relevant and adequate rescue procedures are developed and ready to implement in the event of an emergency;

3.2.12 Ensure visiting Vestas, VAWT, VCWT employees, contractors, sub-contractors and/or External Service Providers' are trained and qualified to work in Confined Spaces;

3.2.13 Conduct random inspections of confined space equipment to ensure proper operation and take immediate action to repair and/or replace defective confined space safety equipment;

3.2.14 Coordinate Confined Space Entry operations in the event qualified contractors, sub-contractors and/or visitors are entering Confined Spaces with Vestas employees.

3.2.15 The JSA and the Confined Space Entry Permit are the mandatory coordination documents and must be made available to all entrants and to every worker who performs related work with respect to the space, and to the worker's representative, if applicable.

3.2.16 Ensure new and/or re-assigned employees on-site are trained in the Confined Space Entry Program and informed of the:

3.2.16.1 Existence and locations of Permit Required Confined Spaces;

3.2.16.2 Potential hazards in those spaces; and

3.2.16.3 Emergency Response Plan

3.2.17 Provide a site orientation to contractors/sub-contractors identifying the:

3.2.17.1 Location and classification of Confined Spaces on-site as well as Confined Space Hazard Assessments;

3.2.17.2 Hazards and operations within or near the space;

3.2.17.3 Vestas experience with the space;

3.2.17.4 Any precautions Vestas has implemented in or near the Confined Space where the contractors/sub-contractors will be working; and,

3.2.17.5 Detailed Emergency Response Plan instructions

3.2.18 Debrief contractors/sub-contractors after job completion and discuss any hazards created or encountered in the space.

3.2.19 Ensure Rescue Practice for First Responders is performed per paragraph 10.5 and locally documented.

3.2.20 Provide free flow valves (also known as in-line check valves) for nitrogen supply tanks.

3.3 Quality, Safety and Environment

3.3.1 Serves as primary resource and contact on Confined Space issues;

3.3.2 Maintains, revises, and distributes this program to appropriate departments;

3.3.3 Assists in the evaluation and identification of Confined Spaces;

3.3.4 Assesses hazards on new turbine platforms;

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3.3.5 Develops and sets protocol for Confined Space entry and rescue training; and,

3.3.6 Conduct an annual review of this document and all of its components.

3.4 Entry Supervisors

3.4.1 Signs and issues written and complete Confined Space Entry Permits for specific spaces;

3.4.2 Determines if acceptable entry conditions are present at the Confined Space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry if prohibited conditions develop;

3.4.3 Shall be in close proximity of the Confined Space being entered.

3.4.4 Assign a 3rd person to the team if the conditions in the space presents, or could possibly present, an increased risk to Entrants.

3.4.5 Assess the increased risks associated with a confined space entry, determine the number of rescue personnel needed and where they are to be positioned for quick response.

3.4.6 Review the applicable Confined Space Hazard Assessments, Confined Space Entry Permit, JSA, work instructions and/or pre-task plans to ensure hazards identified are effectively controlled.

3.4.7 Post or have readily available, in a conspicuous location near Confined Space being entered, an up-to-date Emergency Response Action Plan for immediate use by the Attendants and Entrant;

3.4.8 The Confined Space Entry Permit should be placed in the nacelle for work tasks in the hub and blade.

3.4.9 May also serve as an Attendant or an Entrant if training and qualifications are current.

3.4.10 Pass the duties of the Entry Supervisor to another qualified Entry Supervisor that has been properly trained in accordance with the VAWT Confined Space Entry Program.

3.4.11 Shall ensure that all PPE and emergency equipment has been inspected and properly functioning and;

3.4.12 Verify that rescue services are available and that a means for summoning them is operable and redundant.

3.5 Attendants

3.5.1 Prevent entry by unauthorized personnel;

3.5.2 Understand the hazards or potential hazards of Confined Spaces;

3.5.3 Maintain accurate count of Entrant(s) in the space;

3.5.4 Communicate with Entrant(s) to ensure the safety of Entrant(s);

3.5.5 Be on the alert for any behavioral effects related to exposure a hazards that might affect the authorized entrant;

3.5.6 Order Entrant(s) evacuation if any prohibited or hazardous conditions develop during the entry either inside or outside of the space;

3.5.7 Summon a First Responder or on-site response team in the event of Entrant incapacitation that would require an entry rescue using the established Emergency Response Plan;

3.5.8 Monitor more than one permitted space provided the duties of an Attendant can be effectively performed for each Confined Space;

3.5.9 It is permissible to monitor a transformer room and hub entry at the same time but not a basement and hub entry at the same time

3.5.10 Adequate and effective communication must be established prior to entry and for the duration of the entry.

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3.5.11 If an emergency in one space arises, all other confined space entries shall be immediately ceased and entrants must immediately exit the space and provide assistance to the emergency.

3.5.12 May not perform any duties that might interfere with the primary duty to monitor and protect the Entrants; and,

3.5.13 May not enter the space in the event of an emergency unless performing an assigned role as part of a responding rescue team and properly relieved by another qualified Attendant.

3.6 Entrant

3.6.1 Enter into Confined Spaces;

3.6.2 Understand Confined Space hazards;

3.6.3 Use personal protective equipment, entry tools and supplies;

3.6.4 Follow proper Confined Space Entry procedures and safety perform assigned job;

3.6.5 Alert the Attendant whenever a prohibited condition is recognized or develops;

3.6.6 Report any deficiencies or malfunctions of equipment to the Entry Supervisor;

3.6.7 Perform self-monitoring, by using monitoring equipment and by continually checking his or her physical conditions in the space;

3.6.8 Participate in air monitor equipment calibration before entry and review results before entering a confined space;

3.6.9 Communicate with the Attendant;

3.6.10 May request additional air quality monitoring at any time; and

3.6.11 Evacuate space immediately as required.

3.7 Contractors and visitors

3.7.1 Shall follow the VAWT Confined Space program.

3.7.2 The employer of the contractor shall ensure competency in the Permit-Required Confined Space roles the contractor may hold (Entrant, Attendant, and/or Supervisor).

3.7.3 The employer of the contractor shall provide necessary PPE needed to safely perform a Confined Space entry.

3.7.4 Return all Confined Space Entry Permits to local manager for retention; and,

3.7.5 Report to local manager or designee any hazards confronted or created in permitted spaces.

4 Definitions

4.1 Confined Space

4.1.1 A space that has *all* three of the following criteria:

4.1.1.1 Large enough and so configured that an individual can physically enter and perform assigned work.

4.1.1.2 Limited or restricted means for entry or exit that can complicate first aid, evacuation, rescue, or other emergency services.

4.1.1.2.1 If entering the space includes contorting the body to enter it may be considered as having limited means of entry and exit. Examples: climbing through a porthole, climbing up a ladder or crawling through a tunnel.

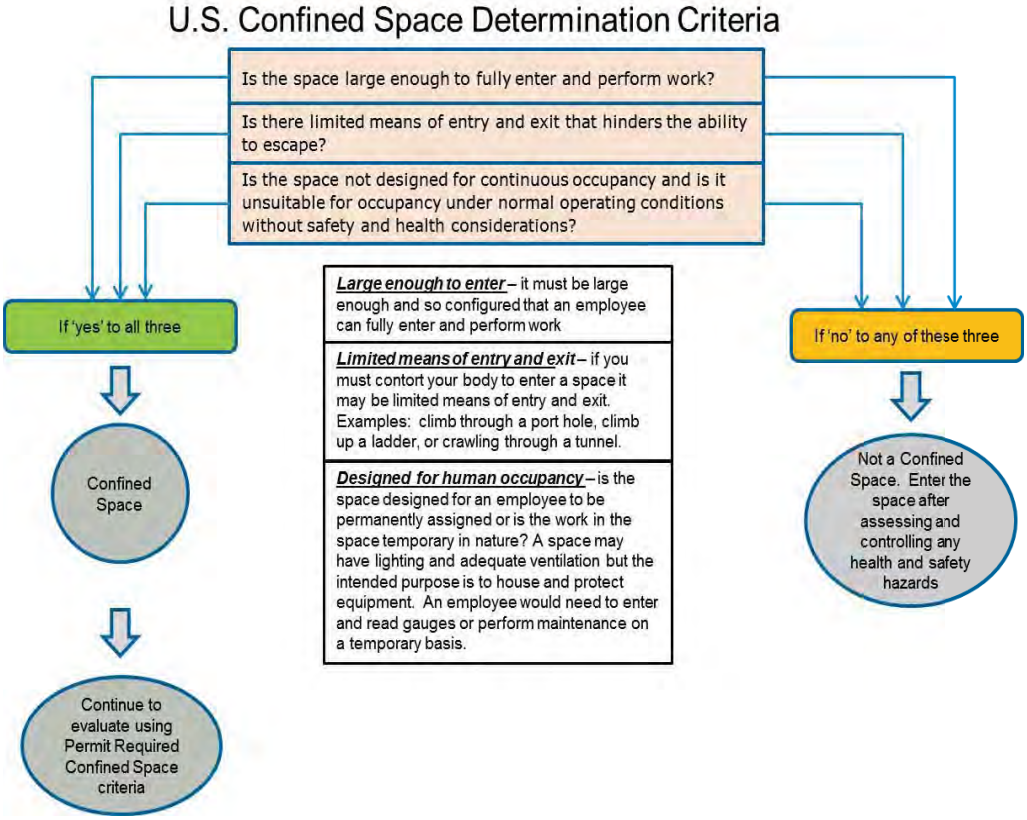
4.1.1.2.2 Another way to measure limited means of entry and exit is to determine how difficult it would be to extract an injured person from the space.

4.1.1.3 Is not designed for continuous occupancy.

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4.1.1.3.1 Criteria for evaluating continuous occupancy are the space design. If the space is designed for workers to temporarily enter and perform assigned tasks and maintenance and not permanently remain in the space then it is considered not designed for continual occupancy despite having adequate lighting and ventilation.



4.2 Permit-Required Confined Space

4.2.1 A Confined Space that possesses additional potential hazards that could result in serious injury or death and are therefore subject to all the provisions of this program before entry is allowed.

4.2.1.1 Any Confined Space that contains one or more of the following characteristics is considered a Permit-Required Confined Space and requires a written Confined Space Entry Permit prior to entry:

4.2.1.2 Contains or could contain a hazardous atmosphere; or

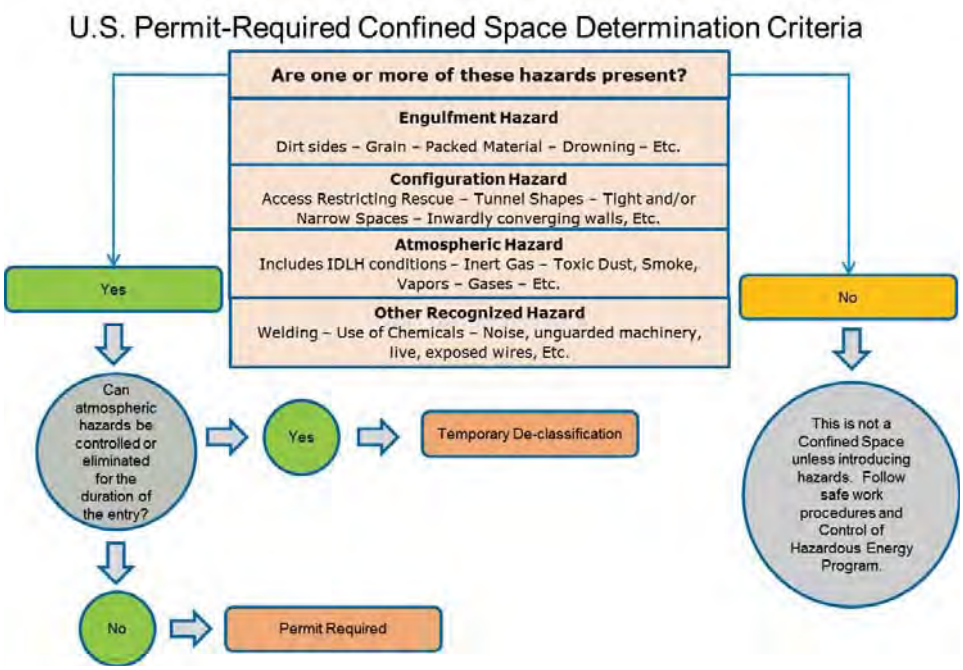
4.2.1.3 Contains a material that could engulf an Entrant; or

4.2.1.4 Possesses an internal configuration that could trap or asphyxiate an Entrant; or

4.2.1.5 Contains any other recognized serious safety or health hazard.

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4.3 Non-Permit-Required Confined Spaces

4.3.1 A Confined Space that, under normal operating conditions, does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

4.4 Acceptable Entry Conditions

4.4.1 To achieve acceptable entry conditions the following, at a minimum, must be met:

4.4.1.1 Atmosphere test performed indicating acceptable results and documented on permit, if required by the Confined Space Hazard Assessment;

4.4.1.2 Space has been isolated (LOTO);

4.4.1.3 Means to summons First Responder(s)/Rescue Team is established; and

4.4.1.4 Proper training of the Entry Supervisor, Attendant and Entrant

4.5 Attendant

4.5.1 An individual stationed outside the Confined Space who monitors the Entrants inside the Confined Space; and

4.5.2 Performs all Attendants' duties assigned in this program

4.6 Cancellation

4.6.1 Confined Space Entry Permits are cancelled at the completion of the assigned task in the Confined Space.

4.7 Confined Space Entry Permit

4.7.1 The written or printed document that defines the conditions of Permit-Required Confined Space entry;

4.7.2 The anticipated hazards associated with the Confined Space entry,

4.7.3 The reasons for entering the Confined Space,

4.7.4 Provides a listing of Attendants and Entrants,

4.7.5 The date of entry into the Confined Space, and

4.7.6 The expiration time of the Confined Space Entry Permit

4.7.7 All sections of the Confined Space Entry Permit must be completed.

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4.8 Controlling Contractor

4.8.1 The employer that has overall responsibility for construction at the worksite.

4.9 Engulfment

4.9.1 The surrounding and effective capture of an Entrant by a liquid or (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or exert enough force on the body to cause strangulation, constriction, or crushing.

4.10 Entrant

4.10.1 All personnel who are authorized to enter a Permit-Required Confined Space under controlled conditions.

4.11 Entrapment

4.11.1 Areas where walls or structure create narrowing pinch points can trap Entrants making escape difficult or potentially causing positional suffocation.

4.12 Entrant Employer

4.12.1 Any employer who decides that an employee it directs will enter a permit space.

4.13 Entry

4.13.1 The act of passing through an opening into a Permit-Required Confined Space.

4.13.2 Entry action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

4.13.3 If opening the access to a permitted space could allow hazards to endanger personnel outside the Confined Space additional precautions will be required to control the hazard exposure.

4.13.4 Entry can occur both during work and during preparation for work.

4.14 Entry Supervisor

4.14.1 Person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section.

4.14.2 Shall be named in writing on the entry permit.

4.15 First Responder(s)

4.15.1 A person(s) or outside entity that has been evaluated and:

4.15.2 Has the capability to reach a victim within the maximum three (3) hours;

4.15.3 Is equipped for and proficient in performing the needed rescue services;

4.15.4 Has been informed of the hazards they may confront when called upon to perform a rescue;

4.15.5 Has been trained and is skilled with the equipment to perform the rescue;

4.15.6 Has a documented annual practice drill; and

4.15.7 Willing and able to perform as a First Responder.

4.16 First Response Kit

4.16.1 Consists of:

4.16.1.1 First Out Kit;

4.16.1.2 ERE Kit (Includes Tractel or similar descent device);

4.16.1.3 Yates Spec Pack (patient packaging and extraction system);

4.16.1.4 AED

4.16.1.5 4:1 Rescue Transfer Unit (RTU)

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4.17 Hazardous Atmosphere

4.17.1 A hazardous atmosphere in which an Entrant may risk death, incapacitation, the inability to self-rescue, injury, or acute illness if exposed to:

4.17.1.1 Flammable gas, vapor, or mist in excess of 10 percent of its LFL;

4.17.1.2 Airborne combustible dust the meets or exceeds LFL; or

4.17.1.3 Oxygen content below 19.5 percent or above 23.5 percent.

4.17.1.4 Immediately Dangerous to Life or Health

4.18 Host Employer

4.18.1 The employer that owns or manages the property where the construction work is taking place.

4.19 Immediate Dangerous to Life or Health (IDLH)

4.19.1 A hazardous atmosphere that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that interfere with a person's ability to escape unaided from a permit space.

4.19.2 No work will take place under IDLH conditions.

4.20 Instrument Reliability Verification

4.20.1 Calibration of direct reading portable gas detectors in accordance with manufacturer's recommendations and includes:

4.20.1.1 Prescribed calibration; and

4.20.1.2 Daily function test (bump test)

4.21 Mechanical Ventilation

4.21.1 Mechanical, forced air ventilation of a space can be:

4.21.1.1 Positive – clean, respirable air pumped into the space

4.21.1.2 Negative – contaminated air from the space is pumped out of the space

4.21.1.3 The exhaust from the space must not endanger the safety of occupants or others in nearby areas.

4.22 Opening Size

4.22.1 Restricted

4.22.1.1 An opening of 24" (61 cm) or less in the least dimension is too small to allow a rescuer to extract an immobilized injured victim.

4.22.2 Unrestricted

4.22.2.1 Openings of larger 24" (61 cm) allows relatively free access to the space.

4.23 Prohibited Condition

4.23.1 Any condition in a permit space that is not allowed by the permit during the period when the entry authorized.

4.23.2 A hazardous atmosphere is a prohibited condition.

4.24 Serious Safety or Health Hazards

4.24.1 Examples are unguarded machinery or exposed live wires, oxygen rich/poor environment.

4.25 Temporary Declassification

4.25.1 The process of reclassifying a Permit-Required Confined Space to a non-permit-required confined space provided the space;

4.25.1.1 Poses no actual or potential atmospheric hazards and

4.25.1.2 All hazards within the space are controlled without entry into the space.

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4.26 Termination

4.26.1 Stoppage of a Confined Space Entry Permit due to changes in conditions or control measures required to protect the Entrant. Termination of the entry permit is an automatic closure of that entry permit. Re-entry into the space requires a new entry permit.

5 References

Document No.	Title
ANSI/ASSE Z117.1-2009	Safety Requirements for Confined Spaces
CA Title Code 8	Confined Space
OAR 437-002-0146	Oregon OSHA Confined Space Program
29 CFR.1910.134	Respiratory Protection
29 CFR 1910.146	Permit-Required Confined Spaces
29 CFR 1910.269	Electric Power Generation, Transmission, and Distribution
29 CFR 1926 Subpart AA	Confined Spaces in Construction
29 CFR 1926.21	Safety and Health Regulations for Construction
0049-0580	Control of Hazardous Energy Program
0049-0603	Switchgear SF^6 Release Volume

6 Associated Documents

Document No.	Title
0049-0586	VAWT Confined Space Entry Permit
0049-0585	VAWT Confined Space Hazard Assessment
0049-0589	VAWT Confined Space Entry Quick Reference Guide
0049-0588	Supplementary Confined Space Entry Log
0049-0600	Personal Work Practice Audit
0049-0620	Field Rescue Response Protocol
0029-0220	Scheduling Third Party Bundled Three Safety Training

7 Space Classification

(See Hazard Assessment for specific turbine space classifications)

7.1 Confined Spaces

7.1.1 Entrants must wear an approved multi-gas detector for the duration of the entry.

7.1.2 Confined Spaces automatically revert to a Permit-Required Confined Space when introducing chemicals, performing hot work activities or when hazard control measures fail to control the hazards.

7.2 Permit-Required Confined Spaces

7.2.1 These spaces are designated as Permit-Required Confined Spaces:

7.2.1.1 Blades

7.2.1.2 Hub, except MK 10's

7.2.1.3 Tower Damper/Ballast Tanks

7.3 Non-Permit Required Confined Spaces

7.3.1 These spaces are classified as Non-Permit Required Confined Spaces:

7.3.1.1 Tower Basement

7.3.1.2 Transformer Room

7.3.1.3 Nose Cone

7.3.1.4 Under main shaft, also known as the 'dog house.'

7.3.1.5 Non-Permit Required Confined Spaces do not require labeling.

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7.3.1.6 Workers must always prepare to evaluate Non-Permit Required Confined Spaces and re-classify to Permit-Required Confined Spaces based on changing space conditions and type of work performed.

7.4 Not Confined Spaces

7.4.1 These spaces are not classified as confined spaces:

7.4.1.1 Tower

7.4.1.2 Nacelle

7.4.1.3 Workers must evaluate the nacelle and tower prior to performing tasks that may create a hazardous atmosphere and re-classify the space as a Permit-Required Confined Space.

7.5 Construction (Installation)

7.5.1 During the construction phase spaces are not classified as Permit-Required Confined Space during the installation phase due to lack of energization. Engineering controls and control measures to protect the Entrant(s) shall be used and listed in the Job Safety Analysis and/or Pre-Task Plan.

7.5.2 While the third and final blade is being installed on the hub, the Entrant will continually monitor the atmosphere with an air quality monitor.

7.6 Pre-Commissioning

7.6.1 During Pre-commissioning activities space classification in paragraph 7.5 and 7.6 apply.

8 Hazard Determination

8.1 Hazard Assessment

8.1.1 A hazard assessment has been performed on all spaces identified to exist in VAWT wind turbines where individuals may be required to enter to perform work. The hazard assessments are part of a robust Confined Space Program and should be used as a reference. (VAWT Confined Space Hazard Assessment (0049-0585).

8.1.2 Confined Spaces within maintenance facilities or on VAWT worksites will also be assessed.

8.1.2.1 The format of the assessment is space specific and includes following information:

8.1.2.2 The title of the space and its location;

8.1.2.3 Initial determination of Permit-Required status;

8.1.2.4 A summary of recognized physical hazards; and,

8.1.2.5 Requirements for hazard control procedures.

8.1.3 Initial Determination

8.1.3.1 The VAWT Quality, Safety and Environment will evaluate all new turbine models/platforms to adequately assess for Confined Spaces. If a Confined Space contains any actual or potential hazards that cannot be physically controlled as a routine condition, it must be considered a Permit-Required Confined Space.

9 Known or Possible Hazards (not inclusive)

9.1 High Pressure Hazards

9.1.1 Hydraulic systems

9.1.2 Nitrogen accumulators

9.2 Atmospheric Hazards

9.2.1 Oxygen deficiency

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9.2.2 Toxic or volatile chemicals
9.2.3 Nitrogen gas
9.2.4 Hydraulic mist
9.2.5 Extreme heat
9.2.6 Extreme cold
9.2.7 Airborne dust

9.3 Electrical Hazards

9.3.1 Electrical shock potential
9.3.2 Arc flash/blast potential
9.3.3 Water in the basement

9.4 Engulfment Hazards

9.4.1 Highly refined mineral oil in tower dampeners

9.5 Entrapment Hazards

9.5.1 Interior of blades
9.5.2 Collar between the nacelle and hub

9.6 Crushing/Pinching Hazards

9.6.1 Movement of pendulum weight
9.6.2 Movable pitch systems
9.6.3 Unexpected movement of machinery

9.7 Entrant Generated Hazards

9.7.1 Cleaning
9.7.2 Welding or cutting
9.7.3 Sanding and grinding
9.7.4 Use of gas powered equipment
9.7.5 Spray painting

9.8 Slips, Trips, Falls

9.8.1 Greasy, oily, slippery walking/working surfaces

10 Qualifications and Training

10.1 Vestas Employees working in the U.S.

10.1.1 Individuals involved in any aspect of work within Permit-Required Confined Spaces must receive Confined Space Entry and Rescue training prior to the job assignment. This training must cover:

10.1.1.1 Classification and evaluation of Confined Spaces;
10.1.1.2 Specific Confined Space hazards;
10.1.1.3 The VAWT Confined Space Entry Program;
10.1.1.4 An explanation of the VAWT Confined Space Hazard Assessment (0049-0585) and the permit system;
10.1.1.5 Duties and responsibilities of each member of the Confined Space entry team;
10.1.1.6 Appropriate use and care of atmospheric monitoring equipment;
10.1.1.7 Setup and use of forced air ventilation;
10.1.1.8 Emergency procedures, including the use of rescue equipment.

10.1.2 The documentation of training shall be made available for inspection by employees and their authorized representatives.

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10.1.3 The training must be in both a language and vocabulary that the employee can understand.

10.2 Contractors

10.2.1 Authorized/Approved contractors/sub-contractors must provide documentation of Confined Space entry training.

10.2.2 The training shall establish individual proficiency and certification in Confined Space entry duties.

10.2.3 Shall certify that the training has been accomplished and the certification shall contain:

10.2.3.1 Participants' name;

10.2.3.2 The signatures or initials of the trainers; and

10.2.3.3 The dates of training

10.3 Technical Training Center

10.3.1 Train participants to the U.S. and Canada Confined Space Entry Programs.

10.3.2 Shall maintain documentations for at least three years or as otherwise provided under Vestas document retention policies. Training records and shall contain, at a minimum:

10.3.2.1 Employee name;

10.3.2.2 Trainer's name and qualifications;

10.3.2.3 Date(s) of training;

10.3.2.4 Duration of the training;

10.3.2.5 Learning objectives;

10.3.2.6 A copy of the training material delivered; and

10.3.2.7 A copy of the completed evaluation tool

10.4 Retraining

10.4.1 Retraining shall be required when:

10.4.1.1 There is a change in the individual's assigned duties such as new turbine platforms; or

10.4.1.2 There are deviations from the Confined Space Entry Permit procedures or inadequacies in the individuals' use or knowledge of these procedures; or

10.4.1.3 There is a change in the Confined Space Entry operations that present a hazard about which an individual has not been trained; or

10.4.1.4 When this program is re-written or revised

10.4.2 Confined Space Entry and Rescue training, Safe Access and Rescue, and Trauma at Heights, shall be repeated at least every two (2) years or sooner if deemed necessary.

10.5 Rescue Practice

10.5.1 Rescues should be practiced, and documented, at an interval that is sufficient to maintain proficiency and the rescue practice should closely as possible resemble the scenario and conditions for which the rescue may take place. This interval shall not exceed 12 months.

10.6 Requesting Confined Space Entry Training

10.6.1 Requests for training should be made in accordance with Scheduling Third Party Bundled Three Safety Training 0029-0220.

11 Confined Space Entry Permits

11.1 VAWT Confined Space Entry Permit (0049-0586)

11.1.1 Confined Space Entry Permits shall include at a minimum:

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11.1.1.1 The date and location of entry;

11.1.1.2 The names or other identification (individual SAP ID or employee number) of the Entrants, Attendants, and the Entry Supervisor;

11.1.1.3 The scope of work that will be conducted;

11.1.1.4 The duration which the permit will be valid (not to exceed the working shift);

11.1.1.5 A space for the approval of the permit by the Entry Supervisor;

11.1.1.6 Permit number which shall be formatted such as;

11.1.1.7 Turbine ID

11.1.1.8 Date (day/month/year format)

11.1.1.9 Sequential number of permits for that turbine visit

11.1.1.10 Example: E44 08/30/2011 01, 02, 03…

11.1.1.11 A space for recording each person's space entry and exits;

11.1.1.12 The name of the person issuing the permit;

11.1.1.13 Verification that an emergency response plan has been established; and,

11.1.1.14 A space for recording closure of the permit and for providing a sign off that the work has been completed and the space is returned to its original classification

11.1.2 The Confined Space Entry Permit, signed by the Entry Supervisor, must be posted or conspicuously placed at all entrances or otherwise made available to Entrants before they enter the Confined Space.

12 Signage and Space Markings

12.1 Danger signs

12.1.1 Danger signs shall be posted at the entrance to all Confined and Permit-Required Confined Spaces by any effective means of the existence of such spaces and shall indicate:

12.1.2 "Danger – Confined Space – Do not enter" or words to that effect based on local requirements.

12.1.3 Spaces are not required to be marked with signage provided managers adequately inform all employees and sub-contractors of the confined spaces and the hazards the present.

12.1.4 Space marking activities shall be coordinated with customers prior to marking.

12.1.5 Regardless of space marking, sites will comply with Vestas Confined Space Program and applicable hazard assessments.

13 Permit-Required Confined Space Entry Procedures

13.1 Entry Requirements

13.1.1 Use the VAWT Confined Space Hazard Assessment (0049-0585) to determine if a space meets the definition of a Confined Space or Permit-Required Confined Space, and if so, what procedures are required for entry.

13.1.2 Organize and obtain required forms and equipment as follows:

13.1.2.1 VAWT Confined Space Entry Permit (0049-0586);

13.1.2.2 Air monitoring equipment;

13.1.2.3 Ventilation equipment and power supply;

13.1.2.4 Applicable SDS for permit entry;

13.1.2.5 Hot Work Permit, if applicable;

13.1.2.6 Energized Work Permit, if applicable;

13.1.2.7 Appropriate communication equipment;

13.1.2.8 Emergency Rescue Equipment and full body harness (for both horizontal and vertical entry); and,

13.1.2.9 Markers (Cones), signage, caution tape as needed.

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13.2 Initial Monitoring

13.2.1 Qualified individuals will perform initial monitoring before entering into Permit-Required Confined Spaces with approved multi-gas detector that has been calibrated with all sensors in operation.

13.2.2 Entrants and/or their representative shall be allowed to participate in, review of, or request additional testing prior to entry.

13.2.2.1 Refer to the multi-gas detector operating manual when using the device.

13.2.3 Air quality sampling shall be performed at various heights within the Confined Space.

13.3 Record all monitoring results

13.3.1 Record all monitoring results, if acceptable; continue with Confined Space Entry procedures.

13.3.2 If unacceptable readings and/or alarms are activated during any monitoring tests, the atmosphere is likely to be contaminated and unsafe for Confined Space Entry.

13.3.2.1 Ventilate for at least five minutes and resample. If the atmosphere has not cleared after this initial forced ventilation, TERMINATE THE ENTRY.

13.3.2.2 The terminated Confined Space Entry Permit shall be returned to the Site/Construction Manager or Authorized Supervisor for retention with any problems noted on the permit during the entry operations.

13.4 Cancellation

13.4.1 At the completion of the job task the Entry Supervisor shall cancel the Confined Space Entry Permit.

13.4.2 Cancelled Confined Space Entry Permits shall be retained for the longer of 1 year, or pursuant to Vestas document retention policies.

13.5 Working under a Confined Space Entry Permit

13.5.1 While working in a Confined Space under permitted conditions the following is required:

13.5.1.1 When an actual or potential atmospheric hazard (e.g., oxygen deficiency) is possible, continual air quality monitoring with a multi-gas detector;

13.5.1.2 Mechanical, forced ventilation to maintain uncontaminated breathing conditions;

13.5.1.3 If there are no actual or potential atmospheric hazards and the only hazard in the space is due to electrical, mechanical, or hydraulic energies, forced ventilation may not be required.

13.5.1.4 An attendant stationed outside the space;

13.5.1.5 Prevention of entry into the Permit-Required Confined Space by unauthorized personnel;

13.5.1.6 Non-entry rescue equipment present and immediately accessible to the Attendant; (if applicable)

13.5.1.7 Confined Space Entry Permit under the control of the Attendant or posted near the opening of the space being entered;

13.5.1.8 A First Responder documented on the JSA in accordance with the Rescue Response Protocol (0049-0620);

13.5.1.9 An up-to-date Emergency Response Plan, taking into account work scope and response time to the location noted on the Confined Space Entry Permit;

13.5.1.10 Emergency communication must be verified as operational in the event additional rescue assistance needs to be summoned.

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13.6 Temporary Declassification/Reclassification Procedure

13.6.1 A space classified as a Permit-Required Confined Space may be temporarily reclassified as a Non-Permit-Required Confined Space under the following procedures:

13.6.1.1 The Permit-Required Confined Space contains no actual or potential atmospheric hazards and if all hazards are controlled without entry into the Permit-Required Confined Space for the duration of the entry.

13.6.1.2 Initial air sampling is required and must be documented on the entry permit prior to reclassifying the space.

13.6.1.3 If it is necessary to enter the Permit-Required Confined Space to control hazards, such entry shall be performed under the Permit-Required Confined Space procedures for the purpose of controlling the hazards.

13.6.1.4 Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards.

13.6.1.5 The temporary declassification shall document the basis for determining that all hazards in a Permit-Required Confined Space have been controlled, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification shall be made available to any individual entering the space.

13.6.1.6 If hazards arise within a Permit-Required Confined Space that has been temporarily declassified to a Non-Permit-Required Confined Space, each individual in the space must exit and the Confined Space Entry Permit terminated.

13.7 The space automatically becomes a Permit-Required Confined Space.

13.7.1 Entry Supervisor shall then reevaluate the space and determine the cause of the hazards and initiate a new Confined Space Entry Permit.

13.7.2 A space that has been declassified because all actual or potential hazards inside the Confined Space have been controlled does not require:

13.7.2.1 An Attendant stationed outside of the space;

13.7.2.2 Rescue equipment to be pre-positioned;

13.7.2.3 Barricading and/or guarding of the space opening to prevent unauthorized entry.

14 Non-Permit Required Confined Space Entry Procedures

14.1 Entry Requirements

14.1.1 Entry into designated Non-Permit Required Confined Spaces can be accomplished without a permit provided *ALL* of the following conditions are met:

14.1.1.1 All Entrants have been properly trained for Confined Space entry;

14.1.1.2 The space to be entered has been evaluated by the Entry Supervisor and the space is safe for entry;

14.1.1.3 There is no hot work taking place in the space;

14.1.1.4 There are no Entrant induced chemicals or toxic material (other than approved cleaning materials) for the duration of the entry;

14.1.1.5 The JSA/PTP must reflect all actions being taken to ensure Entrants will not be exposed to any additional hazards in the space; and

14.1.1.6 Entrants must immediately evacuate the space if hazard control methods fail to maintain a safe working environment or if conditions become unsafe.

14.1.2 The space immediately reverts to a Permit Required Confined Space and shall not be re-entered until the hazards are identified and controlled.

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15 Emergency Rescue Procedures

15.1 Rescue Coordination

15.1.1 VAWT will coordinate the rescue procedures unless a memorandum of agreement has been established by all parties in the event that VAWT employees and contractors, clients, vendors, external service providers and other visitors are working in the same Confined Space.

15.2 Types of Emergency Rescue Procedures

15.2.1 Self-Evacuation (unaided escape from a confined space)

15.2.1.1 Self-evacuation is not intended to be a rescue method and cannot be used as the rescue plan for any Confined Space entry.

15.2.1.2 Entrant self-evacuation generally provides the most effective means of escaping a recognized Confined Space hazard. Self-rescue/evacuation must be initiated immediately whenever an Entrant(s) or Attendant recognizes the presence of a hazardous atmosphere, any signs or symptoms of over-exposure, or any other serious space hazards.

15.2.1.3 Entrants will perform self-evacuation in the event of forced air ventilation system failure.

15.2.1.4 Self-evacuation requires Entrants to safely stop whatever they are doing and exit the space in the most expedient and safe manner possible.

15.2.2 Appropriate means for rescue must be established prior to Confined Space entry. There are two (2) methods of rescue:

15.2.2.1 Entry rescue

15.2.2.2 Non-entry rescue

15.2.3 Entry Rescue

15.2.3.1 Entry rescue shall not be attempted unless the condition that caused the incident/injury is known and controlled.

15.2.3.2 Entry rescue teams must evaluate the conditions in the space using the Confined Space Entry Permit and mitigate any hazards.

15.2.3.3 Entry rescue may only be attempted by appropriately trained individuals possessing knowledge of Confined Space entry and associated space hazards.

15.2.3.4 An entry rescue plan must be developed prior to implementing this level of rescue responsibility, and include the following elements:

15.2.3.4.1 Barricades for crowd/traffic control;

15.2.3.4.2 Additional ventilation options;

15.2.3.4.3 Applicable SDS's

15.2.3.4.4 Controls for other potential hazards (e.g., electrical, fire);

15.2.3.4.5 Protective clothing and equipment;

15.2.3.4.6 Explosion-proof lighting equipment;

15.2.3.4.7 Redundant methods of communication;

15.2.3.4.8 Onsite rescue team;

15.2.3.4.9 Personnel removal procedures and devices;

15.2.3.4.10 Available emergency vehicles; and,

15.2.3.4.11 Medically trained personnel

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15.2.4 Non-Entry Rescue:

15.2.4.1 This type of rescue is only effective on simple vertical or clear horizontal spaces. Non-entry rescue reduces the risk of collateral injury to rescuers as well as the need for additional rescue personnel on scene. When self-rescue is not possible due to unconsciousness or incapacitation of an Entrant, non-entry rescue should be initiated. Under this method, mechanical equipment is used to physically extract, lift, pull, or otherwise remove Entrants from the Confined Space without requiring any additional persons to enter into the space.

15.2.4.2 Non-entry rescue equipment typically consists of a body harness, rope haul systems, rope, winch, and extended poles that can be operated from outside of the Confined Space by the Attendant. Since mechanical retrieval of unconscious or incapacitated Entrants from complex, convoluted spaces can cause serious injuries from entanglement, strangulation, and blunt force impacts, this method of retrieval must be carefully evaluated before implementation.

15.2.4.3 Whenever possible provisions shall be made to facilitate training with local emergency response teams to affect a Confined Space rescue operation in the event an incident occurs during off work hours or sites are remotely positioned where an effective response is greater than three (3) hours.

15.2.5 Outside Rescue Services

15.2.5.1 This type of rescue is conducted with the support of non-Vestas emergency personnel such as local fire department. If this method of rescue is used, emergency personnel must be informed of the hazards they may confront, and the personnel must have access to all Permit-Required Confined Spaces in order to develop rescue plans and practice rescues before a rescue can be performed.

15.2.5.2 Never assume that local emergency personnel are trained or equipped to make a Confined Space rescue unless the requirements listed above have been met.

15.2.5.3 This method of rescue is acceptable provided there is joint cooperation between VAWT and the rescue service personnel and regular practice rescues are performed in accordance with this program.

15.2.5.4 On-site personnel in all cases must be prepared to perform rescue in the event the outside rescue service personnel are unavailable or unable to respond.

16 Record Keeping

16.1 Quality, Safety and Environment

16.1.1 Maintain safety audits and incident investigations pertaining to confined space deficiencies and/or incidents.

16.2 Technical Training Center

16.2.1 Maintains training records (hard copies and/or electronic) for each employee qualified to this program.

16.3 Sites

16.3.1 Maintain copies of cancelled and terminated Confined Space Entry Permits for the greater of 1 (one) years or as prescribed under Vestas document retention policies.

16.3.2 Maintain Personal Work Practice Audit results for all assigned individuals, if performed.

16.3.3 Maintain records of training and practice drills of the First Responders.

17 Auditing

17.1 Quality, Safety, and Environment

17.1.1 Conduct annual QSE Audits.

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17.2 Site/Construction Managers and Authorized Supervisor

17.2.1 Conduct Personal Work Practice Audit (0049-0600) on assigned personnel if there are suspected deviations, misunderstandings, or deficiencies in personnel performance regarding Confined Space or Alternate Entry procedures.

18 APPENDIX: version history

Version No.	Date	Description of Changes
00	2012.03.16	New document
01	2014.01.06	Updated sections 2,3,4,5,6,7,8,9,10,11,13,14,15, 16,17,18 (see grey highlighted text)
02	2014.03.24	Removed confined space work practice audit requirements (section 4 and 18)
03	2014.06.25	• Changed classification of nacelle and tower to not a confined space. • Changed wording on para 15.1.1.2 to remove Acceptable Entry Condition statement. • Changed paragraph 15.1.1.5 to remove 'hazardous environments'
00	2015.01.08	• Converted from T09 to T03 document. Original DMS 0028-1550 • Added requirement for free flow valve on nitrogen supply tanks
		•

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VAWT Confined Space Hazard Assessment Vestas System Instruction				Document ID: 0049-0585 INS SUS-SAF-OPC [AME US] Confined Space
Owner(s): BPO Del. SUS	Author(s): JATYL	Valid from: 2016.05.02		Version: 02

Version history

Version No.	Date	Description of Changes
02		Added electrical hazard to hubs. Added V117

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1 Purpose

1.1 Evaluation of spaces to determine if any are permit-required confined spaces.

(L5 Document Template V02)

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2 Tower Basement - V80, V90, V100

This space has been assessed as a:	 
Non-Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit (ladder access required)	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Water seepage	De-energize collection system. Pump out excessive water
Electrical Shock/Arc Flash/Blast	Do not handle high voltage line without isolating collection system. Avoid contact with HV cables. Do not perform activities that may damage HV cable insulation.
Items dropped from overhead	Do not enter with personnel working overhead. Wear head protection.
Blast from switchgear	Do not enter while switchgear is being operated.
Biological	Biological
None	None
Chemical	Chemical
SF_6 Gas	Verify SF_6 gas on switch gear prior to entering (Refer to SB 073)
CO	Position internal combustion engines away from turbine door entrance
Introducing toxic or hazardous chemicals	Mechanical, forced air ventilation
	Refer to SDS
	Continual air monitoring
	Wear approved respirator or self-contained breathing apparatus as determined by the SDS and PPE Sheets (0001-0410)

This space will be classified as a permit required confined space if:

- Introducing hazardous chemicals
- Switchgear indicates low SF^6 gas
- Welding, cutting, or other hot work activities
- Painting
- Standing water
- 4 gas monitor indicates unsafe atmosphere
- Exposed, electrically energized conductors

Note: The worker must assess the hazards and establish safe work procedures before entering the basement.

Note: See VAME Safety Bulletin SB 073 “SF_6 Discharge.” Calculations for switchgear SF_6 gas release volumes in basement see (0035-8893).

Note: Initial air sampling is not required to enter the basement, but continual air quality monitoring is required for entry and throughout the duration of the entry.

Note: Entry into the basement is not allowed if switchgear SF_6 is not within safe ranges on indicator gauge.

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VESTAS PROPRIETARY NOTICE

3 Tower Basement - V82, NM72

This space has been assessed as a:	 
Non-Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit (ladder access required)	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Water seepage	De-energize collection system. Pump out excessive water
Electrical Shock/Arc Flash/Blast	Do not handle high voltage line without isolating collection system. Avoid contact with HV cables Do not perform activities that may damage HV cable insulation
Items dropped from overhead	Do not enter with personnel working overhead. Wear head protection.
Crushing Hazards	Do not enter if service lift is in operation.
Biological	Biological
None	None
Chemical	Chemical
CO	Position internal combustion engines away from turbine door entrance
Introducing hazardous chemicals	Mechanical, forced air ventilation
	Refer to SDS
	Continual air monitoring
	Wear approved respirator or self-contained breathing apparatus as determined by the SDS and PPE Sheets (0001-0410)

This space will be classified as a permit required confined space if

- Introducing hazardous chemicals (refer to appropriate SDS)
- Standing water
- Gas monitor indicates unsafe atmosphere
- Welding, cutting, or other hot work activities
- Exposed, electrically energized conductors
- Painting

Note: The worker must assess the hazards and establish safe work procedures before entering the basement.

Note: Air Sampling is not required to enter the basement

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VESTAS PROPRIETARY NOTICE

5 Tower Basement - V112 and V117 (with S&C Switchgear)

This space has been assessed as a:	
Non-Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit (ladder access required)	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Electrical Shock/Arc Flash/Blast	Do not handle high voltage line without isolating collection system. Avoid contact with HV cables Do not perform activities that may damage HV cable insulation
Switch Gear Explosion	Do not enter during switching operations. Entry requires rescue equipment (4:1, hoist and haul systems) to be rigged and at the ready. Verify SF_6 prior to switch gear operation
Hazardous Atmosphere (SF_6)	Continual air quality monitoring during entry. See SB 073. See note.
Water seepage	De-energize collection system. Pump out excessive water
Fall to lower level	Fall Protection required to ascend/descend the basement ladder section
Struck by falling objects	Wear head protection, close ladder hatch.
Biological	Biological
None	None
Chemical	Chemical
CO	Position internal combustion engines away from turbine door entrance
Introducing hazardous chemicals	Mechanical, forced air ventilation
	Refer to SDS
	Continual air monitoring
	Wear approved respirator or self-contained breathing apparatus as determined by the SDS and PPE Sheets (0001-0410)

This space will be classified as a permit required confined space if	
• Introducing hazardous chemicals • Exposed, electrically energized conductors • Standing water	• Welding, cutting, or other hot work activities • Painting

Note: The worker must assess the hazards and establish safe work procedures before entering the basement.

Note: See VAME Safety Bulletin SB 073 “SF_6 Discharge.”

Note: Calculations for switchgear SF_6 gas release volumes in basement see (0035-8893).

Note: Initial air sampling is not required to enter the basement, but continual air quality monitoring is required for entry and throughout the duration of the entry.

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VESTAS PROPRIETARY NOTICE

6 Tower Basement - V112 (with ABB Switchgear)

This space has been assessed as a:	
Non-Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit (ladder access required)	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Electrical Shock/Arc Flash/Blast	Do not handle high voltage line without isolating collection system. Avoid contact. Do not perform activities that may damage HV cable insulation
Arc Flash/Blast	Entrants must don 40 cal/cm^2 PPE to ground switchgear
Switch Gear Explosion	Do not enter during switching operations (except during grounding operations). Entry requires rescue equipment (4:1, hoist and haul systems) to be rigged and at the ready. Verify SF_6 prior to switch gear operation
Hazardous Atmosphere (SF_6)	Continual air quality monitoring during entry. See SB 073. See note.
Water seepage	De-energize collection system. Pump out excessive water
Fall to lower level	Fall Protection required to ascend/descend the basement ladder section
Struck by falling objects	Wear head protection, close ladder hatch.
Biological	Biological
None	None
Chemical	Chemical
CO	Position internal combustion engines away from turbine door entrance
Introducing hazardous chemicals	Mechanical, forced air ventilation
	Refer to SDS
	Wear approved respirator or self-contained breathing apparatus as determined by the SDS

This space will be classified as a permit required confined space if

- Introducing hazardous chemicals
- Welding, cutting or hot work activities
- Exposed, electrically energized conductors
- Painting

Note: The worker must assess the hazards and establish safe work procedures before entering the basement.

Note: See VAME Safety Bulletin SB 073 "SF_6 Discharge."

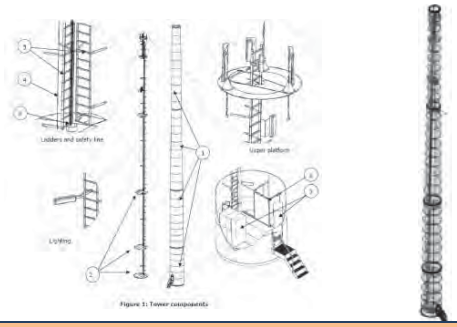
Note: Calculations for switchgear SF_6 gas release volumes in basement see (0035-8893).

Note: Initial air sampling is not required to enter the basement, but continual air quality monitoring is required for entry and throughout the duration of the entry.

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VESTAS PROPRIETARY NOTICE

7 Tower - erected (all)

This space has been assessed as a:	
Not a confined space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	No
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Electric Shock	Avoid contact with HV Cables De-energize main power if there exposed, energized electrical wiring or cracked insulation on HV cables
Biological	Biological
None	None
Chemical	Chemical
None	None

This space will be classified as a permit required confined space if:

- Painting
- Welding
- Hot work
- Introducing hazardous chemicals
- Suspected medium voltage cable damage

Note: Individuals can create a hazardous atmosphere and/or other safety considerations. Care must be taken regarding work tasks and chemicals introduced. JSA's should reflect appropriate hazard control methods.

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VESTAS PROPRIETARY NOTICE

8 Tower - pre-erection (all)

This space has been assessed as a:	
Not a confined space	 

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	No
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Crushing Injuries	Do not enter unless tower section is properly stored and blocked from movement per work instructions
	Ensure tower internal parts are securely fastened
Slips, trips and falls	Ensure walking surfaces are clean, dry and free of trip hazards
Bites/stings	Visually inspect tower section with adequate lighting to verify absence of snakes, bees, scorpions, or other pests/rodents
Biological	Biological
Animal/vermin droppings	Wear appropriate approved respirator and protective gloves
Chemical	Chemical
Introducing hazardous chemicals	Mechanical, forced air ventilation
	Refer to SDS
	Continual air monitoring
	Wear approved respirator or self-contained breathing apparatus as determined by the SDS and PPE Sheets (0001-0410).
	Remove covers (tarps) at both ends for adequate ventilation

This space will be classified as a confined space if:

- Welding, cutting, hot work
- Introducing hazardous chemicals
- Painting

Note: Individuals can create a hazardous atmosphere and/or other safety considerations. Care must be taken regarding work tasks and chemicals introduced. JSA's should reflect appropriate hazard control methods.

Note: Cordon off or barricade entrances to work area to prevent unauthorized access.

Note: Entrants should be aware of the possibility of wildlife taking harbor in components stored on the ground and employ appropriate risk control methods.

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VESTAS PROPRIETARY NOTICE

9 Nacelle - V80 MK 7 and below

This space has been assessed as a:	
Not a confined space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit (ladder access)	No
Is not designed for continuous occupancy	No

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Electrical Shock/Arc Flash/Blast	Wear appropriate PPE when operating circuit breakers/opening cabinets. Follow Control of Hazardous Energy Program. Keep all cabinet doors closed, latched or bolted.
Hydraulic injection injury	Follow LOTO prior to working on pressurized hydraulics. Do not use hydraulic lines as hangars, handholds or steps. Promptly repair any leaks after LOTO is applied and system pressure verified to be zero
Dust (cleaning of cooling fans)	Forced, mechanical ventilation to reduce dust. Wear approved negative pressure respirator with appropriate filter cartridges.
Biological	Biological
None	None
Chemical	Chemical
Nitrogen (when brought into the nacelle to recharge hub accumulators)	Open all hatches for natural ventilation. Continual air quality monitoring.
Introducing hazardous chemicals	Use only approved chemicals (refer to applicable SDS)
	Use approved respiratory protection in accordance with SDS and PPE Sheets (0001-0410)
	Ventilate (using mechanical, forced ventilation or natural ventilation)

This space will be classified as a Permit Required Confined Space if:

- Painting
- Welding, cutting, hot work
- Introducing hazardous chemicals
- Cleaning cooling fans using high pressure power equipment

Note: Individuals can create a hazardous atmosphere and/or other safety considerations. Care must be taken regarding work tasks and chemicals introduced. JSA's should reflect appropriate hazard control methods.

Note: V80 Mk 7 and below have limited ingress and egress.

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VESTAS PROPRIETARY NOTICE

10 Nacelle - except V80/V90/V100 2MW MK 9 and V80 MK 7 and below, and V112 3.0 MW

This space has been assessed as a:	
Not a confined space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit (ladder access required)	No
Is not designed for continuous occupancy	No

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Electrical Shock/Arc Flash/Blast	Wear appropriate PPE when operating circuit breakers/opening cabinets. Follow Control of Hazardous Energy Program. Keep all cabinet doors closed, latched or bolted.
Hydraulic injection injury	Follow LOTO prior to working on pressurized hydraulics. Do not use hydraulic lines as hangars, handholds or steps. Promptly repair any leaks after LOTO is applied and system pressure verified to be zero
Dust (cleaning of cooling fans)	Forced, mechanical ventilation to reduce dust. Wear approved negative pressure respirator with appropriate filter cartridges.
Biological	Biological
None	None
Chemical	Chemical
Nitrogen (when brought into the nacelle to recharge hub accumulators)	Open all hatches for natural ventilation. Continual air quality monitoring
Hazardous chemicals	Use only approved chemicals (refer to applicable SDS)
	Use approved respiratory protection in accordance with SDS and PPE Sheets (0001-0410)
	With mechanical, forced ventilation or natural ventilation

This space will be classified as a Permit Required Confined Space if:

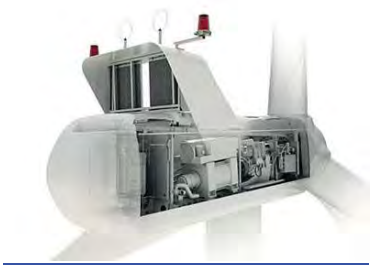
- Painting
- Welding, cutting, hot work
- Introducing hazardous chemicals
- Cleaning cooling fans using high pressure power equipment

Note: Individuals can create a hazardous atmosphere and/or other safety considerations. Care must be taken regarding work tasks and chemicals introduced. JSA's should reflect appropriate hazard control methods.

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VESTAS PROPRIETARY NOTICE

11 Nacelle - V80/V90/V100 2MW MK 9

This space has been assessed as a:	
Not a confined space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit (ladder access)	No
Is not designed for continuous occupancy	No

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Electrical Shock/Arc Flash/Blast	Wear appropriate PPE when operating circuit breakers/opening cabinets. Follow Control of Hazardous Energy Program. Keep all cabinet doors closed, latched or bolted.
Hydraulic injection injury	Follow LOTO prior to working on pressurized hydraulics. Do not use hydraulic lines as hangars, handholds or steps. Promptly repair any leaks after LOTO is applied and system pressure verified to be zero
Biological	Biological
None	None
Chemical	Chemical
Nitrogen (when brought into the nacelle to recharge hub accumulators)	Open all hatches for natural ventilation. Continual air quality monitoring
Hazardous chemicals	Use only approved chemicals (refer to applicable SDS)
	Use approved respiratory protection in accordance with SDS and PPE Sheets (0001-0410)
	Ventilate (with mechanical, forced ventilation or natural ventilation)

This space will be classified as a Permit Required Confined Space if:

- Painting
- Welding, cutting, hot work
- Introducing hazardous chemicals

Note: Individuals can create a hazardous atmosphere and/or other safety considerations. Care must be taken regarding work tasks and chemicals introduced. JSA's should reflect appropriate hazard control methods.

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VESTAS PROPRIETARY NOTICE

12 Nacelle - V112 and V117

This space has been assessed as a:	
Not a confined space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	No
Is not designed for continuous occupancy	No

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Electrical Shock/Arc Flash/Blast	Wear appropriate PPE when operating circuit breakers/opening cabinets. Follow Control of Hazardous Energy Program. Keep all cabinet doors closed, latched or bolted.
Hydraulic Injection Injury	Depressurize hydraulic system if pressurized. Do not stand near the rotating transfer unit in the nacelle or the hub while hydraulic system is pressurized, including pressurized accumulators
Biological	Biological
None	None
Chemical	Chemical
Nitrogen (when brought into the nacelle to recharge hub accumulators)	Open all hatches for natural ventilation. Continual air quality monitoring
Hazardous chemicals	Use only approved chemical (refer to applicable SDS)
	Use approved respiratory protection in accordance with SDS and PPE Sheets (0001-0410)
	Ventilate (with mechanical, forced ventilation or natural ventilation)

This space will be classified as a Permit Required Confined Space if:

- Painting
- Welding, cutting, hot work
- Introducing hazardous chemicals

Note: Individuals can create a hazardous atmosphere and/or other safety considerations. Care must be taken regarding work tasks and chemicals introduced. JSA's should reflect appropriate hazard control methods.

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VESTAS PROPRIETARY NOTICE

13 Main shaft dog house - V80 1.8 MW MK 1–5

This space has been assessed as a:	
Non-Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Electrical Shock	Perform Lockout/tagout of yaw motors
Crushing/pinching injuries	Release residual energy from yaw gear prior to removing motor
Head/neck injuries	Workers overhead use tool lanyards. Wear head protection
Strains/sprains	Move with caution, stretch, and take adequate breaks. Use mechanical lifting devices due to weight of motors (32 kg)
Biological	Biological
None	None
Chemical	Chemical
Chemical spills (hydraulic fluid, greases, etc.)	Wipe/clean spills using appropriate PPE
Hazardous chemicals	Use only approved chemical (refer to applicable SDS)
	Use approved respiratory protection in accordance with SDS and PPE Sheets (0001-0410)
	Ventilate (with mechanical, forced ventilation or natural ventilation)

This space will be classified as a Permit Required Confined Space if:

- Painting
- Welding, cutting, hot work

Note: The doghouse presents unique challenges in respect to rescue of an injured victim. Workers need to carefully plan work and ensure a rescue plan has been established.

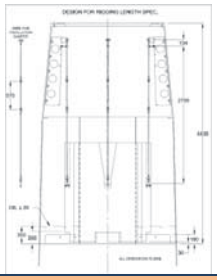
Note: Use appropriate work instructions for Replacement of Yaw Motors (0004-1224).

Note: Use JSA to carefully evaluate all possible hazards prior to entry.

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VESTAS PROPRIETARY NOTICE

14 Tower Damper/Ballast Tank

This space has been assessed as a:	
Permit-Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards (crushing hazards)	Yes

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Slips/Trips/Fall Hazards	Use approved fall restraint with deck plates removed Keep decks clean and free of oils and grease Use rescue device to control position once inside ballast tank Chain and block potential movement of pendulum prior to entry
Crushing Hazards	Lower pendulum prior to opening or accessing ballast tank Do not climb into damper tank to gather fallen fenders or bumpers
Biological	Biological
Human waste	Use Respirator Wear splash proof goggles Wear appropriate PPE to prevent contact in the event of human waste
Chemical	Chemical
Inhalation (Mineral Oil)	Mechanical, forced air ventilation to reduce irritation from vapors or mist from oil in tanks
	Use approved respirator with appropriate filter cartridges
Splashing	Wear safety goggles

This space may not be declassified if:

- Movement of pendulum cannot be controlled
- Wind speeds greater than 12 m/s
- Painting
- Welding, cutting, hot work

Note: Rig rescue device to main shaft (after LOTO) using an approved wire rope or anchor sling and attach to harness of entrant prior to entry.

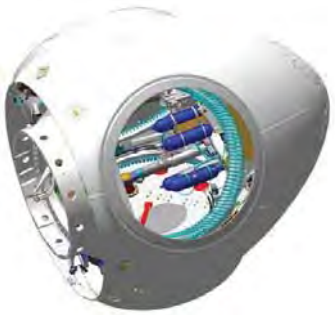
Note: Entry into these spaces is physically not possible unless the deck plates are removed.

Note: Tanks contain high grade mineral oil. See data sheets Castrol Alpha 320 and/or Texaco Way Lubricant X320

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VESTAS PROPRIETARY NOTICE

15 Hub - V112 and V117

This space has been assessed as a:	
Permit-Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere (Oxygen content)	Yes
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Electrical shock	LOTO 230 VAC UPS via -630-20-Q1 (may not be appropriate for all tasks). Accumulator heating blankets (230 V) are always energized unless locked out
Static shock	Do not work on blades without discharge cable connected
Crushing Injuries	Apply Rotor and Pitch Lock. Do not enter nose cone before blades are pitched to ≥ 88°.
Hazardous Atmosphere	Sample air before entry. Continual air quality monitoring during entry
Hydraulic Injection	Ensure “Hub in Safe Mode” lamp is permanently lit. Exit hub when pitch hydraulic pressure is rebuilding
Falling from heights	Fall protection/prevention must be used is man hole cover is removed on blade pointing down
Biological	Biological
None	None
Chemical	Chemical
Introducing hazardous chemicals	Mechanical, forced air ventilation
	Refer to SDS
	Continual air monitoring
	Wear approved respirator

This space may not be declassified if:	
• Recharging Accumulators • Operating pitch/hydraulic system while in hub • Welding/cutting, hot work • Painting	• Introducing hazardous chemicals • Blocking the entrance/exit with large equipment • Open blade cover plates while blade is in vertical (down) position

Note: The worker must assess the hazards and establish safe work procedures before entering the hub.

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VESTAS PROPRIETARY NOTICE

16 Hub - NM72, V82, V80, V90, V100

This space has been assessed as a:	
Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere (Oxygen content)	Yes
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Crushing injuries	LOTO rotor and blade pitch system. Take extreme caution when removing blade pitch locks while system is pressurized
Heat stress	Use ventilator for cooling/hydrate/take prescribed cooling periods
Cold stress	Take prescribed warming periods
Head injuries/Contusion	Wear prescribed PPE (hardhat) Install hose anti-whips on nitrogen filling hose
Hydraulic injection	LOTO hydraulic system, bleed hydraulic pressures. Exit the hub prior to recharging hydraulic system
Hazardous Atmosphere	Continual air quality monitoring. Forced air ventilation when recharging accumulators or maintaining nitrogen system.
Toxic fumes	Mechanical, forced air ventilation
Slips, trips and falls	Clean all work surfaces Use PFAS and fall restraint Use adequate lighting
Electrical Shock	LOTO pitch pumps or affected systems. Accumulator heating blankets (230 V) are always energized unless locked out
Static shock	Do not work on blades without electro-static discharge system installed
Biological	Biological
None	None
Chemical	Chemical
Hazardous chemicals	Use only approved chemicals (refer to applicable SDS)
	Use approved respirator and mechanical, forced air ventilation

This space may not be declassified if:

- Recharging accumulators
- Operating pitch/hydraulic system while in hub
- Welding/cutting
- Painting
- Introducing hazardous chemicals
- Blocking the entrance/exit with large equipment
- Open blade cover plates while blade is in vertical (down) position

Note: When torqueing NM72/V82 Blade Bearing bolts via the hub rear access panel fall restraint must be used to prevent inadvertent falling into hub. Extend the hub top tie off point using an approved wire rope or anchor sling.

Note: Rescue equipment shall be staged in the nosecone when accessing blades.

Note: Can be declassified if fall restraint is employed by all Entrants during period while the blade cover is removed on down position blade.

Note: Ensure JSA reflect hazards associated when installing/removing blade pitch locks.

Note: Installing blade pitch locks requires a Confined Space Entry Permit. Space can be declassified after locks are installed.

T03 0052-0329 Ver 02 - Approved - Exported from DMS: 2016-06-03 by RIREG

VESTAS PROPRIETARY NOTICE

17 Hub - MK 10A

This space has been assessed as a:	
Non-Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere (Oxygen content)	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

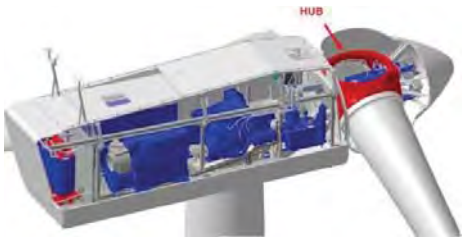
Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Crushing injuries	LOTO rotor. Take extreme caution when removing blade pitch locks while system is pressurized
Heat stress	Use ventilator for cooling/hydrate/take prescribed cooling periods
Cold stress	Take prescribed warming periods
Head injuries/Contusion	Wear prescribed PPE (hardhat)
Hydraulic injection	Ensure “Hub in Safe Mode” lamp is permanently lit. Exit hub when pitch hydraulic pressure is rebuilding
Hazardous Atmosphere	Continual air quality monitoring. Forced air ventilation when recharging accumulators or maintaining nitrogen system.
Toxic fumes	Mechanical, forced air ventilation
Slips, trips and falls	Clean all work surfaces Use PFAS and fall restraint Use adequate lighting
Electrical Shock	LOTO pitch pumps or affected systems. Accumulator heating blankets (230 V) are always energized unless locked out
Static shock	Do not work on blades without electro-static discharge system installed
Biological	Biological
None	None
Chemical	Chemical
Hazardous chemicals	Use only approved chemicals (refer to applicable SDS)
	Use approved respirator and mechanical, forced air ventilation

This space will be classified as a Permit Required Confined Space if:	
• Recharging accumulators • Operating pitch/hydraulic system while in hub • Welding/cutting • Painting	• Introducing hazardous chemicals • Blocking the entrance/exit with large equipment • Open blade cover plates while blade is in vertical (down) position

T03 0069-0329 Ver 02 - Approved - Exported from DMS: 2016-06-03 by RIREG

VESTAS PROPRIETARY NOTICE

18 Hub - NM48, 52, 54, V44 and V47

This space has been assessed as a:	
Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards (Crush/Pinch Hazards)	Yes

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Crushing injuries	LOTO rotor and blade pitch system (Traverse)
Heat stress	Use ventilator for cooling/hydrate/take prescribed cooling periods
Cold stress	Take prescribed warming periods
Head injuries	Wear prescribed PPE (hardhat)
Hydraulic injection	LOTO hydraulic system, bleed hydraulic pressures (NM Platforms Only)
Static shock	Do not work on blades without discharge cable connected
Electrical	Accumulator heating blankets (230 V) are always energized unless locked out
Biological	Biological
None	None
Chemical	Chemical
Hazardous chemicals	Use only approved chemicals (refer to applicable SDS)
	Use approved respirator
	Mechanical, forced air ventilation

This space may not be declassified if:	
• Welding/Cutting/Grinding • Introducing toxic, flammable chemicals • Blocking the entrance/exit with large equipment	• Painting

Note: NM52 hub entry requires a clear and concise written rescue/evacuation plan

Note: These turbines do not contain or have the potential to contain a hazardous atmosphere therefore, air quality testing is not applicable. A Confined Space Entry Permit is required to be completed indicating all other hazards are controlled and a rescue plan is in place. Enter “Not required” in the air quality testing section of the Confined Space Entry Permit.

T03 0052-0329 Ver 02 - Approved - Exported from DMS: 2016-06-03 by RIREG

VESTAS PROPRIETARY NOTICE

19 Nose Cone - All – Except MK10

This space has been assessed as a:	
Non-Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Crushing injuries (pitch actuators)	Apply LOTO to rotor and pitch system
Heat stress	Use ventilator for cooling/hydrate/take prescribed cooling periods
Cold stress	Take prescribed warming periods
Head injuries	Wear prescribed PPE (hardhat)
Slips, trips and falls	Ensure grease and oils are removed from working/walking surfaces
Biological	Biological
None	None
Chemical	Chemical
Hazardous chemicals	Refer to applicable SDS
	Use approved respiratory protection in accordance with SDS and PPE Sheets (0001-0410)
	Mechanical, forced air ventilation
Toxic fumes	Mechanical, forced air ventilation during welding, cutting, grinding operations

This space will be classified as a Permit Required Confined Space if:

- Welding/Cutting/Grinding
- Introducing hazardous chemicals
- Blocking the entrance/exit with large equipment
- Painting

Note: Workers need to ensure JSA adequately reflect the hazards of the nose cone due to configuration and access/egress and ensure First Responder/Emergency Response Plan is in place prior to entry.

Note: The Nose cone is not a walking/weight bearing surface.

Note: Although not a confined space hazard, workers should be vigilant regarding possibilities of a weak nose cone support due to cracks creating an unstable condition.

Note: All workers must wear fall protection/restraint any time the nose cone is open, or has missing/broken hardware.

T03 0052-0329 Ver 02 - Approved - Exported from DMS: 2016-06-03 by RIREG

VESTAS PROPRIETARY NOTICE

20 Nose Cone - MK10

This space has been assessed as a:	
Non-Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Crushing injuries	Apply LOTO to rotor
Heat stress	Use ventilator for cooling/hydrate/take prescribed cooling periods
Cold stress	Take prescribed warming periods
Head injuries	Wear prescribed PPE (hardhat)
Slips, trips and falls	Ensure grease and oils are removed from working/walking surfaces
Biological	Biological
None	None
Chemical	Chemical
Hazardous chemicals	Refer to applicable SDS
	Use approved respiratory protection in accordance with SDS and PPE Sheets (0001-0410)
	Mechanical, forced air ventilation
Hazardous atmosphere	Mechanical, forced air ventilation during welding, cutting, grinding, or recharging accumulators. Open nose cone access hatches.

This space will be classified as a Permit Required Confined Space if:

- Welding/Cutting/Grinding
- Introducing hazardous chemicals
- Blocking the entrance/exit with large equipment
- Painting

Note: Workers need to ensure JSA adequately reflect the hazards of the nose cone due to configuration and access/egress and ensure First Responder/Emergency Response Plan is in place prior to entry.

Note: The Nose cone is not a walking/weight bearing surface.

Note: All workers must wear fall protection/restraint any time the nose cone is open, or has missing/broken hardware.

Note: Continuous air quality monitoring is required when recharging accumulators in the nose cone.

T03 0069-0329 Ver 02 - Approved - Exported from DMS: 2016-06-03 by RIREG

VESTAS PROPRIETARY NOTICE

21 Blades - (Except V112 - See V112 Blade Hazard Assessment for V112 blade entries)

This space has been assessed as a:	
Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere (Oxygen content)	Yes
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	Yes
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Crushing injuries	Apply LOTO to rotor and pitch system; blades on ground must be secured and cribbed
Heat stress	Use ventilator for cooling/hydrate/take prescribed cooling periods
Cold stress	Take prescribed warming periods
Head injuries	Wear prescribed PPE (hardhat)
Entrapment	Use PFAS, fall restriction, and 4:1 RTU's, retrieval lines Do not open access covers with blade point down (6 o'clock position) Position blades for entrance in the inclined position (horizontal or 'rabbit-eared')
Static shock	Do not work on blades without discharge cable connected
Biological	Biological
None	None
Chemical	Chemical
Hazardous chemicals	Refer to applicable SDS
Blade Repair Materials	Use approved respiratory protection in accordance with SDS and PPE Sheets (0001-0410)
	Ventilate
	Use supplied air systems
Toxic fumes	Ventilate during welding or internal blade repair operations

This space may not be declassified and forced ventilation and/or special precautions may be required if:

• Recharging accumulators • Operating pitch/hydraulic system while in blade • Open blade cover plates while blade is in vertical (down) position	• Welding/Cutting/Grinding • Introducing toxic, flammable chemicals • Blocking the entrance/exit with large equipment Painting

Note: Rescue equipment shall be staged in the nosecone when accessing blades.

Note: Fall restraint must be used when blade is in vertical (down) position with blade access cover removed.

Note: Deep entries into the blade require retrieval lines attached to the Entrant.

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VESTAS PROPRIETARY NOTICE

22 Blades - V112 and V117

This space has been assessed as a:	
Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere (Oxygen content)	Yes
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	Yes
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Static shock	Do not work on blade and LCTU before the discharge cable is connected
Crushing Injuries	Apply Rotor and Pitch Locks
Hydraulic Injection	Ensure “Hub in Safe Mode” lamp is permanently lit. Exit hub when pitch hydraulic pressure is rebuilding
Biological	Biological
None	None
Chemical	Chemical
Introducing hazardous chemicals	Mechanical, forced air ventilation
	Refer to SDS
	Continual air monitoring
	Use approved respiratory protection in accordance with SDS and PPE Sheets (0001-0410)
Hazardous Atmosphere	Sample air before entry. Continual air quality monitoring during entry. Mechanical, forced air ventilation

This space may not be declassified and forced ventilation and/or special precautions may be required if:

- Introducing hazardous chemicals
- Recharging accumulators
- Operating pitch/hydraulic system while in blade
- Open blade cover plates while blade is in vertical (down) position
- Welding/Cutting/Grinding or performing work that creates excessive dust
- Blocking the entrance/exit with large equipment
- Painting

Note: Rescue equipment shall be staged in the nosecone when accessing blades.

Note: Fall restraint must be used when blade is in vertical (down) position with blade access cover removed.

Note: Deep entries into the blade require retrieval lines attached to the Entrant.

T03 0069-0329 Ver 02 - Approved - Exported from DMS: 2016-06-03 by RIREG

VESTAS PROPRIETARY NOTICE

23 Blades - on ground

This space has been assessed as a:	
Non-Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	Yes
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Static Shock	Do not work on blades without discharge cable connected
Crushing injuries	Blades on ground must be secured and cribbed
Heat stress	Use mechanical, forced air ventilation for cooling/hydrate/take prescribed cooling periods
Cold stress	Take prescribed warming periods
Head injuries	Wear prescribed PPE (hardhat)
Entrapment	Use PFAS, fall restriction, and 4:1 RTU's, retrieval lines
Biological	Biological
None	None
Chemical	Chemical
Hazardous chemicals	Refer to applicable SDS
Blade repair materials	Use approved respiratory protection in accordance with SDS and PPE Sheets (0001-0410)
	Mechanical, forced air ventilation
	Use supplied air systems
Hazardous atmosphere	Mechanical, forced air ventilation during welding or internal blade repair operations
CO	Position internal combustion engines away from entrances. Monitor wind direction to ensure exhaust does not enter the blade.

This space will be classified as a Permit Required Confined Space if:

- Welding/cutting
- Introducing hazardous chemicals
- Blocking the entrance/exit with large equipment
- Painting

Note: Individuals can create a hazardous atmosphere and/or other safety considerations. Care must be taken regarding work tasks and chemicals introduced. JSA's should reflect appropriate hazard control methods.

Note: Cordon off or barricade entrances to work area to prevent unauthorized access.

T03 0069-0329 Ver 02 - Approved - Exported from DMS: 2016-06-03 by RIREG

VESTAS PROPRIETARY NOTICE

24 Transformer Room - V80, V90, V100, V110, V112, V117

This space has been assessed as a:	
Non-Permit Required Confined Space	

Confined Space Determination Criteria	
It is sufficiently large for a worker to enter and work	Yes
Has limited or restricted means for entry or exit	Yes
Is not designed for continuous occupancy	Yes

Permit Required Confined Space Determination Criteria	
Contains or has the potential to contain a hazardous atmosphere	No
Contains a material that has the potential for engulfing an entrant	No
Configured so that a worker could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section	No
The space contains any other recognized serious safety or health hazards	No

Actual and/or Potential Hazards	Hazard Control
Physical	Physical
Electrocution/Arc Flash/Blast	Apply LOTO to switchgear. Ground transformer. See note.
Heat stress	Allow adequate time for transformers to cool before entering
Head injuries	Wear prescribed PPE (hardhat)
Dust	Wear approved respirator or dust mask
Biological	Biological
None	None
Chemical	Chemical
Introducing hazardous chemicals	Mechanical, forced air ventilation
	Refer to SDS
	Continual air monitoring
	Use approved respiratory protection in accordance with SDS and PPE Sheets (0001-0410)

This space will be classified as a Permit Required Confined Space if:

- Introducing hazardous materials
- Welding, cutting, grinding, spray painting
- Painting

Note: If external power source is in use ensure proper control of hazardous energy to prevent back feed into the transformer.

Note: There is no possibility of a hazardous atmosphere in the transformer room unless introduced (cleaning chemicals, sealants, etc.,) by the entrant.

Note: Workers must be aware and document on the JSA that the main hazards associated with the Transformer Room is – configuration hazards in a small area, high voltage (controlled by LOTO), and on some models difficulty of access/egress.

Note: Air Sampling is not required for entry nor is continual air quality monitoring.

Note: All hazards will be controlled prior to entry using the LOTO Instruction and JSA.

T03 0069-0329 Ver 02 - Approved - Exported from DMS: 2016-06-03 by RIREG

VESTAS PROPRIETARY NOTICE

# VAWT Confined Space Entry Permit Vestas System Instruction				Document ID: 0049-0586 INS SUS-SAF-OPC [AME-US] Confined Space
Owner(s): BPO Del. SUS	Author(s): JATYL	Valid from: 2015.01.09		Version: 00

Version history

Version No.	Date	Description of Changes
00	2015.01.09	Converted to T03 document type from T09. Original 0008-8016

Entry Date		Pad #		Platform Model		Task	
Entry Duration		Permit Number (Pad, Date #) (E44/11-04-2011/01, 02, 03)				Space: Circle Space Being Entered Blade Basement Trafo Room Hub Ballast tank	
Permit Expiration		Site		Instruction		Certifications current for CS workers ☐ Yes ☐ No	
Hot Work Permit				Energized Work Permit			

Type of Hazard	Space Hazards: Known or Potential Hazards (check those that apply)	Hub	Blade	Basement	Trafo room	Ballast tank		Mitigation/Control (circle those that apply) NOTE: if a known or potential hazard is marked then you ***MUST*** employ mitigation/control measures
Physical	Entrapment						»	Fall Restraint/100% Protection/4:1 RTU
	Crushing/Pinching						»	Fall Restraint/Protection/LOTO/Block/Chock
	Engulfment						»	Drain or Remove Material/Fall Restraint
	Falling Objects						»	Barricade Overhead Spaces/Tool Lanyards
	Temperature (Heat/Cold)						»	Natural/Forced Ventilation/Air Monitoring
	Atmospheric						»	Forced or Natural ventilation/Air Monitoring
	Noise						»	Alternate Communication Methods
	Electrocution						»	LOTO/Test-Verify-Test
	Hydraulic Injection/Ruptured Nitrogen Hose						»	LOTO/Test-Verify-Test/Bleed Hyd. Pressure/Hose Anti-Whips or Air Fuse
Chemical (Refer to applicable SDS)	SF_6 Gas						»	Forced Ventilation/Air Monitoring/Check SF_6
	Nitrogen						»	Forced Ventilation/Air Monitoring
	Cleaning Chemicals						»	Forced Ventilation/Air Monitoring
	Blade Repair Chemicals						»	Forced Ventilation/Air Monitoring

Emergency Response Rescue/Evacuation Plan			
Emergency Phone #			
Nearest First Responder	Name:	Phone #:	Location:
Alternative Communications			
First Response Kit Location			
Entry Supervisor Location			
Fire Extinguisher Location			
ERE Kit Location			
Attach SDS			

Gas Detector Operator: Gas Detector S/N:_____ Time of Test: _____
☐ Battery √ ☐ Calibration √

Entrant(s)	Entry Time	Exit Time	Attendant	Start Time	Stop Time

(L5 Document Template V02)

T03 0049-0586 Ver 00 - Approved - Exported from DMS: 2016-06-05 by RIREC

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VESTAS PROPRIETARY NOTICE

Record Initially And Every Hour During Entry

(Three blade entry may be used with this permit. If additional space is needed use 0049-0586)

		Initial Reading		Reading 2		Reading 3		Reading 4		Reading 5		Reading 6		Reading 7	
Air Quality	Safe Limit	Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐ Other ☐		Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐ Other ☐		Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐ Other ☐		Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐ Other ☐		Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐ Other ☐		Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐ Other ☐		Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐Other	
O^2	19.5 – 23.5%	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time
CO	‹35 PPM	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time
H_2S	‹5 PPM	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time
LEL	‹10%	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time

Entry Authorization I certify this confined space is safe for entry to perform the planned work on this Confined Space Entry Permit	Entry Supervisor Authorization: (Printed name and signature) Date:

Temporary De-Classification Authorization

A Permit Required Confined Space (PRCS) qualifies for temporary declassification if **BOTH** of these conditions are met:

a) *No* actual or potential ***atmospheric*** hazards exist; and

b) *All hazards associated with the confined space under normal conditions* can be controlled for the duration of the entry per CFR 1910 (c), (7). If these conditions are not met then the space may not be temporarily De-Classified.

Temporary De-Classification Not Allowed If Column Is Checked

Space	Unsafe Atmosphere	Recharging Accumulators	Blade in vertical (down) position with cover removed	Introducing hazardous chemicals	Entrance, Exit blocked	Welding, cutting, grinding, spray painting	Wind Speeds >12 m/s	Operating pitch systems (while in hub)	NOTES 1. Fall restraint is required
Hub	X	X	X [1]	X	X	X		X	
Blades	X	X	X [1]	X	X	X		X	
Ballast Tank	X			X		X	X		

Atmospheric Testing Acceptable ☐ No ☐ Yes	Temporary De-classified Space Description:
Hazard(s) Controlled: ☐ Electrical ☐ Entrapment ☐ Asphyxiates ☐ Mechanical ☐ Engulfment ☐ Explosive	Briefly List Control Measure(s) Used (Example – LOTO)

Hazards introduced by planned work:

I certify that the named Confined Space and the planned work qualify for Temporary De-Classification.

Entry Supervisor Print name: Entry Supervisor Signature:

Time:

Entry Permit Closure Status	Entry Supervisor: (Printed name and signature) Date:
☐ Cancelled (Job completion)	☐ Terminated (Work stopped due to change in conditions or control measures)

Form Retention: 1 year

1 APPENDIX: version history

Version No.	Date	Description of Changes
00	2015.01.09	Converted to T03 document from T09. Original 0008-8016

T03 0049-0739 Ver 00 - Approved - Exported from DMS: 2016-06-05 by RIREG

VESTAS PROPRIETARY NOTICE

Confined Space Supplementary Entry Log Vestas System Instruction			Document ID: 0049-0588 INS-SUS-SAF-OPC [AME] Confined Space
Owner(s): BPO Del. SUS	Author(s): JATYL	Valid from: 2015.01.21	Version: 01

Version history

Version No.	Date	Description of Changes
00	2015.01.09	Converted from T03 to T09 Document. Original 0028-1544
01	2015.01.21	Corrected Air Quality checks to 15min.

Record initially and every 15min. during entry
(Three blade entry may be used with this form)

		Initial Reading		Reading 2		Reading 3		Reading 4		Reading 5		Reading 6		Reading 7	
Air Quality	Safe Limit	Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐ Other ☐		Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐ Other ☐		Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐ Other ☐		Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐ Other ☐		Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐ Other ☐		Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐ Other ☐		Trafo ☐ Hub ☐ Blade (A) ☐ Blade (B) ☐ Blade (C) ☐ Basement ☐ Ballast ☐ Other ☐	
O^2	19.5 – 23.5%	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time
CO	‹25 PPM	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time
H_2S	‹5 PPM	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time
LEL	‹10%	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time	Reading	Time

Entrants	Entry Time	Exit Time	Attendant	Start Time	Stop Time

Form Retention: 1 year

1 APPENDIX: version history

Version No.	Date	Description of Changes
00	2015.01.09	Converted from T03 to T09 Document. Original 0028-1544

T03 0049-0588 Ver 01 - Approved - Exported from DMS: 2016-06-03 by RIREG

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VESTAS PROPRIETARY NOTICE

VAWT Confined Space Entry Quick Reference Guide Vestas System Instruction				Document ID: 0049-0589 INS SUS-SAF-OPC [AME-US] Confined Space
Owner(s): BPO Del. SUS	Author(s): JATYL	Valid from: 2015.01.09		Version: 00

Version history

Version No.	Date	Description of Changes
00	2015.01.09	Converted to T03 from T09 document. Original 0028-1539

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1 Step 1 – Preparations before leaving:

- Obtain a blank VAWT Confined Space Entry Permit (0049-0586)
- See VAWT Confined Space Hazard Assessments (0049-0585) for the space(s) being entered
- Determine emergency communication method to be used (verify radios/cell phones work correctly)
- Verify the availability of emergency first responders during entry operations. Add this information onto the Confined Space Entry Permit and JSA
- Determine possibility of de-classifying the space
- Obtain and review applicable SDS
- Minimum safety equipment requirements:

☐ All required lock out equipment	☐ Confined space ventilator	☐ Rescue Equipment
☐ Gas detection equipment – verify calibration battery charged	☐ First aid kit	☐ Fire Extinguisher

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2 Step 2 – At the turbine before entering the space:

- Verify emergency communications are working correctly (verify radios/cell phones work correctly) to the First Responder and site office
- Hoist all required safety equipment to the level of the entry
- The Entry Supervisor opens Confined Space Entry Permit and is required to be present during the entry
- Establish and agree upon entry communication methods between Entrant(s), Attendant and Entry Supervisor
- Identify existing and potential confined space hazards and determine hazard control methods
- Apply LOTO and engineering controls to the identified hazards without entering the space
- Entrants shall wear a full body harness during entry operations in addition to other required PPE
- Perform pre-entry atmospheric testing with gas detection equipment and record results on the Confined Space Entry Permit
- Post the Confined Space Entry Permit near the entry point of the confined space
  - o If the space qualifies for Temporarily De-Classification - Follow Temporary De-classification Procedures (below)

3 Step 3 – During permit required entry:

- If there is an atmospheric hazard, or there is a potential for atmospheric hazards, mechanical forced air ventilation is required
- Monitor atmospheric conditions and record any change on the permit
- Otherwise, document acceptable atmospheric conditions at least hourly on the permit.
- Entrant and Attendant must verify communications at least every 15 minutes
- The Attendant shall prevent unauthorized personnel from entering the permit required confined space

4 Step 4 – Task completion:

- All safety equipment, tools and materials used for the assigned task are removed from the confined space
- Once the Entrant(s) have made their final exit, the Entry Supervisor shall terminate the Entry Permit by signing the appropriate area of the permit and noting the time of cancellation

5 Step 5 – After returning to Office:

- Verify the Confined Space Entry Permit has been completed correctly
- Turn over the completed Entry Permit to the Site Manager (or Safety Representative)
- Return gas detection equipment to the charging station

6 Temporary De-Classification Procedure:

Temporary De-Classification of the permit required confined space is not permissible if all atmospheric and other hazards cannot be controlled for the duration of the confined space entry

Procedure:

1. Using gas detection equipment ensure there is no actual atmospheric hazards associated with entering the space

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2. Ensure all other hazards identified inside the space can be fully controlled prior to entry

If procedures 1 and 2 above are confirmed, the Entry Supervisor shall document Temporary De-Classification measures on the Confined Space Entry Permit and permission shall be granted to enter without special precautions by signing the certification statement on the Confined Space Entry Permit

During Temporary De-Classification Entry:

- All hazard control measures must be in place and verified by the Entry Supervisor as effectively controlling all actual or potential hazards identified
- An Attendant continuously monitor the Entrant(s) is not required
- The Entry Supervisor is not required to stand by the space entrance during the entry
  - Entry Supervisor must be in the nacelle during a hub or transformer room entry and can be performing other tasks
- Continuous air monitoring is recommended but not required to be recorded on the entry permit

If any hazardous condition is recognized during the Temporary De-Classification entry:

1. The Entrant(s) must immediately evacuate the confined space
2. The Entry Supervisor must be immediately notified and the entry operation terminated
3. Site management, Regional Manager, and QSE must be notified of the incident
4. The confined space shall remain permit required and entry will be prohibited until a reassessment of hazard exposures and a revised hazard control plan is developed
5. A new Confined Space Entry Permit that identifies new hazards and appropriate control measures will be required to re-enter the space
6. Report the hazardous condition in the incident database

7 APPENDIX: version history

Version No.	Date	Description of Changes
00	2015.01.09	Converted to T03 from T09 document. Original 0028-1539

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Trenching and Excavation Vestas System Instruction				Document ID: 0049-0583 INS SUS-SAF-OPC Trenching & Excavation
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.03.16		Version: 00

1 Version history

Version No.	Date	Description of Changes
00	2015.03.16	Converted T09 Document (0008-7998) to T03

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2 Purpose

Vestas-American Wind Technology (VAWT) will establish procedures for “trenching and excavation” undertaken by its employees through the use of this document. Preventing future work-place injuries in our company is the principal purpose of this document. This

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document will provide a basis for ensuring that all procedures implemented, revised or modified meet our requirements for safety. This document will help identify hazards in our workplace and enable us to determine the best course of action to take to reduce or eliminate known hazards.

3 Basis

OSHA requires all employers to maintain a written program. The primary hazard to which employees may be exposed during excavation work is a cave-in, which occurs when the soil forming the side of the excavation can no longer resist the forces applied to it. This results from a reduction in the frictional and cohesive capacities of the soil to resist forces. Changing environmental conditions, such as freezing and thawing, or the addition or removal of water from the pores of the soil, can reduce the ability of a soil to resist forces. The addition of superimposed loads from spoil piles, or the placement of equipment or materials near the edge of the excavation, also creates forces that can exceed the ability of the soil to resist.

4 Responsibility

The Safety Manager and/or Safety Representative is responsible for all facets of this program and has full authority to make necessary decisions to ensure success of the program. The Safety Manager and/or Safety Representative are authorized to amend these instructions and is authorized to halt any operation in the area where there is danger of serious personal injury.

5 Definitions and Abbreviations

Word:	Definition
Accepted Engineering Practices	Those requirements which are compatible with standards of practice required by a registered professional engineer.
Aluminum Hydraulic Shoring	A pre-engineered shoring system comprised of aluminum hydraulic cylinders (cross braces) used in conjunction with vertical rails (uprights) or horizontal rails (wales). Such system is designed specifically to support the sidewalls of an excavation and prevent cave-ins.
Bell-Bottom Pier Hole	A type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a bell shape.
Benching (Benching System)	A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
Cave-In	The separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.
Competent Person	For the purposes of this document, one who is capable of identifying existing and predictable hazards in their surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

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Cross Braces	The horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bare against either uprights or wales.
Excavation	Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.
Faces or Sides	The vertical or inclined earth surfaces formed as a result of excavation work.
Failure	The breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.
Hazardous Atmosphere	An atmosphere which, by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause, death, illness, or injury.
Kick Out	The accidental release or failure of a cross brace.
Protective System	A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.
Ramp	An inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.
Registered Professional Engineer	A person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce.
Sheeting	The members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.
Shield (Shield System)	A structure that is able to withstand the forces imposed on it by a cave-in and thereby protecting employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 1926.652. Shields used in trenches are usually referred to as "trench boxes" or "trench shields".
Shoring (Shoring System)	A structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.
Sides	See "Faces."
Sloping (Sloping System)	A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

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Stable Rock	Natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.
Structural Ramp	A ramp built of steel or wood, usually used for vehicle access. Ramps made of soil or rocks are not considered structural ramps.
Support System	A structure such as underpinning, bracing, or shoring which provides support to an adjacent structure, underground installation, or the sides of an excavation.
Tabulated Data	Tables and charts approved by a registered professional engineer and used to design and construct a protective system.
Trench (Trench Excavation)	A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.
Trench Box	See "Shield."
Trench Shield	See "Shield."
Uprights	The vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called "sheeting."
Wales	Horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.
DMS	Document Management System
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
VAWT	Vestas American Wind Technologies

6 References

29 CFR 1926.650 - 653

7 General Requirements

VAWT will ensure that whenever an excavation operation is being undertaken, work practices and proper conditions are met prior to beginning, during and at the conclusion of such excavation operations. It should not be assumed that every acceptable safety precaution is contained herein or that unusual circumstances may not require further or additional procedures, equipment and practices. Employees will cease operations if there is a question regarding a hazard or if such is suspected or discovered.

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8 Written Program

8.1 Review and evaluate:

8.1.1 On an annual basis

8.1.2 When regulatory changes occur that prompt revision of this document

8.1.3 When facility operational changes occur that require a revision of this document

8.1.4 When there is an accident or close-call that relates to this topic

8.1.5 Effective implementation of this program requires support from all levels of management within this company. This written program will be communicated to all personnel that are affected by it. It encompasses the total workplace, regardless of the number of workers employed or the number of work shifts. It is designed to establish clear goals and objectives.

8.2 Surface Encumbrances and Underground Installations - Safety Guidelines

8.2.1 All surface encumbrances that are located so as to create a hazard to employees will be removed or supported, as necessary, to safeguard employees. The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, will be determined prior to opening an excavation. The following procedures are designed to provide employees of this company with a system for protection and safe conditions while working in a trenching or excavation environment. Employees at all levels within the work force designed these guidelines for use.

8.2.2 Establish the locations of all underground and overhead utilities and services before beginning trenching or excavation operations.

8.2.3 Contact utility and service companies to include municipally owned underground and overhead utilities and services, and advise them prior to the start of all actual excavation. No exceptions.

8.2.4 When excavation operations approach the estimated location of underground installations, the exact location of the installations will be determined by safe and acceptable means (modern techniques and customary types of equipment). Where this determination is unclear, the owning utility will be contacted for assistance.

8.2.5 While any excavation is open, underground installations will be protected, supported or removed as necessary to safeguard employees.

9 Protection from Hazards Associated with Water Accumulation

9.1 Precautions

9.1.1 Employees will not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline systems.

9.1.2 Inspect all excavations after any rainfall or other hazard-producing occurrence to determine if any change to the soil's capacity to resist the force has occurred. A person that has the competence to do so will perform this assessment.

9.1.3 Water should not be allowed to accumulate within the excavation.

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9.1.4 Water will be controlled or prevented from accumulating by the use of water removal equipment; a competent person who can ensure proper operation will monitor the water removal equipment and operations.

9.1.5 If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches or dikes, suitable means will be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. A competent person will inspect excavations subject to runoff from heavy rains.

10 Protection from Superimposed Loads

Superimposed loads (crane, backhoe and other such equipment working close to the excavation edges) require extra sheet piling, shoring or other bracing be used to assure the ability of the soil to resist. The use of mobile equipment near the excavation requires proper vehicle barricades and/or stop blocks.

11 Accesses and Egress from Excavations

11.1 Structural ramps

11.1.1 A competent person will design structural ramps that are used solely by employees as a means of access or egress from excavations. Structural ramps used for access or egress of equipment will be designed by a competent person qualified in structural design, and will be constructed in accordance with the design.

11.2 Means of egress from trench excavations (less than 20ft deep)

11.2.1 A stairway, ladder, ramp or other safe means of egress will be located in trench excavations that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees.

11.3 Means of egress from trench excavations (20ft or greater in depth)

11.3.1 Ladders will be equipped with ladder platforms at 20-foot intervals.

12 Trench Safety

12.1.1 Trenches more than five feet deep require shoring or will be laid back to its angle of repose (stabilized slope).

12.1.2 In hazardous soil conditions (loosely compacted or rocky) trenches less than five feet in depth need protection.

12.1.3 At any excavation site, there shall be a competently trained person who is capable of identifying existing and predictable hazards, and who shall have the authority to take prompt corrective action to eliminate them on the site. This individual shall be able to identify soil classifications and protective systems (shoring, bracing and piling) to be used in accordance with OSHA Trenching Standards found in 29 CFR 1926.652.

12.1.4 Trenches more than five (5) feet deep require shoring or will be laid back to a stable slope. In hazardous soil, trenches under five (5) feet will also be protected.

12.1.5 Portable trench boxes or sliding trench boxes used in place of shoring and sloping shall be designed, constructed and maintained to provide protection at least equal to the required sheeting and shoring. Shields shall be designed by a registered professional engineer and will meet the standards found in 29 CFR 1926.652.

12.1.6 Shields shall be installed so as to restrict lateral or other hazardous movement. Trench boxes and shields shall extend to the bottom of the trench and no less than eighteen (18) inches above the vertical top of the trench or excavation face. Exceptions are found in 29

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CFR 1926.652. Excavation to a level not greater than 2 feet (.61 m) below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield. No employee shall be allowed within the shield or trench box during the installation, removal or relocation. If trench boxes are stacked at any time, means shall be provided to prevent separation.

13 Exposure to Vehicular Traffic

Employees exposed to public vehicular traffic will be provided with, and will wear warning vests or other suitable garments marked with or made of reflector like or high-visibility material.

14 Exposure to Falling Loads

14.1 Drop Zone

14.1.1 No employee will be permitted underneath loads handled by lifting or digging equipment.

14.1.2 Employees will be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.

14.1.3 Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with 29 CFR 1926.601, to provide adequate protection for the operator during loading and unloading operations.

15 Warning Systems for Mobile Equipment

When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system will be utilized, such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

16 Hazardous Atmospheres

16.1 Testing and controls

Confined space entry procedures will be adhered to in accordance with Vestas-American Wind Technology Confined Space Entry Program. (See Confined Spaces (DMS 0049-0584) and Confined Spaces Canada (DMS 0049-0626) To prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements apply:

16.1.1 Oxygen deficiency

Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation will be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.

16.1.2 Flammable atmospheres

Adequate precautions will be taken, such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 20 percent of the lower flammable limit of the gas.

16.1.3 Testing

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When using controls intended to reduce the level of atmospheric contaminants to acceptable levels, testing will be conducted as often as necessary to ensure that the atmosphere remains safe.

16.2 Emergency rescue equipment

16.2.1 Availability

Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, will be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. The equipment will be attended when in use.

16.2.2 Lifelines

Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, will wear a harness with a lifeline securely attached to it. The lifeline will be separate from any line used to handle materials, and will be individually attended at all times while the employee wearing the lifeline is in the excavation.

17 Personal Protective Equipment (PPE)

The following procedures are designed to provide employees of this company with a checklist system or procedure to follow for the selection of proper PPE for operations under this program.

17.1.1 Checklist

- ☐ Hard hat
- ☐ Long sleeve garment
- ☐ Trouser
- ☐ Safety-toed work boot
- ☐ Proper eye and face protection
- ☐ Work gloves - rubber or neoprene when working with or in chemicals
- ☐ NIOSH-approved respirator where or when the job hazard may require
- ☐ Hearing protection
- ☐ Rubber or neoprene boots when exposed to waste-water products (a sanitary washing facility will be provided for cleanup)

Note: The first line supervisor or senior supervisor on the site will be responsible for compliance for proper utilization of PPE.

18 Material Handling Equipment

All material handling equipment will be operated in accordance with established Vestas-American Wind Technology's written policies, manufactures procedures and applicable OSHA standards.

19 Adjacent Structures

19.1 Stability

19.1.1 Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning will be provided to ensure the stability of such structures for the protection of employees.

19.1.2 Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees will not be permitted except when:

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19.1.2.1 A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or

19.1.2.2 The excavation is in stable rock; or

19.1.2.3 A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or

19.1.2.4 A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

19.1.3 Sidewalks, pavements and appurtenant structures will not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

20 Loose Rock or Soil

20.1 Protection of Employees

20.1.1 Adequate protection will be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection will consist of scaling to remove loose material, installation of protective barricades at intervals as necessary on the face to stop and contain falling material, or other means that provide equivalent protection.

20.1.2 Employees will be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection will be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

21 Site Inspections

21.1 Daily

21.1.1 Inspections of excavations, the adjacent areas, and protective systems will be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. These inspections are only required when employee exposure can be reasonably anticipated. An inspection will be:

21.1.1.1 Conducted by a competent person prior to start of work and as needed throughout the shift;

21.1.1.2 Inspections will also be made after every rainstorm or other hazard-increasing occurrence; and

21.1.1.3 Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees will be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

22 Fall Protection

22.1 Guardrails and Barriers

22.1.1 Where employees or equipment are required or permitted to cross over excavations, walkways or bridges with standard guardrails will be provided.

22.1.2 Adequate barrier physical protection will be provided at all remotely located excavations. All wells, pits, shafts, etc., will be barricaded or covered. Upon completion of exploration and other similar operations, temporary wells, pits, shafts, etc., will be backfilled.

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23 Training Requirements

23.1 Initial training

Vestas-AWT shall provide training to ensure the purpose and function of the trenching and excavation program is understood by employees and the knowledge and skills required for safe trenching and excavation operations is acquired by all affected employees. The training shall include as a minimum, the following:

23.1.1 Training in the recognition of applicable hazards associated with trenching and excavation operations.

23.1.2 Each affected employee shall be instructed in the purpose and use of this standard practice instruction.

23.1.3 All other employees whose work operations are or may be in an area where trenching and excavation operation are conducted shall be instructed to an awareness level about the procedures and prohibitions relating to work in such areas.

23.2 Refresher training

23.2.1 Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in equipment or processes that present a new hazard, or when there is a change in these procedures. Note: Retraining (to include a procedural review) will also be provided whenever there is a "close-call" or these procedures fail.

23.2.2 Additional retraining shall also be conducted whenever a periodic inspection reveals, or whenever the Company has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of these procedures.

23.2.3 The retraining shall reestablish employee proficiency and introduce new or revised operational methods and procedures, as necessary.

23.3 Documentation

23.3.1 The Company shall document that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.

24 Protection of Employees in Excavations

24.1 General

24.1.1 Each employee in an excavation will be protected from cave-ins by an adequately designed protective system except when:

24.1.1.1 Excavations are made entirely in stable rock; or

24.1.1.2 Excavations are less than 5 feet (1.52 m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

24.1.2 Protective systems will have the capacity to resist without failure all loads that are intended, or could reasonably be expected to be applied or transmitted to the system.

25 Design of Sloping and Benching Systems

The slopes and configurations of sloping and benching systems will be properly selected and constructed as follows:

25.1 Option 1 –

Allowable configurations and slopes: Excavations will be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless the employer uses one of the other options listed below.

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25.2 Option 2 -

Determination of slopes and configurations is made using 29CFR 1926.652, Appendices A and B: Maximum Allowable Slopes, and allowable configurations for sloping and benching systems.

25.3 Option 3 –

Designs using other tabulated data. Designs of sloping or benching systems will be selected from and in accordance with tabulated data, such as approved tables and charts. The tabulated data will be in written form and will include:

25.3.1 Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;

25.3.2 Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;

25.3.3 Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

Note: At least one copy of the tabulated data, which identifies the registered professional engineer who approved the data, will be maintained at the jobsite during construction of the protective system. After that time, the data may be stored off the jobsite, but a copy of the data will be made available to OSHA upon request.

25.4 Option 4 –

Design by a registered professional engineer. Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) will be approved by a registered professional engineer. Designs will be in written form and will include at least the following:

25.4.1 Magnitude of the slopes that were determined safe for the particular project;

25.4.2 Configurations that were determined to be safe for the particular project; and

25.4.3 Identity of the registered professional engineer approving the design.

Note: At least one copy of the design will be maintained at the jobsite while the slope is being constructed. After that time, the design need not be at the jobsite, but a copy will be made available to OSHA upon request.

26 Design of Support Systems, Shield Systems, and other Protective Systems

Design of support systems, shield systems, and other protective systems will be selected and constructed in accordance with the following options:

26.1 Option 1 -

Designs using Appendices A, C and D of 29CFR §1926.652. Designs for timber shoring in trenches will be determined in accordance with the conditions and requirements set forth in appendices A and C. Designs for aluminum hydraulic shoring will be in accordance with appendix D of 29CFR §1926.652, but if manufacturer's tabulated data cannot be utilized, designs will be in accordance with appendix D.

26.2 Option 2 -

Designs using Manufacturer's Tabulated Data; Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data will be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

26.2.1 Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer will only be allowed after the manufacturer issues specific written approval.

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26.2.2 Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations will be in written form at the jobsite during construction of the protective system. After that time, this data may be stored off the jobsite, but a copy will be made available to OSHA upon request.

26.3 Option 3 -

Designs using other Tabulated Data; Designs of support systems, shield systems, or other protective systems will be selected from and be in accordance with tabulated data, such as tables and charts. The tabulated data will be in written form and include all of the following:

26.3.1 Identification of the parameters that affect the selection of a protective system drawn from such data;

26.3.2 Identification of the limits of use of the data;

26.3.3 Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

Note: At least one copy of the tabulated data which identifies the registered professional engineer who approved the data will be maintained at the jobsite during construction of the protective system. After that time, the data may be stored off the jobsite, but a copy of the data will be made available to OSHA upon request.

26.4 Option 4 -

Design by a registered professional engineer. A registered professional engineer will approve support systems, shield systems, and other protective systems not utilizing Option 1, Option 2 or Option 3 above. Designs will be in written form and will include the following:

26.4.1 A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and

26.4.2 Identification of the registered professional engineer approving the design.

27 Protective Systems

27.1 Materials and Equipment used

27.1.1 Materials and equipment used for protective systems will be free from damage or defects that might impair their proper function.

27.1.2 Manufactured materials and equipment used for protective systems will be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.

27.1.3 When material or equipment that is used for protective systems is damaged, a competent person will examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then the material or equipment will be removed from service, and will be evaluated and approved by a registered professional engineer before being returned to service.

28 Installations and Removal of Support Systems

28.1 General requirements

28.1.1 Members of support systems will be securely connected together to prevent sliding, falling, kick outs, or other predictable failure.

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28.1.2 Support systems will be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.

28.1.3 Individual members of support systems will not be subjected to loads exceeding those which those members were designed to withstand.

28.1.4 Before temporary removal of individual members begins, additional precautions will be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.

28.1.5 Removal will begin at, and progress from, the bottom of the excavation. Members will be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.

28.1.6 Backfilling will progress together with the removal of support systems from excavations.

28.2 Additional requirements for support systems for trench excavations

28.2.1 Excavation of material to a level no greater than 2 feet (.61 m) below the bottom of the members of a support system will be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

28.2.2 Installation of a support system will be closely coordinated with the excavation of trenches.

29 Sloping and Benching Systems

Employees will not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

30 Shield Systems

30.1 Requirements

30.1.1 Shield systems will not be subjected to loads exceeding those which the system was designed to withstand.

30.1.2 Shields will be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

30.1.3 Employees will be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.

30.1.4 Employees will not be allowed in shields when shields are being installed, removed, or moved vertically.

30.1.5 Excavations of earth material to a level not greater than 2 feet (.61 m) below the bottom of a shield will be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

31 APPENDIX: version history

Version No.	Date	Description of Changes
00	Unknown	Not Used
01	Unknown	Not Used
02	2002.10.15	Old AWT number 31033 Changes undocumented
03	2010.01.01	Template updated
04	2014.08.06	Review and Template update

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Version history

Version No.	Date	Description of Changes
01	2015.09.03	Removed AME from header, Sections: (5) added references, (6) added Training requirements

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1 Purpose

State the minimum safety requirements whenever cranes are used for lifting operations under Vestas responsibility within construction and/or service sites. This procedure is intended to comprehensively address the issues of:

- Evaluating the associated potential hazards and communicating information concerning these hazards;
- Establishing appropriate procedures and protective measures for employees and site personnel and the design, construction, testing, use and maintenance of personnel platforms and;
- The hoisting of personnel platforms on the load lines of cranes.
- Vestas will establish crane safety operational procedures through the use of this document.

2 Scope

This document sets forth requirements for contractors using mobile cranes to perform service and/or construction services involving component hoisting operations for Vestas.

- Activities in construction sites involving mobile cranes, including civil activities
- Wind turbine assembly
- Corrective maintenance of wind turbines (e.g., replacement of gearbox, generator, etc.)
- Total or partial decommissioning of wind turbines

3 Definitions

Competent person - A person who is capable of identifying hazardous or dangerous conditions in the equipment in which they are using or operating.

Complex environment - Environmental physical conditions which significantly increase the level of risk of the hoisting operation. For example:

- Space restrictions.
- Presence of overhead electrical lines, roads, etc.
- Special ground conditions.

Crane - A machine for lifting and lowering a load and moving it horizontally, with the hoisting mechanism an integral part of the machine.

Drop Zone / Danger Zone – Area under the suspended load (taking into account the hoisting trajectory).

Failure: the load refusal, breakage, or separation of components.

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Hoist (or hoisting): all crane or derrick functions such as lowering, lifting, swinging, booming in and out or up and down, or suspending a personnel platform.

Load - The total superimposed weight on the load block or hook.

Maximum intended load: the total load reasonably anticipated to be applied at any one time.

Protective Zone- Protective zones consisting of temporary supports, cribbing, blocking or equivalent which shall be used for work in danger zones and be verified by engineering calculations or testing.

Qualified Person - One who has received training, holds proper certifications consistent with local/state/national regulations and has demonstrated skills and knowledge in the construction and operation of the equipment, installations and the hazards involved.

Rated load - The maximum load for which a crane or individual hoist is designed and built by the manufacturer and shown on the equipment nameplate(s).

Road / Crane Path / Runway: a firm, level surface designed, prepared and designated as a path of travel for the weight and configuration of the crane being used to lift and travel with the crane suspended platform. An existing surface may be used as long as it meets these criteria

4 Responsibilities & Requirements

4.1 Crane Owner / Crane Contractor

Has custodial control of a crane by virtue of lease or ownership and is responsible for:

- Providing a crane that meets the requirements of the applicable local/state/national standards and regulations;
- Providing a crane that meets the specific job requirements;
- Providing a crane that meets Vestas contractual requirements;
- Ensuring that the crane being provided, has all the necessary components, specified by the manufacturer and meets the minimum identified configuration and capacity;
- Being able to provide the applicable load/capacity charts for the crane;
- Providing for the safe, secure transport of crane components to the site and within the site at all times;
- Providing the necessary support for field assembly, disassembly and maintenance;
- Establishing the inspection, testing and maintenance programs according to the requirements of the manufacturer, national (e.g., OSHA, LOLER), state or local regulations as applicable;
- Ensuring a regular crane inspection, testing and maintenance program as applies to the subject crane as well as providing evidence of identified programs upon request;
- Supplying designated qualified and/or certified personnel who meet the requirements to maintain, repair, transport, assemble, disassemble and inspect the supplied crane(s); and
- Utilizing only subcontractors that have been approved / accepted by Vestas.

4.2 Crane Operator

Is ultimately responsible for:

- Successfully completing a specific training course meeting the requirements of applicable national standards and shall be trained, qualified, and licensed to operate the specific type and model of crane in use;
- Safe operation of the crane according to the manufacturer's instructions;
- Maintaining a current crane operator certification;
- Crane, rigging, load, personnel and surrounding equipment or materials;
- Never conducting any lift of any load that has not been rigged safely;
- Verification of load weights or accurately estimating the load weight;

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- Performing a pre-use inspection and documentation on a daily basis prior to operating the crane;
- Ensure the crane and lifting equipment is properly inspected, of proper capacity, has no defects, and is used according to the manufacturer's recommendations;
- Verification of a functioning black box (if applicable) indicating and recording lift speed and other data;
- Understanding and following instructions in the lift plan, load chart, and operating manual of the crane;
- Immediate Notification to Site/Construction Manager of any defect, near miss or incident involving the crane;
- Determining necessary precautions when conditions are less than optimal;
- Compliance with crane suspended personnel platform requirements (if applicable) and special/complex/critical lift requirements (if applicable) of this program;
- Utilizing full authority to take actions deemed necessary to avoid dangerous situations;
- Fully understanding that lifting the load is under their control and shall stop the operation if it becomes unsafe;
- Understanding the requirements for all phases of the lift;
- Meeting and maintaining the minimum physical and mental requirements of operators;
- Being drug and alcohol free;
- Being thoroughly trained in all facets of the required lift;
- Having a mature and safe attitude at all times;
- Having good depth perception (essential for load spotting);
- Having good hearing and vision (corrected or uncorrected);
- Having no history of unsafe acts in the workplace;
- Having the ability to react quickly in an emergency;
- Taking no medication that will interfere with the operation; and
- Being at least 18 years of age.

4.3 Lift Supervisor

Shall be trained, shall meet all requirements and be fully qualified to perform the following activities:

- Supervise all crane lifting and rigging activities;
- Prepare comprehensive lift plans;
- Being drug and alcohol free during any lifting event;
- Selecting or approving cranes of suitable capacity and condition to perform lifting operations based on site conditions, the crane's capacity and the radius at which it will operate;
- Select or approve the appropriate load handling equipment including chains, slings, lifting beams, spreader bars, shackles, etc.;
- Determine or approve the method of attaching the load to the crane;
- Ensure the crane and lifting equipment is properly inspected, of proper capacity, has no defects, and is used according to the manufacturer's recommendations;
- Verification of load weights or accurately estimating the load weight;
- Ensure the lifting team is trained and qualified;
- Ensure the lifting team understands all communication practices, e.g., signals, languages, etc.; and

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- Being drug and alcohol free.

4.4 Rigger

Shall be trained, shall meet all requirements and be fully qualified to perform the following tasks:

- Verification of load weights or accurately estimating the load weight;
- Determination of appropriate rigging for the load and conditions of the lift in accordance with the lift plan;
- Inspect rigging equipment, appliances, and hardware prior to use;
- Maintain equipment registers in accordance with local/state/national standards and regulations;
- Identify lift points and understand the effect that load/sling angles have on their capacity;
- Safely attach loads to a crane;
- Understanding the basic operation of crane equipment;
- Proper application and protection of rigging equipment;
- Determining proper guide rope (tag line) attachment points and handling procedures;
- Directing the Crane Operator to take the weight of the lift load and ensure the load is safely attached before it is lifted to any height;
- Responsible for verifying there are no overhead obstacles; and
- Being drug and alcohol free.

4.5 Signal Person / Spotter

Shall be trained, shall meet all requirements and be fully qualified to perform the following tasks:

- Capable of understanding the crane signals used;
- Competent in using these signals;
- Understands the operations and limitations of the equipment including the crane dynamics involved in swinging, raising, lowering and stopping loads;
- Discuss and ensure understanding with the crane operator, all signals to be used during the lift;
- Maintain a clear line of sight with the crane operator at all time;
- Ensure all signals are clear and concise;
- Use a clear and concise voice communication and ensure crane operator and lift team understand the identified language to be spoken (documented in pre-lift meeting and/or JSA) during radio use;
- Once the load is suspended, the Signal Person relays directions to the Crane Operator for the movement of the load to its destination using either standard hand signals or radio (preferably digital) communications;
- Determine necessary precautions when conditions are less than optimal;
- If more than one Signal Person is used, only one Signal Person shall give instructions at any one time and a safe system of signal transfer shall be in place as responsibility moves between Signal Persons;
- Responsible for guiding the crane safely at the site, especially when the crane is reversing or performing tight maneuvers; and
- Being drug and alcohol free.

NOTE: The duties of the Rigger and Signal Person are sometimes combined into one person's responsibility and it is usual for this person to be trained and qualified in both functions. However, on larger or complex lifts these duties shall be performed by separate individuals.

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4.6 Personnel

All persons involved with crane lifting activities shall be trained, qualified, and competent to perform their assigned tasks. Training and qualifications shall be according to the following minimum requirements and be available to Vestas upon request.

- Obey all signs, barricades and personnel involved in crane operations;
- Ensure all established communications practices, e.g., signals, language, etc., are clearly understood;
- Report any unsafe conditions;
- Never stand or pass under a suspended load; and
- Being drug and alcohol free.

5 References

- OSHA – 29 CFR 1926.179 – Overhead and Gantry Cranes
- OSHA – 29 CFR 1926.180 – General Industry Crawler/Locomotive/Truck Cranes
- OSHA – 29 CFR 1926.1400 Construction Cranes & Derricks
- OSHA - 29 CFR 1903.1 (The General Duty Clause)
- CMAA - Spec. No. 70 and 74 Crane Operator's Manual
- ANSI - ANSI/ASME:
    - B-30 series Cranes, Derricks, Hoists,
    - B- 30.2 Overhead And Gantry Cranes (Top Running Hoist)
    - B- 30.10 Hooks
    - B- 30.11 Monorail and Underhung Cranes
    - B- 30.16 Overhead Hoists (Underhung)
    - B- 30.17 Overhead & Gantry Cranes (Underhung Hoists)
    - B- 30.18 Stacker Cranes
    - B- 30.21 Manually Lever Operated Hoists
    - B- 30.5 Mobile Cranes
- MED INS 30.11.01
- UK Lifting Operations and Lifting Equipment Regulations (1998)
- Federation European Manutention (FEM) 5.016 - "Guideline - Safety Issues in Wind Turbine Installation and Transportation"
- INS BEI 01.01.31 Lifting and Rigging Operation Safety (ASP – China)
- Mobile crane – Code of Practice 2006 (Queensland)
- AS 1418.5 – Cranes, Hoists and Winches – mobile cranes
- AS 2550.5 – Cranes, Hoists and Winches – Safe use – Mobile Cranes
- AS 4991 – Lifting devices
- AS 4024 (series) – Safety of machinery
- AS 2759 – Steel wire rope – Use, Operation and Maintenance
- AS 1353.2 – Flat synthetic webbing slings – Care and use
- AS 2550 – Cranes, Safe Use

6 Training requirements

6.1 Personnel

Training shall be conducted prior to job assignment. The employer shall provide training to ensure that the purpose, function, and proper use of cranes is understood by employees and that the knowledge and skills required for the safe application and usage is acquired by employees. This standard practice instruction shall be provided to, and

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read by, all employees receiving training. The training shall include, at a minimum, the following:

- Preoperational inspection requirements of the crane to be used;
- Specific operational requirements of the crane to be used;
- Principles of crane operations;
- Recognition of applicable hazards associated with the work to be completed;
- Load determination and balancing requirements;
- Procedures for removal of a crane from service; and
- All other employees whose work operations are or may be in an area where cranes may be utilized shall be instructed in an awareness level concerning hazards associated with cranes.

6.2 Retraining

Retraining shall be provided for all authorized and affected employees whenever there is a change in:

- their job assignments;
- in the type of crane used;
- equipment being lifted;
- lifting procedures; or
- A known hazard is added to the lifting environment.
- Additional retraining shall also be conducted whenever a periodic inspection reveals, or whenever this employer has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of crane procedures.
- The retraining shall reestablish employee proficiency and introduce new or revised methods and procedures as necessary.

7 Safe Operating Practices

Whenever any crane is used, the following safe practices (at a minimum) shall be observed:

- Always check warning devices and signals before use;
- Always verify black box (if applicable), for indicating and recording lift speed and other data, is present and functioning;
- Always document and maintain inspection records;
- Always ensure cranes shall not be loaded in excess of their rated capacity;
- Always ensure the new location supports the weight;
- Always keep employees clear of loads about to be lifted and/or suspended loads;
- Always keep suspended loads clear of all obstructions;
- Always lockout / tag out before maintenance or repairing cranes;
- Always position the hook directly over the load (center of gravity) before lifting;
- Always test brakes, by method of a short lift, to ensure control;
- Before being lifted, loads will be checked for proper balance;
- Hands must not be placed between the suspension means and the load during lifting;
- Know where you’re going to set the load down;
- Know your travel path in advance of the lift;
- Loads will, in all cases, be properly balanced to prevent slippage;
- Move loads only after being signaled by the designated, qualified signalperson / spotter;
- Never allow riders on loads or hooks;
- Never allow unauthorized persons to operate cranes;
- Never attempt to operate a crane or hoist that is suspected to be unsafe;
- Never carry loads over workers;
- Never carry loads past workers (they must yield right of way);

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- Never use cranes that are damaged or defective in any way;
- Shock loading is prohibited;
- Test all hoist controls and brakes at the beginning of each shift;
- Load charts, or their functioning electronic equivalent, shall be highly visible to the Crane Operator;
- Crane Hooks shall be the type that can be closed and locked to eliminate the throat opening;
- Guide ropes (tag lines) shall be used to control loads that can potentially rotate or swing out of control. Guide ropes shall meet all local/state/national standards and regulations. Guide ropes do not need to be used in situations where they can create a hazard or if a load can otherwise be safely guided into place;
- All rigging and lifting equipment such as slings, shackles, chains, etc., shall be clearly marked according to their rated capacity;
- Rigging and lifting equipment shall be visually inspected for defects by a qualified person (normally the rigger) before each use. Defective rigging and lifting equipment shall not be used, shall be placed in quarantine and be clearly labeled “Unsafe, Do Not Use” or other similar language;
- Standard crane signals shall be used and be understood by the operator and signal person. Radios may also be used to communicate with crane operators. Communication language specifications shall be agreed to prior to using any radio communication and shall be documented in the pre-lift meeting and/or JSA. When radios (preferably digital) are used, the crane operator’s radio shall be the ‘hands-free’ or voice activated type;
- Wind speed indicator (outdoor lifting operations): A device shall be provided to display the wind speed. This device should be mounted at the top of the boom or jib of the crane and used to ensure wind speed is within crane and project specifications. This device shall be calibrated and shall have data logging capability (regional regulations may or may not require). Calibration and documentation of wind speed shall be provided to Vestas upon request;
- Lifting and rigging equipment inspections: At a minimum, lifting and rigging equipment (i.e. chains, slings, shackles, spreader beams, etc.) shall be thoroughly examined by a qualified person on an annual basis or other frequency defined by local regulations. Labels or equivalent identification shall be applied to the equipment to verify inspection and the required register (local/state/national) must be kept current; and
- Custom lifting and rigging equipment (e.g., nacelle bars, j-hooks, blade grippers, etc.) shall be accompanied by certification of initial load testing documentation.

8 Crane Safety Devices

Cranes shall be equipped with fully functioning safety devices. These devices shall not be bypassed or altered for any reason. Minimum safety devices are:

- A properly functioning device which shuts off power to the hoist mechanism when the lower load block or overhaul ball is hoisted too near the hoist mechanism (limit switch, anti-two blocking device);
- A system which measures the weight on the hook and displays the load weight (Load Indicating Device); or
- An electronic system which displays to the crane operator the weight on the hook, radius, and /or percentage of rated capacity [Rated Capacity Indicator, Load Moment Indicator (LMI)]; or
- An electronic system similar to a Load Movement Indicator (LMI) that is also tied to the crane’s control system and will automatically shut off power and set the brakes if an overload condition is reached (also known as a Rated Capacity Limiter).

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9 Suspended Loads

No person is permitted to stand or put any part of their body under a suspended load or in the area where uncontrolled movement of the load could occur (Drop / Danger zone).

- Likewise, parking of vehicles or staging of equipment in the identified danger zone is also strictly prohibited. This includes areas to the sides of the load and fixed objects where it is possible for the person or equipment to be caught, crushed, or otherwise injured or damaged due to mechanical failure, operator error, or other factor.
- Refer to regional drop zone management programs where applicable.
- Limited Exclusions: In very limited situations it might not be possible to establish a protective zone. In these cases the activity shall be specifically risk assessed and documented with specific measures or precautions taken to limit personnel exposure to the particular hazards through training, instruction, planning and execution.
- It is never acceptable for any person, parked vehicle or equipment to be under a suspended load at any time unless in a protective zone.

10 Crane Inspections

10.1 Daily Inspection

Shall be performed and documented by a qualified person (normally the crane operator) before each day's use and include the following items at a minimum (in addition to any other crane manual requirements):

- Operator cab windows for conditions that would hamper the operator's view;
- Control and drive mechanisms;
- Anemometer or other wind speed indication equipment is present, functional, and calibrated with calibration documents immediately available;
- Black box (if applicable), indicating and recording lift speed and other data, is present and functioning;
- Air, hydraulic, and other pressurized lines;
- Load charts are present and legible in the operator's cab;
- Angle indicator is visible from the operator's cab;
- Hydraulic system for proper fluid level;
- Hooks and latches for deformation, cracks, excessive wear, or damage;
- Wire rope reeving, spooling, and general condition; and
- Tires or tracks for proper condition.

10.2 Periodic Inspection

All Cranes and hoists shall have been thoroughly inspected by a qualified person (certified by local, regional, or national authorities) within at least the past 12 months. Documentation of the most recent annual inspection shall be maintained at the jobsite for immediate review. Annual inspections shall include the following items at a minimum:

- Chain or cable;
- Electrification;
- Brakes;
- Rails;
- Warning devices;
- Reeving;
- Limit Switches;
- Balance;
- End stops;
- Hook condition;

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- Travel drives;
- Couplings;
- Hydraulic systems;
- Controls; and
- Signage

10.3 Inspection Documentation

Crane inspections will be documented. Scheduled inspections will be documented as having been conducted and contain the following:

- Identification of the items that were inspected;
- Status of the inspected items;
- Signature of the inspector; and
- Date of inspection.
- Inspections shall be kept on file where readily available to appointed personnel.

10.4 Inspection Results

- If any deficiency is identified, an immediate determination must be made by the competent person as to whether the deficiency constitutes a safety hazard or, though not yet a safety hazard, needs to be monitored in the monthly inspections.
- If the deficiency is determined to constitute a safety hazard, the equipment must be immediately taken out of service until it has been corrected.

11 Positioning Cranes, Loads and Hoisting Equipment

Before positioning/assembling the cranes, loads and/or hoisting equipment, the appointed person will check that the platform on which they will rest is appropriate both in terms of size and soil bearing capacity. Soil bearing capacity shall be documented through the responsible Civil Engineering party.

- Whenever possible, the cranes (main and auxiliary) will completely extend all stabilizers (outriggers) and the latter will be placed on appropriate distribution elements.
- Stabilizers (Outriggers) will always be placed on distribution sheets or wooden beams and always on flat terrain (never on ditches).
- If it is necessary to increase height, no more than two levels may be stacked on each other and the area of each level will be increased in the direction of the terrain.
- Distance from slopes and ditches:
  - Appropriately compacted terrain: Rule 1:1 (separation distance equal to or greater than the depth of the ditch or trench).
  - Inadequately compacted terrain: Rule 2:1 (separation distance two times greater or more than the depth of the ditch or trench).
- At no time will the crane masts encroach upon the area swept by the turbine rotor during its revolutions or yawing of the nacelle until the emergency stop button has been activated and the rotor has been locked mechanically. In all cases, the Lift Supervisor must personally authorize the crane driver to perform the maneuver in the vicinity of the rotor once he has verified the safety conditions.
- If any of these rules cannot be applied the hoisting plan will be updated to detail the positioning of the crane and its stabilizers and the plan will have to be reapproved by the initial lift plan developer.

12 Positioning Cranes, Loads and Hoisting Equipment

12.1 Roadway closure

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- If the roadway to be closed is a public roadway with regular traffic, the developer/owner of the wind farm will be asked to request the corresponding permits from the appropriate authorities.
- If the roadway to be closed is a public roadway with sporadic traffic of regular people/businesses, they will be notified of the date and estimated time of roadway closure as per local requirements.
- If the roadway has no regular traffic, no special action will be taken.
- In all three cases, any vehicles in transit will be informed of the estimated duration of the closure and possible alternative routes which will be signposted (developer's responsibility).
- In any case, the safety coordinator of projects will always be informed.
- Layout of the stacking position of components: using the stacking diagrams contained in the hoisting plan, the position where the main components will be piled will be marked on the terrain using marking spray paint of the type used in topography and civil works.

12.2 Criteria for Crane Mobilization Within Wind Farm

Whenever mobilizing a crane (crawler, mobile, etc.) within a wind farm the following minimum criteria shall be required:

- Review and understand any local and/or state requirements for transportation permits, load limit requirements, etc., on all affected roadways with the crane company and customer.
- Complete JHA/JSA/JESA/Pre-Task Plan for crane build, demobilization, mobilization, etc. Take special note of any recent road work, recent weather changes that can affect the roadways, time of season (harvest, school start-up), etc., and develop plan accordingly.
- Review any partial breakdown with walking the crane path and plan with crane company and customer.
- Implement best practice of using pilot/flagging vehicles for road block/clearance in front and behind all cranes during site mobilization.
- Prior to making a move, whether fully rigged or in a partial tear down, document the maximum incline/decline and shed section (road cross slope) the crane can move in the identified configuration through referencing the crane charts.

12.3 Criteria for Barrier Location and Use

The purpose of placing barriers is to denote the exclusion zone in hoisting operations within which only the minimum indispensable machines, vehicles and people may remain.

- Employees who have no specific task assignment related to the hoisting to be performed may not remain in the exclusion zone.
- The barrier will be placed at a minimum distance equal to the height of the wind turbine plus 40 meters (measured from the center of the foundation section).
- All personnel must recognize and adhere to the exclusionary zone during any hoisting operation. Personnel may not proceed through the exclusionary zone unless they are granted permission by the Lift Supervisor or their designee.
- Barriers will be placed on roadways. If it is necessary to sign post all or part of the adjacent terrain due to it being an alternative access to the operations area, signaling tape or another clearly distinguishable method will be used.
- The drop zone / danger area (the area below the suspended load, taking into account the hoisting trajectory) will be under the constant supervision of the hoisting supervisor, in order to prevent anyone from accessing it.

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12.4 Means of Access Closures and Signposting

- Jersey barriers will preferentially be used for closing roadways. Alternatively, roadways may be closed with other similarly efficient systems (No signaling tape or orange mesh will be allowed).
- Sign posting: Multi-risk sign will be placed in a visible location, preferably on the closure barriers. Posting requirements, i.e., sign content, vary by region and should be verified prior to barricading the areas.



Practical example of signposting and roadway closure

13 Using Guiding Ropes (Tag Lines)

Guiding ropes (tag lines) must be used in one of the following ways:

- Direct retention by the operator of the guiding rope - Each guiding rope will have at least two people.
- Indirect retention of guiding ropes: The guiding rope will be passed through a fixed element which causes friction on the rope, thereby reducing its pulling force. They may be managed by just one operator if the friction on the fixed element is sufficient. The fixed element's weight and stability on the terrain must be sufficient to prevent it from moving accidentally.
- Guide ropes must meet any local/state/national standards and/or regulations.
- Basic safety regulations: The rope must be held with one hand and guided with the other, avoiding looping the rope around hands, feet/legs, waist, etc., so that in case there is a sudden pull of the load, the employee is not thrown forwards or entrapped in the fixed element. Proper PPE, gloves, etc., must also be worn per local regulations.
- When retaining ropes on fixed elements such as vehicles, dynamic knots will be used. Blocking knots are forbidden to prevent the elements from being lifted by one of their axis or moved by the guide rope. In no case will employees remain inside the vehicles or drive them in reverse to pull the guide rope.
- The free end of guide ropes will always be controlled by an operator who will prevent the rope from getting caught on any element within the environment (plants, vehicles, etc.).
- Guide ropes shall be stored appropriately and never driven over.
- Guide ropes must be inspected visually, in their entirety before using them. Guide ropes are to be verified they are long enough for the hoisting operation, taking into account possible uneven terrain.

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13.1 Clearance from Overhead Power Lines

Operation and transportation of cranes, mobile aerial equipment and man baskets in the vicinity of exposed overhead lines requires the utmost care and diligence. Voltages of 35 kV or less require *minimum* clearance of 3 meters (10 feet). At voltages above 35 kV, this distance increases according to the table below. Local/state/national requirements may be more stringent, in which case they will preside.

Line Voltage	Minimum Clearance Distance
440V – 35kV	3.0 meters
35kV and higher	3.0 meters + 1cm for each 1kV above 35kV

Minimum Crane Distance from Power Lines

- If the safe distance must be infringed upon, the power lines shall be placed in an electrically safe work condition be visibly earthed at the work location and verified via the appropriate authority before the work begins.
- When cranes, mobile aerial equipment and man baskets are being operated near overhead power lines, employees standing on the ground may not contact the cranes, mobile aerial equipment and man basket unless it is located so that the required clearance cannot be violated even at the maximum reach of the equipment.

14 Fall Protection

This section applies to persons who perform assembly, disassembly, maintenance and inspections on cranes or their components any time they are exposed to a potential fall of 2.0 meters or more (any distance in Victoria, Australia).

- A full-body safety harness and two shock absorbing lanyards (or a single 'Y' type lanyard) attached to an anchor point shall be applied (regional regulation specific). This anchor point shall be a structural member of the crane or a lifeline that is securely attached to a structural member of the crane capable of supporting a fall impact (5000# / 2267 kg).
- Personnel performing this type of work shall be trained in working at heights.
- Employees shall be attached to the anchor point 100 percent of the time when a potential fall of 2.0 meters or more exists as shown in the illustration below.



Fall protection during crane erection/maintenance/inspection/disassembly

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15 Lift Plans

Lift plans shall be developed and supervised by a qualified person. They are a requirement for any lift performed with a crane. Lifts that do not meet Special/Complex/Critical Lift criteria refer to section 17.0 Lift Plan Requirements.

- It is the responsibility of the Site Manager/Construction Manager to ensure a review of the lift plans, by a qualified person, as well as to enforce the requirements of the lift plans whenever the crane company is a direct subcontractor of Vestas. A quick reference card (DMS 0049-0579) has been developed to assist site management in the review / validation of a lift plan. Refer to the forms section (20) at the end of this document.
- No lift shall exceed chart capacity as mandated by the crane manufacturer.

15.1 VAME Specific

Any lift plans above 85% of chart capacity shall require a licensed engineer stamped lift plan. With engineer approval lift will be capped at 95% of chart capacity.

16 Lift Plans

16.1 Elevation View Drawing

Elevation view drawings must include, at a minimum:

- Crane manufacturer(s), model(s), and counterweight(s) if variable;
- Boom length(s) and lifting radius (i);
- Maximum load elevation during lifting procedure;
- Any jibs or special lifting devices required;
- Minimum number of parts of crane hoist line required for lifting the load;
- All required slings, shackles and other rigging components identified by capacity, size, length and location; and
- Calculated center of gravity of load.

16.2 Plan View Drawing

Plan view drawings must contain, at a minimum:

- Route that transport will take to position the load for lifting;
- Initial lifting position of the load, including radius. Lifting radius must be accurately determined;
- Final placement position of the load, including radius. Lifting radius must be accurately determined;
- Location of the crane(s) including tail swing limits;
- Route that crane(s) will take, if walking with the load, as well as associated matting requirements;
- Any utilities located within the work zone. Underground utilities – piping, ducts, etc., - must be accurately located;
- Space necessary to assemble the crane; and
- Planning must include load transportation considerations, e.g., how to get the load close enough to the crane.

16.3 Lift Analysis

Lift analysis must contain, at a minimum:

- Tabulation of gross load weight, including the weight of all blocks and rigging tackle;
- Rigging attachment points and special rigging requirements;
- Gross rated capacity of the crane in the configuration specified;

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- Calculation of the percentage of the crane's rated capacity at which the lift will be made;
- Crane imposed soil loads must be determined. Soil analysis may be needed to verify crane imposed loads can be safely supported;
- Allowable weather conditions for the lift and the effect of wind loading; and
- Sequence of work, including lift off, steady state conditions and set down of load (including positions where there is a shift in the location of the center of gravity for the pick points).

17 Special/Complex/Critical Lifts

17.1 Criteria

Special/Complex/Critical lifting operations require, at a minimum, the completion of a specific lift plan, specific risk assessment, specific work instruction, permit to work and a pre-lift job meeting and are defined as any lifts that meet any of the following criteria:

- Tandem lifts;
- Load exceeds 75% of the crane's rated capacity or manufacturer's rated load chart;
- Lifting over live process equipment or that endangers existing facilities;
- Lifting of personnel in non-emergency situation;
- Helicopter used to lift in an industrial setting;
- Lift is within the limits of approach to high voltage electrical or high pressure gas lines;
- Hazardous substances are involved;
- Special rigging is required;
- There is a load transfer required;
- Load exceeds 4.5 meters / 15 feet from center of gravity;
- Wind speed exceeds 10 m/s / 22 mph / 35 Kph (engineering may be required);
- Temperatures are lower than -30^{o} C / -22^{o} F (engineering may be required); or
- Owner, site supervisor or construction manager identifies lift as a "special, complex or critical" lift;
- Local/state/national regulations and/or standards may also define; or
- Non-routine hoisting operations that take place during the mounting of prototypes or the installation or disassembly of wind turbines that:
    - Are not described in the installation or service manuals, or
    - Involve special risks due to the type of load (unknown center of gravity, seriously damaged components, etc.) and/or complex environment, or
    - Are being carried out to test new configurations, equipment or hoisting machines.

17.2 Requirements

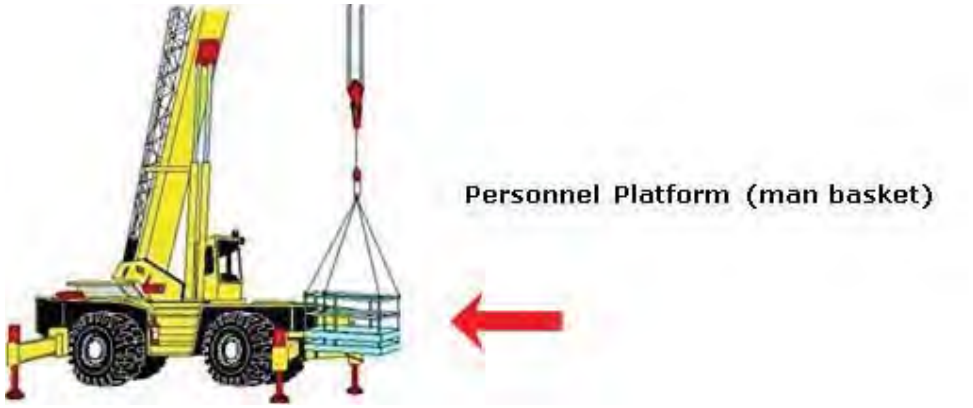
The following are the minimum requirements to satisfy a Special/Complex/Critical Lift Plan:

- Completion of a Pre-Lift Job Briefing with all individuals involved with the lift to ensure their roles and responsibilities outlined by the lift plan are fully understood;
- Completion of a Critical Lift Checklist;
- Initial boom inspection documentation;
- Personnel platform inspection documentation (if applicable);
- Lift drawings (Refer to section 17 – Lift Plan Drawing Requirements);
- Communication methods (standard ANSI hand signals, emergency signals, methods of communication, agreed upon communication language);
- Rigging weight (block, headache ball, rigging hardware and load);

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- Load analysis (to assist in selecting sling type) – size, weight, CG, shape surface finish, contents, type of hitch, spreader bar or other connective hardware and sling angle;
- Rigging gear;
- Proof testing of rigging gear;
- Identity of persons involved in the lift and their specific roles and responsibilities (e.g., rigger, signalman, lifting supervisor, etc.);
- Environmental conditions (wind, snow, cold temperatures, hot surfaces, terrain, etc.);
- Hazardous substances;
- Required PPE;
- Worksite inspection;
- Lift test documentation (proof of initial load testing, proof of load testing prior to lift);
- Identity of the item(s) being lifted including the weight and center of gravity;
- The specific lifting equipment to be used including rated capacities (crane type, rigging components, etc.);
- Lift point identification;
- Method(s) of attachment;
- Load angle factors and sling angle factors;
- Accessories used; and,
- Ground condition assessment and special precautions such as crane mats or outrigger supports.



18 Personnel Platforms

(Man baskets, Man-riding equipment, Man boxes, Skip boxes, etc.)

These devices shall be used as a last resort to access elevated work areas when no other safe means exists. At a minimum the use of personnel platforms shall be authorized by a competent person and approved by Vestas. Personnel Platforms shall be of the type that are attached to and moved by a crane. Personnel platforms arranged by block/shiv and hoists are prohibited. Personnel platforms of this type are not allowable in Japan.

18.1 General Personnel Platform Requirements

- The platform shall be designed by a qualified engineer or a person qualified in structural design.
- Each platform shall be designed to support five times the maximum intended load without failure. The maximum intended load shall be permanently marked on the platform.

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- Personnel shall wear a full body harness and lanyard secured to a structural member within the personnel platform capable of supporting a fall impact for employees using the anchorage.
- Personnel platforms shall be equipped with a standard guardrail system and shall be enclosed at least from the toe board to mid-rail with either solid construction or expanded metal having openings no greater than 1.27 cm (1/2-inch). Local/state/national standards/regulations shall be applied.
- A grab rail shall be installed on the inside perimeter except for the access gate area.
- The system used to connect the personnel platform to the equipment must allow the platform to remain within 10 degrees of level, regardless of boom angle.
- The suspension system shall be designed to minimize tipping of the platform due to movement of employees occupying the platform.
- Access gates, if installed, shall not swing outward during hoisting.
- Access gates, including sliding or folding gates, shall be equipped with a restraining device to prevent accidental opening.
- Headroom shall be provided which allows employees to stand upright in the platform.
- In addition to the use of hard hats (chinstraps may be required); employees shall be protected by overhead protection on the personnel platform when employees are exposed to falling objects.
- All rough edges exposed to contact by employees shall be surfaced or smoothed in order to prevent injury to employees from punctures or lacerations.
- All welding of the personnel platform and its components shall be performed by a qualified welder familiar with the weld grades, types and material specified in the platform design.
- The personnel platform shall be conspicuously posted with a plate or other permanent marking which indicates the weight of the platform, and its rated load capacity or maximum intended load.

18.2 Platform Loading

- The personnel platform shall not be loaded in excess of its rated load capacity, When a personnel platform does not have a rated load capacity then the personnel platform shall not be loaded in excess of its maximum intended load.
- The number of employees occupying the personnel platform shall not exceed the maximum number the platform was designed to hold or the number required for the work being performed.
- Personnel platforms shall be used only for employees, their tools and the materials necessary to do their work, and shall not be used to hoist only materials or tools when not hoisting personnel.
- Materials and tools for use during a personnel lift shall be secured to prevent displacement.
- Materials and tools for use during a personnel lift shall be evenly distributed within the confines of the platform while the platform is suspended.

18.3 Platform Rigging

- When a wire rope bridle is used to connect the personnel platform to the load line, each bridle leg shall be connected to a master link or shackle in such a manner to ensure that the load is evenly divided among the bridle legs.
- Hooks on overhaul ball assemblies, lower load blocks, or other attachment assemblies shall be of a type that can be closed and locked, eliminating the hook throat opening. Alternatively, an alloy anchor type shackle with a bolt, nut and retaining pin may be used.

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- Wire rope, shackles, rings, master links, and other rigging hardware must be capable of supporting, without failure, at least five times the maximum intended load applied or transmitted to that component. Where rotation resistant rope is used, the slings shall be capable of supporting without failure at least ten times the maximum intended load.
- All eyes in wire rope slings shall be fabricated with thimbles.
- Bridles and associated rigging for attaching the personnel platform to the hoist line shall be used only for the platform and the necessary employees, their tools and the materials necessary to do their work and shall not be used for any other purpose when not hoisting personnel.

18.4 Trial Lift

- A trial lift of the unoccupied personnel platform shall be made before employees are hoisted.
- During the trial lift, the personnel platform shall be loaded to at least its anticipated lift weight. The trial lift shall start at ground level or at the location where employees will enter the platform and proceed to each location where the personnel platform is to be hoisted.
- The trial lift shall be repeated if the crane is moved or repositioned.
- The operator shall determine that all systems, controls and safety devices are activated and functioning properly; that no interferences exist; and that all configurations necessary to reach those work locations will allow the operator to remain under the 50 percent limit of the hoist's rated capacity.
- Materials and tools to be used during the actual lift can be loaded in the platform for the trial lift. A single trial lift may be performed at one time for all locations that are to be reached from a single set up position.
- The trial lift shall be repeated prior to hoisting employees whenever the crane or derrick is moved and set up in a new location or returned to a previously used location. Additionally, the trial lift shall be repeated when the lift route is changed unless the operator determines that the route change is not significant (i.e. the route change would not affect the safety of hoisted employees.)
- After the trial lift, and immediately prior to each lift, the platform shall be hoisted a few inches with the personnel and materials/tools on board and inspected by a competent person to ensure that it is secure and properly balanced. Employees shall not be hoisted unless the following conditions are determined to exist:
    - Hoist ropes shall be free of kinks;
    - Multiple part lines shall not be twisted around each other;
    - The primary attachment shall be centered over the platform, and
    - The hoisting system shall be inspected if the load rope is slack to ensure all ropes are properly stated on drums and in sheaves.
    - A visual inspection of the crane or derrick, rigging, personnel platform, and the crane or derrick base support or ground shall be conducted by a competent person immediately after the trial lift to determine whether the testing has exposed any defect or produced any adverse effect upon any component or structure.
- Any defects found during inspections which create a safety hazard shall be corrected before hoisting personnel.

18.5 Platform Proof Testing

At each job site, prior to hoisting employees on the personnel platform, and after any repair or modification, the platform and rigging shall be proof tested to 125 percent of the platform's rated capacity.

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- The platform must be lowered by controlled load lowering, braked and held in a suspended position for five minutes with the test load evenly distributed on the platform (this may be done concurrently with the trial lift).
- After proof testing, a competent person shall inspect the platform and rigging.
- Any deficiencies found shall be corrected and another proof test shall be conducted. Personnel hoisting shall not be conducted until the proof testing requirements are satisfied.

18.6 Work Practices

- Employees shall keep all parts of the body inside the platform during raising, lowering, and positioning. This provision does not apply to an occupant of the platform performing the duties of a signal person.
- Before employees exit or enter a hoisted personnel platform that is not landed, the platform shall be secured to the structure where the work is to be performed, unless securing to the structure creates an unsafe situation.
- Guide ropes / Tag lines shall be used unless their use creates an unsafe condition.
- The crane or derrick operator shall remain at the controls at all times when the crane engine is running and the platform is occupied.
- Hoisting of employees shall be promptly discontinued upon indication of any dangerous weather conditions or other impending danger.
- Employees being hoisted shall remain in continuous sight of and in direct communication with the operator or signal person. In those situations where direct visual contact with the operator is not possible, and the use of a signal person would create a greater hazard for the person, direct communication alone such as by radio may be used.
- Except over water, employees occupying the personnel platform shall use a body belt/harness system with lanyard appropriately attached to a structural member within the personnel platform capable of supporting a fall impact for employees using the anchorage.
- Hoisting personnel within 20 feet (6 meters) of a power line that is up to 350 kV and hoisting personnel within 50 feet (15 meters) of a power line that is over 350 kV is prohibited.
- No lifts shall be made on another of the crane's or derrick's load lines while personnel are suspended on a platform.

19 Forms

Document No.	Title
0049-7525	Critical Lift Plan Suspended Personnel Platform Inspection (VAME)
0049-0576	Pre-Lift Job Briefing (VAME)
0049-2054	Crane Inspection (VAME)
0049-0579	Crane Program – Quick Reference Card

20 APPENDIX: version history

Version No.	Date	Description of Changes
00	Unknown	New document
01	Unknown	Unknown

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RESTRICTED

Crane Inspection Form

(To Be Used ONLY If Crane Owner Does Not Have An Inspection Form)

SITE: _____ LOCATION: _____ DATE: _____

EQUIPMENT MAKE/MODEL/ID #: _____

VESTAS INSPECTOR NAME:_____ SIGNATURE: _____

CRANE OWNER/INSPECTOR NAME:_____ SIGNATURE: _____

Mark each item "X" if inspected and NO DEFECTS found, or N/A if Not Applicable

	ITEM	DESCRIPTION / PURPOSE	
*	**OPERATOR**	Has current and valid crane operation certification.	
1	**MFR Operation & Maintenance Manuals**	Manufacturer's operating and maintenance manuals shall accompany all mobile hoisting equipment. These manuals set forth specific inspection, operation and maintenance criteria for each mobile crane and lifting capacity.	
2	**Guarding**	All exposed moving parts such as gears, chains, reciprocating or rotating parts are guarded or isolated.	
3	**Swing Clearance**	Materials for guarding rear swing area.	
4	**High-Voltage Warning**	HV warning signs displaying restrictions and requirements are installed at the operator's station & at strategic locations on the	
5	**Boom Stops**	Shock absorbing or hydraulic type boom stops are installed in a manner to resist boom overturning.	
6	**Jib Boom Stops**	Jib stops are restraints to resist overturning.	
7	**Boom Angle Indicator**	A boom angle indicator readable for the operator station is installed accurately to indicate boom angle.	
8	**Boom Hoist Disconnect, Automatic Boom Hoist Shutoff**	A boom hoist disconnect safety shutoff or hydraulic relief to auto stop the boom hoist when the boom reaches a predetermined high angle.	
9	**Two-Blocking Device**	Cranes with telescoping booms should be equipped with a two-blocking damage prevention feature that has been tested on-site in accordance with manufacturer's requirements. All cranes, hydraulic and fixed boom used to hoist personnel must be equipped with two-blocking devices on all hoistlines intended to be used in the operation. The anti-two blocking device has automatic capabilities for controlling functions that may cause a two-blocking condition.	
#	**Power Controlled Lowering**	Cranes for use to hoist personnel must be equipped for power controlled lowering operation on all hoistlines. Check clutch, chains, and sprockets for wear.	
#	**Leveling Indicating Device**	A device or procedure for leveling the crane must be provided.	
#	**Sheaves**	Almost every wire rope installation has one or more sheaves – ranging from traveling blocks with complicated reeving patterns to equalizing sheaves where only minimum rope movement is noticed. Sheave grooves shall be smooth and free from surface defects, cracks, or worn places that could cause rope damage. Flanges must not be broken, cracked, or chipped. The bottom of the sheave groove must form a close fitting saddle for the rope being used. Lower load blocks must be equipped with close fitting guards.	
#	**Main Hoist and Auxiliary Drums System**	Drum crushing is a rope condition sometimes observed which indicates deterioration of the rope. Spooling is that characteristic of a rope which affects how it wraps onto and off a drum. Spooling is affected by the care and skill with which the first layer of wraps is applied on the drum. **Inspect** (note where applicable, Manufacturer's criteria):	
		Minimum number of wraps to remain on the drum:	
		Condition of drum grooves:	
		Condition of flanges at the end of drum:	
		Rope end attachment:	
		Spooling characteristics of rope:	
		Rope condition:	
#	**Main Boom, Jib Boom, Boom Extension**	Boom jibs, or extensions, must not be cracked or corroded. Bolts and rivets must be tight. Certification that repaired boom members meet manufacturer's original design standard shall be documented. Non-certified repaired members shall not be used until recertified.	
#	**Load Hooks and Hook Blocks**	Hooks and blocks must be permanently labeled with rated capacity. Hooks and blocks are counterweighted to the weight of the overhaul line from highest hook position. Hooks must not have cracks or throat openings more than 15% of normal or twisted off center more than 10^{o} from the longitudinal axis. All hooks used to hoist personnel must be equipped with effective positive safety catches, especially on hydraulic cranes.	
#	**Hydraulic Hoses, Fittings, and Tubing**	Flexible hoses must be sound and show no signs of leaking at the surface or the junction with the metal and couplings. Hoses must not show blistering or abnormal deformation to the outer covering and should have no leaks at threaded or clamped joints that cannot be eliminated by normal tightening or recommended procedures. There should be no evidence of excessive abrasion or scrubbing on the outer surfaces of hoses, rigid tubing, or hydraulic fittings.	
#	**Outriggers**	Outrigger number, locations, types and type of control are in accordance with manufacturer's specifications. Outriggers are designed and operated to relieve all weight from wheels or tracks within the boundaries of the outriggers. If not, the manufacturer's specifications and operating procedures must be clearly defined. Outriggers must be visible to the operator or a signal person during extension or setting.	
#	**Load Rating Chart**	A durable rating chart(s) with legible letters and figures must be attached to the crane in a location accessible to the operator while at the controls. The rating charts shall contain the following:	
		A full and complete range of manufacturer's crane loading ratings at all stated operating radii.	
		Optional equipment on the crane such as outriggers and extra counterweight which effect ratings.	
		A work area chart for which capacities are listed in the load rating chart, i.e. over side, over rear, over front.	
		Weights of auxiliary equipment, i.e. load block, jibs, boom extensions.	
		A clearly distinguishable list of ratings based on structural, hydraulic or other factors rather than stability.	
		A list of no-load work areas.	
		A description of hoistline reeving requirements on the chart or in operator's manual.	

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#	**Wire Rope**	Main hoist and auxiliary wire rope inspection should include examining for broken wires, excess wear, external damage from crushing, kinking, cutting or corrosion.	
#	**Cab**	Contains all crane function controls in addition to mechanical boom angle indicators, electric wipers, dash lights, warning lights and buzzers, fire extinguishers, seat belts, horn, and clear unbroken glass.	
#	**Braking Systems**	Truck cranes and self-propelled cranes mounted on rubber-tired chassis or frames must be equipped with a service brake system, secondary stopping emergency brake system and a parking brake system, unless the owner/operator ***can show written evidence*** that such systems were not required by the standards or regulations in force at the date of manufacture and are not available from the manufacturer. The braking systems must have been inspected and tested and found to be in conformance with applicable requirements.	
		Crawler cranes are provided with brakes or other locking devices that effectively hold the machine stationary on level grade during the working cycle. The braking system must be capable of stopping and holding the machine on the maximum grade recommended for travel. The brakes or locks are arranged to engage or remain engaged in the event of loss of operating pressure or power.	
#	**Turntable/Crane Body**	Make sure that the rotation point of a crane's gears and rollers are free of damage and wear, are properly adjusted, and the components are securely locked and free of cracks or damage. The swing locking mechanism must be functional (pawl, pin) and operated in the cab.	
#	**Counterweight**	The counterweight must be approved and installed according to manufacturer's specifications with attachment points secured.	

INSPECTION COMMENTS (* Attach a EQUIPMENT DEFECT FORM to promptly address any noted defects):

T03 0052-0020 Ver 00 - Approved - Exported from DMS: 2016-06-05 by RIREG

RESTRICTED

Pre-Lift Job Briefing

Document ID: 0049-0576
INS SUS-MET-LIF (AME US)
Pre-Lift Brief

Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2016.03.02		Version: 01

Site		Location			
Date (D-MTH-YYYY)		Time		AM / PM (Circle one)	
Weather		Temp (F)			
Wind Speed (M/S)		Gusts From (M/S)		to	

Crane Inspection

Operator Name:		Spotter Name:	
☐ Cable	☐ Hydraulics	☐ Operator Certification Current / Available	Exp. Date: _____
☐ Boom Test	☐ Capacity and Chart	☐ Equipment Certification Current / Available	Exp. Date: _____
Designated Signal Person(s):			
☐ Signals by Hand	☐ Signals by Radio / Phone (2 back up radios / phones available)		☐ Signals Reviewed

Rigging

☐ Rigging and lifting devices (Slings, Straps, Wire Rope Chokers, Spreader Bars, etc.) inspected	☐ Hooks have safety latches
☐ Rigging and lifting devices matches the tools required in all applicable work instructions	☐ Load limits verified

Position

☐ Outriggers on Solid Footing	☐ Counterweight Swing Area Barricaded
☐ Escape Routes Identified / Discussed	☐ Pinch Points Identified / Discussed
☐ Boom, Lines & Loads minimum of 10 feet (3.1 meters) from Power lines or ☐ Power Lines De-energized	

Review of Planned Lift (If additional steps are planned – list on back of form - ☐ see back of form)

Task Steps	Assigned to / Affected
1. Conduct test lift with load	Lift Supervisor / Crane Operator
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Crew

☐ Crew members have been oriented to the site	☐ All required PPE is worn correctly
☐ Crew members have received appropriate training	☐ Crew has reviewed lift plan

Crew Member (Print)	Crew Member Signature	Crew Member (Print)	Crew Member Signature
1.		5.	
2.		6.	
3.		7.	
4.		8.	

De-brief the Lift (use the back of the form as necessary - ☐ see back of form)

What went well?	Changes / improvements for next time?

File completed form in the Work Package.

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Critical Lift Plan/
RESTRICTED
Suspended Personnel Platform Inspection

Reason for Critical Lift Plan

Main Turbine Components Critical Lift Checklist (CLC) required Check (✓) All Applicable							
☐	Gearbox	☐	Generator	Hub	☐	Blade	☐ Hub/w Blades
☐	Main Shaft	☐	Main Bearing	Nacelle	☐	Tower Section	

Critical Lift Criteria - (✓) All Applicable
☐ Site Owner's revenue generating equipment is at risk in target lifting zone.
☐ Lifting of personnel (man basket).
☐ Lift is within the "prohibited zone" of electrical or high pressure gas lines. Legal to lift, with provisions.
☐ Multiple crane lift.
☐ Site Owner or Vestas supervision has identified a condition which requires a CLC.
☐ Gross load is greater than 75% of the crane's load charts for the given configuration and radius
☐ Helicopter used for lifting in lieu of crane.
☐ Wind speed greater than 20 km/12mile/hr. but still within crane manufacturer's maximum allowable. (1mph=1.61 km/hr.=.447 m/sec)
☐ Temperatures are lower than -30°C / -22°F.
☐ Hazardous materials are being lifted in the immediate lift zone.

GENERAL:			
Date:		Time:	Location:
Lift Description:			Contract No.:
Vestas Supervisor:			
Installation Subcontractor:		Install Supervisor:	
Crane Contractor:		Crane Operator:	

A	**LOAD:**						
1	Load Dimensions	H		W		L	
	WEIGHT:						

2	Empty		lbs.	6	Of Lifting Beam		lbs.	10	Of Excess Load Mtrl.		lbs.
3	Of Contents		lbs.	7	Of Sling/Shackles		lbs.	11	Other		lbs.
4	Of Aux Block		lbs.	8	Of Jib/Ext (erected/stowed		lbs.	12	Total Combined		lbs.
5	Of Main Block		lbs.	9	Of Hoist Rope		lbs.				

Source of Load weight Info:	
Load weight confirmed by:	

B	**CRANE**											
1	Type of Crane			4a	Radius at swing		ft.	5c	Boom angle at set-down		deg.
2	Boom length during lift		ft.	4b	Crane capacity at swing		lbs.	6	Gross Load (A12)		lbs.
3a	Radius at pick-up		ft.	4c	Boom angle at swing		deg.	7	Lowest gross crane capacity Total of B: 3b,4b,5b		lbs.
3b	Crane capacity at pick-up		lbs.	5a	Radius at set-down		ft.	8	% of crane capacity B:6/7 (must be ≤ 75%)	#DIV/0!	%
3c	Boom angle at pick-up		deg.	5b	Crane capacity at set-down		lbs.				

C	**JIB/EXTENSION**				**D**	**HOIST ROPE**			
1	Erected	☐	Stowed	☐		Main	☐	Rope Diameter	cm
2	If J/E is used: Length		ft.			Aux 1	☐	Parts of line	#
2a	Degree Off-set		deg.			Aux 2	☐	Capacity based on parts	lbs.
3	Capacity at greatest radius		lbs.						

E	**RIGGING (Required)**						
Custom lifting device	☐	Yes	☐	No	Describe:		
Slings	☐	Yes	☐	No	Describe:		
Shackles/Master link	☐	Yes	☐	No	Describe:		
Swivel hoisting ring	☐	Yes	☐	No	Describe:		
Torqueing tools required	☐	Yes	☐	No			
Torque requirements		ft./lbs-nM					

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Critical Lift Plan/
RESTRICTED
Suspended Personnel Platform Inspection

F	CRANE PLACEMENT											
1a	Smooth solid foundation	☐	Yes	☐	No	2a	Pick & carry required	☐	Yes	☐	No
1b	Crane pad (compacted)	☐	Yes	☐	No	2b	Crane Mfg. allows	☐	Yes	☐	No
1c	Crane mats or blocking	☐	Yes	☐	No	2c	Travel path firm & level	☐	Yes	☐	No

G	SPECIAL CONSIDERATIONS				
1a	Completed Pre-Use Inspection	☐	Yes	☐	No
1b	Completed Suspended Personnel Platform (SPP) Checklist	☐	Yes	☐	No
2a	If near electrical lines, de-energized?	☐	Yes	☐	No
2b	If energized, adhere to OSHA rules & clearances. Determine local requirements needed to proceed.			☐	✓ Applicable
2c	Confirm with the gas company about clearances required for lifting			☐	
3	Multiple crane lift requires a separate plan for each crane.			☐	
4	Pre-Lift Job Briefing to be completed before proceeding with this lift.			☐	
5	Vehicular/pedestrian traffic, must be rerouted during lift activity.			☐	
6	Obstructions in immediate area of critical lift.			☐	
7	CLC is accompanied by elevation view and plan view drawings and lift analysis calculations.			☐	Yes ☐ No

H	Lift Director Checklist	✓			✓			✓
1	Crane Inspected	☐	8	Crane Counterweight	☐	15	Signal System	☐
2	Rigging Inspected	☐	9	Load Test	☐	16	Tag Lines	☐
3	Crane Set-up	☐	10	Wind/Temperature	☐	17	MSD sheets	☐
4	Boom Sweep Area	☐	11	Safety Spotter	☐	18	Traffic	☐
5	Hoist Height	☐	12	Hazardous Materials	☐	19	Tailboard	☐
6	Head Room	☐	13	Operator Qualifications	☐	20	Site Control	☐
7	Load Dimensions	☐	14	Rigger Qualifications	☐	21	Signatures	☐

I	COMMENTS/SIGNATURES

Vestas Supervisor or Lift Director

Print Signature Date

Crane Operator

Print Signature Date

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Critical Lift Plan/
RESTRICTED
Suspended Personnel Platform Inspection



Vestas Location:				Date:	
Manufacturer:				Serial #:	
Platform: Capacity		Weight		Inspector:	
Person in Charge:				Crane Operator:	
Signal Person:					
Describe Work Activities:					
Crane Description:					

Status: S = Satisfactory D = Deficiency R = Recommendation NA = Not Applicable

General			**Platform**		
1.	Designed by Qualified Engineer		15.	Rigging Connection Points (Lugs?)	
2.	Document Compartment		16.	Guard Rail System	
3.	Manual or Instructions		17.	Inside Grab Rail (entire perimeter)	
4.	Inspection Reports		18.	Access Gate (swings inward)	
5.	Identification Plate		19.	Gate Restraint	
Dedicated Rigging Assembly			20.	Overhead Protection	
6.	Wire Rope Sling Bridle		21.	Smooth Surface and Edges	
7.	Alloy Chain Sling Bridle		22.	Welds - grades, types & material specified	
8.	Rigid Leg Attachment		23.	Fall Protection Anchorage Points	
9.	Optional Safety Sling to Hoist Line		24.	Slip Resistant Floor	
10.	Shackles		25.	Bolted Connections	
11.	Pins / Fasteners		26.	Material Tie-Downs	
12.	Other		27.	Hand Signal Chart	
13.	Other		28.	Solid construction form toe board to mid-rail	
14.	Other		29.	Data plate - platform weight and capacity	

Comments:

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Critical Lift Plan/
RESTRICTED
Suspended Personnel Platform Inspection

Radius at Work Point:	
Crane Capacity at Above Radius:	
Capacity of Man basket:	
Maximum Body Weight:	
Weight of Tools/Materials:	
Total Load:	

	S = Satisfactory U = Unsatisfactory R= Recommendation NA = Not Applicable		Notes
Pre-Lift	Suspended Personnel Platform (SPP) - is it really needed?		
	Crane Fuel Level - Fluids Full		
	Crane Inspected		
	Personnel, Tools & Materials Within Man basket Capacity		
	Hard Hats, Tag Lines, Radius		
	Inspect SPP, Rigging and Ground Under Crane		
	Crane Adequate, No Free Fall on any Hoist, Main Boom		
	Positive Anti-Two Blocking, Boom Angle Length or Radius Mouse Hook or Have Lock		
	Calculate Weight - SPP and Gross Load		
	50% of Load Lines and Load Chart of Given Radius		
	1% of Level - Firm Ground		
	Outriggers Fully Extended		
	Weather Conditions Permit Work		
	Pre-Lift-Boss, Operator, Ground-Person & Personnel Attending		
	Secure Tools & Materials, Test Lift in Every Direction		
	Follow Lift Route		
	Inspect SPP - Hardware 6" Off Ground		
	Re-evaluate Lift Round - OK?		
	No Kinks, Twisted Lines, Hook Centered		
	Equipment allows platform to remain within 10 degrees of level, regardless of boom angle.		
	Lower SPP, Remove Tests		
Lift	Personnel Fall Arrest Equipment, Life Jackets, & Hard Hats		
	Body Parts Inside During Lift Movements		
	No Other Loads on Hook		
	Easy, Slow Lifts and Movements		
	Move SPP to Work Station as Planned		
	Set Brakes and Stay in Cab		
	May or May Not Secure to Work Station		
	Perform Work		
	Remove Tie-Off if Tied on to Work Station		
	Return SPP to Ground-Same Travel Route, Remove Brakes & Dogs		
Post-Lift	Post Lift Meeting		
	Operator, Boss, Ground-Person, & Working Personnel		
	Review Good & Poor Activities		
	Note Equipment Problems & Correct		
	If SPP Problems Noted (damage) or Modified Proof Test at 125%		

Lift being made complies with the requirements of OSHA 29CFR1926 and ASME B30.23? ☐ Yes ☐ No

Comments or additional Notes:

	/	
Operator Signature:		Supervisor Signature:

Document History		
Rev	Date	Description of Changes
00	9-26-2005	New Document
01	3-1-2010	Document put into DMS
02	6-22-2012	Converted document to Excel and added Personnel Platform Inspection
03	8-6-2014	Fix Revision Number, Added Document History, Corrected spelling, added check boxes

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VESTAS PROPRIETARY NOTICE

Lifting Guidelines for Turbine Service Hoists and Material Handling Vestas System Instruction

Document ID: 0049-0578
INS SUS-MET-LIF (AME US & CAN)
Service Hoist Material Handling

Owner(s):	Author(s):	Valid from:		Version:
BPO.Del.SUS	RIREG	2016.05.03		01

Version history

Version No.	Date	Description of Changes
01	2015-05-03	Updated Sections: 2.2, 2.3, 2.5, 9, 10, 11, 15.1, 16.2

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VESTAS PROPRIETARY NOTICE

1 Purpose

The purpose of this document is to provide guidance on proper lifting procedures when using the turbine's internal hoist to raise and lower equipment from the nacelle.

2 Responsibility

2.1 Senior Management

2.1.1 Ensure effective program development and implementation.

2.1.2 Provide Site/Construction Management with adequate resources and support to carry out program responsibilities and obligations.

2.1.3 Require adherence to all policies, procedures, practices and rules related to the use and care of internal hoists.

2.1.4 Oversee and evaluate Site/Construction Manager performance.

2.2 Site/Construction Managers and Supervisors

2.2.1 Ensure all personnel under Vestas supervision adhere to all policies, procedures and rules related to the use, care and storage of turbine lifting equipment.

2.2.2 Periodically evaluate current work station configurations and employees' work techniques to assess the potential for and prevention of injuries.

2.2.3 Ensure contractors supply required, approved personal protective equipment for their personnel as required by the site hazard assessment.

2.2.4 Ensure all personnel under Vestas supervision have received training from a competent person and have adequate knowledge and skills to perform their duties using the required Personal Fall Arrest System (PFAS) and rigging equipment.

2.2.5 Ensure the Personal Fall Arrest System Inspection Record and Descent Device Inspection Records are filled out and are on file for all personnel, contractors and visitors utilizing said equipment;

2.2.6 Ensure rigging equipment Inspection are completed annually by a Qualified Rigging Inspector and that records are filled out and on file for all rigging equipment;

2.2.7 Ensure the work is carried out in compliance with the requirements of the Vestas Procedures, Federal, State and Local Regulations;

2.2.8 Ensure that all required fields in the Job Safety Analysis are filled out daily in all worksites;

2.2.9 Investigate all personnel complaints and incidents involving fall protection and identify and implement corrective action wherever necessary.

2.3 QSE Department

2.3.1 Oversee and administer the Lifting Guidelines for Turbine Service Hoists;

2.3.2 Act as a resource for inquiries pertaining to the guidelines; and

2.3.3 Lead the annual review of the guidelines and ensure it meets the regulatory requirements.

2.3.4 Lead the annual training review of ergonomic and manual handling techniques.

2.3.5 Investigate injuries caused by improper lifting and incorporate findings into additional equipment or work procedures to avoid future injuries.

2.4 Personnel

2.4.1 Be familiar with the Vestas hoist work instructions and systems;

2.4.2 Follow the procedures as trained;

2.4.3 Inspect equipment before use;

2.4.4 Fill out Job Safety Analysis (hazard analysis);

2.4.5 Maintain equipment in accordance with manufacturer's specifications;

2.4.6 Report any concerns to the Site/Construction Manager or Supervisors;

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2.4.7 Use and inspect equipment in accordance with manufacturer's specifications whenever instructions are not provided in VAME procedures; and

2.4.8 Work in a safe manner with regards to ergonomic body positioning.

2.5 Vestas Technical Training Center (TTC)

2.5.1 Design and develop hoist and rigging training per applicable standards.

2.5.2 Conduct rigging training in Basic Safety Training for all newly hired personnel.

2.5.3 Maintain training records.

2.5.4 Perform material handling and lifting technique training in basic safety.

3 References

Document No.	Title
29 CFR 1910.179	Overhead and gantry Cranes
29 CFR 1910.184	Slings
0049-0574	Crane Safety Program
0049-0571	Fall Protection Program
0008-9806	Emergency Preparedness

4 Scope

This procedure applies to all Vestas personnel, contractors and visitors involved in rigging and/or operating internal hoists and other manual material handling activities.

5 Terms and Abbreviations

Term or Abbreviation	Definition
PPE	Personal Protective Equipment
JSA	Job Safety Analysis
OEM	Original Equipment Manufacturer
TTC	Technical Training Center

6 Forms

Document No.	Title
0049-0549	Job Safety Analysis
0049-0572	Personal Fall Arrest System Inspection Record
0049-0559	Descent Device/RTU Inspection Form

7 Risk Analysis

7.1 Hazards

7.1.1 Falling objects

7.1.2 Working at heights

7.1.3 Pinch points

7.1.4 Electric Shock

7.1.5 Improper anchor points

7.1.6 Manual lifting

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8 Personal Protective Equipment (PPE)

8.1 Requirements

Hard Hat	Safety Boots
Safety Glasses	Gloves
Fire extinguisher	First Aid Kit and eye wash
Emergency decent kit	Personal Fall Arrest System

9 Approved Rigging and Lift Bags

All rigging and Lifting bags require a pre-use inspection; rigging also requires an annual recertification by a Certified Rigging Inspector.

9.1 Rigging:

9.1.1 All rigging has to meet ASME B30.9, B30.10 and B30.20 Standards;

9.1.2 Self-locking hooks are required on all slings with integral hooks.

9.2 Lifting Bags:

9.2.1 All lifting bags must be load rated by the manufacturer.

9.2.2 Require closable tops

10 Manual Lifting Guidelines

10.1 Load Identification

10.1.1 Service and Constructions shall choose between these two options for load identification:

10.1.2 Load Labeling/Tagging













10.1.3 **Equipment Lift Label** – used to identify all loads that always require mechanical advantage equipment to move (forklift, dolly, hoist, 5:1)

10.1.4 **Partner Lift Label** – used to identify all loads that always require at minimum a partner to move.

10.1.5 Solo Lift label – used to identify items that are easily managed by one person**.**

10.1.6 In any scenario where an item is unknown, loose, awkward to handle or otherwise difficulty comes when handling, the next progressive label shall be placed on the item.

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10.1.7 Weight limits/ranges are at the discretion of the Vestas employees performing the labeling, with the intent consideration is made for all employees on location.

10.1.8 Labels and tags can be sourced locally, or through Premier Press @ Phone: 503.223.4984.

10.1.9 Reserved (JSA Planning for load lifting)

10.2 Weight Painting

10.2.1 Weight Painting of items




10.2.2 Utilizing the shipping weight, product specification, or actual weight of items, the weight of individual components can be marked on the item.

10.2.3 This is to be specifically applied to turbine components handled in tight areas, and is to be considered when loading lift bags.

10.2.4 Painting shall be prominent for visibility to service technicians, but must not interfere with inspection or operation of turbine parts or equipment.

10.2.5 Reserved (JSA Planning for load lifting)

11 Select Proper Rigging

11.1 Requirements

11.1.1 Approved rigging devices and slings must be used.

11.1.2 The rigging must have clearly legible labels including serial numbers.

11.1.3 All rigging must be current on its inspection and be tagged or identified clearly showing its expiration date.

11.1.4 If there is any question as to the condition of the rigging, its identification, or inspection expiration date the rigging must not be used.

11.1.5 The approved hooks for Vestas are self-locking hooks; these are industry standard for the prevention of dropped loads.

11.1.6 Rigging and lifting activities must include ambient temperature as an environmental consideration when lift plans are made. All Vestas below the hook lifting devices e.g., nacelle bars, t-bars, j-hooks, etc., as well as nacelle lift points, bolts, etc., have service temperature limits.; Stop/Discontinue rigging and lifting activities if ambient temperature reaches service temperature limits of any single piece of equipment involved in the work.

11.1.7 Synthetic slings must be kept dry, this is especially important in sub-zero temperatures. In the event a sling becomes wet then frozen the sling must be removed from service until it can be dried, and a proper evaluation by a qualified person can be performed; and

11.1.8 Rigging not in use should be removed from the work area and properly stored.

11.1.9 Below are some examples of common rigging devices:

Self Locking Hook



Shackle



4 Leg X-mas Sling



Endless



Eye & Eye



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NOTE: Never use safety gear or PPE for lifting.





11.1.10 Choose proper rating for load being lifted and the configuration used. Rating, type, serial number, & inspection/calibration information must be clearly legible.



11.1.11 Protect rigging and labels from damage such as; sharp edges, corrosives, fluids, or grease. Labels or tags on rigging are not to be used as edge protection!



11.1.12 Only rigging with positive locking devices are approved for use. This is to prevent roll out and dropping loads.



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NOTE: Lift bags with closed tops or other completely sealed containers are the only containers approved for use by Vestas.

11.1.13 Various models of closed top bags are now available through multiple vendors.



VT70003216



VT70003217



VT70003215

11.1.14 Use only lift bags that are rated for lifting and have the required label and ID number per ASME B30 standards.

11.1.15 Use specially rated slings to lift non-rated bags. **Never use unrated handles of equipment.**

11.1.16 Lifting bags are not considered rigging therefore, bags will not be tagged for recertification, but still require pre-use and periodic inspection by a competent person. Lifting bags will be inspected and documented as part of the quarterly truck inspection



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12 Inspection and Use of Rigging

The following items must be inspected on every piece of rigging before each use:

12.1 Labels on rigging legible including

12.1.1 Rated capacity

12.1.2 Manufacturer

12.1.3 Size

12.1.4 Serial Number

12.1.5 Current inspection tag (calibration)

12.1.6 Inspect for damages or wear

12.1.7 Hooks must be functioning and intact

12.1.8 Ensure that no obstructions such as snow or ice are compacted in the casing of the self-locking hooks.

12.1.9 Refer to documentation on the rigging device for the pass/fail criteria.

13 Internal Hoist

13.1 Inspections

A visual inspection of the hoist equipment must take place prior to each use:

13.1.1 Refer to turbine service manual for hoist inspection criteria of before each use;

13.1.2 Inspect chain and hook for visible damage and latch function;

13.1.3 Inspect hoist for any visible damage; and

13.1.4 Inspect the mounting points, hardware and fasteners.

13.2 Use and Testing

The hoist must be tested prior to each use and any defects must be corrected prior to use.

13.2.1 Prior to opening the hoist hatch for testing and using the hoist, remove all nearby objects that pose a falling object hazard. Ensure that all personal items are secured in an appropriate holder (e.g. radios). Hoist operation requires the use of both of the operator's hands.

13.2.2 Some hoists are equipped with a guide tube that allows the chain to flow to and from the chain storage area to the hoist motor. Inspect to ensure that the chain guide is secured. Failure of this chain guide could cause the hoist chain to fall dangerously from the storage area.

NOTE: In the event of an uncontrolled chain fall, DO NOT ATTEMPT to stop the chain once it has started falling as this could result in hand injury

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13.2.3 Test for correct operation of hoist and pendant. Test the 'up' function and the 'down' function for proper operation.

13.2.4 Never attempt to defeat or override the momentary switches on the hoist control pendant.

13.2.5 Refer to hoist manufacturer's manual for inspection and testing before each use (In turbine manual).

13.2.6 Always perform a short test lift to ensure the load is stabilized and recheck the load for loose objects prior to continuing lift.

13.2.7 The shaft brake should be set prior to operating the service hoist lift.

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14 Lifting Hazard Zone

14.1 Lifting outside of a tower:

14.1.1 Before opening the hatch secure all personal items and secure the area around the hatch removing any potential fall hazards.

14.1.2 Ensure that a Lifting hazard zone has been properly established and physically marked with cones, barricades and/or signage.

Example of Physically Marking of Lifting Hazard Zone Using Cones



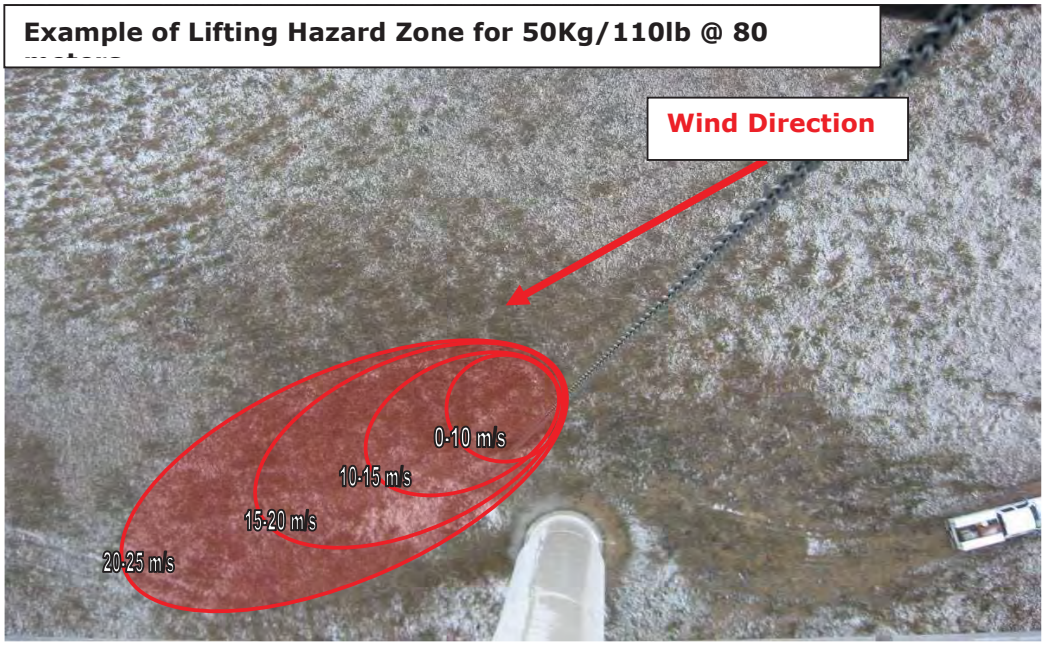
Example of Physically Marking of Lifting Hazard Zone Using Signage



14.1.3 Lifting hazard zone entry protocol should be established and communicated to all site staff, subcontractors and visitors.

14.1.4 The below chart should be used as a guide for when loads are being lifted on the outside of the tower.

Example of Lifting Hazard Zone for 50Kg/110lb @ 80 meters

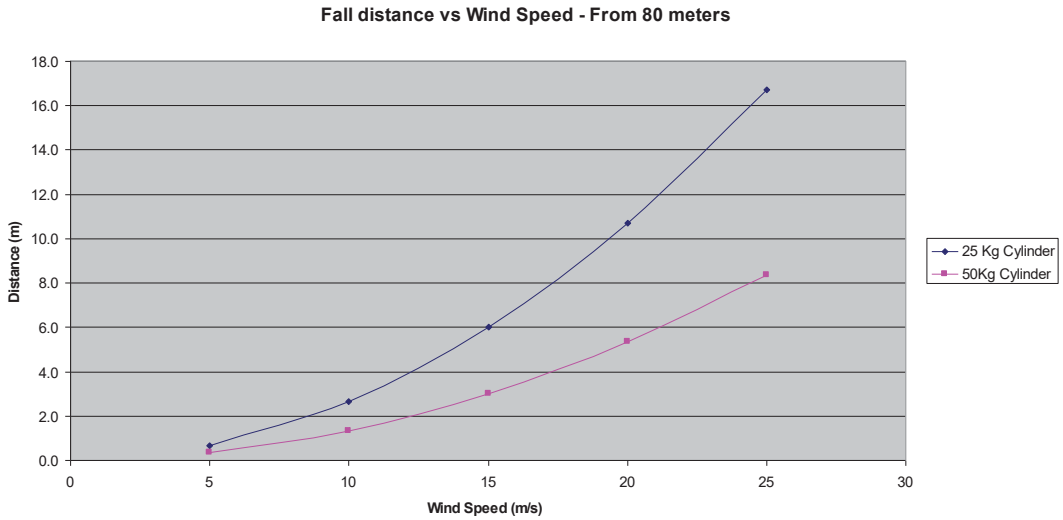


14.1.5 Trucks, personnel, transformers, stairs and any other equipment must never be in the lifting hazard zone when any overhead work is taking place.

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14.1.6 Loads shall never pass over personnel and no persons shall pass or work under suspended loads. Any exception to this practice must be identified on a JSA and discussed in the pre-lift brief.



Below are the assumption and criteria for development for the table.

- Falling Object Calculation: (Based on 0.5m dia x 0.5m tall Cylinder
- Assumptions: Air density 1.2 kg/m3 (sea level, 20deg C

It is important to use this as a guide only; the safe zone is dependent on the mass and affect the wind can have on the load "and your mileage may vary".

15 Lifting and Lowering Practices (Outside Tower)

15.1 General Requirements (all platforms)

15.1.1 Down tower technician shall establish and physically mark drop zone.

15.1.2 Up tower technician shall:

15.1.2.1 Secure all items around hoist hatch; then

15.1.2.2 Radio down tower tech to verify drop zone is clear prior to opening internal hoist hatch.

15.1.3 Technicians must be 100% tied off before opening the internal hoist hatch.

15.1.4 When using a 4 Leg X-mass sling:

15.1.4.1 Heaviest equipment/material should be placed on the shortest leg at the top of sling, closest to the hoist hook.

15.1.4.2 No other rigging shall be utilized for the purpose of adding capacity to the 4 leg sling (no Daisy Chaining).

15.1.4.3 Position bags so that if they are side by side they can fit through the hoist opening.



15.1.5 Load bags at less than rated capacity.

15.1.6 Slings must be woven through bag handles for added protection to prevent rollout and as added protection in case of a failure in the rigging.

15.1.7 The maximum weight for one person to carry is 50 lbs. and the maximum for two people to carry is 100 lbs. per bag.

15.1.8 Only put one item on each hook.

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15.1.9 Tag lines must be utilized wherever they do not pose a hazard for personnel or the load being lifted.

15.1.10 When a hazard is identified, an appropriate mitigation plan must be implemented and documented on the JSA outlining the safest course of action.

Exception: in winds less than 5 m/s on a 10min Ave., a tag line is recommended but optional when the load is away from the wind and not over the stairs or other structure in the drop zone. If during the course of the job, wind speeds rise above 5 m/s, the exception no longer applies and a tag line must be used.

15.1.11 When not in use Tag lines shall be:

- Collected into the nacelle;
- Left on the ground; or
- Candy caned around the tower (if yawing is not required)

NOTE: If a tag line is to be dropped to the ground due to the inability to collect it into the nacelle or safely return it to the ground it may be dropped inside the drop zone provided:

- All personnel and equipment are clear of the area;
- Wind speeds are less than 10m/sec;
- The ground end of the tagline is secure (candy caned or tied off); and
- Dropping of the tag line is documented on the JSA.

15.2 Lifting Practices: (Ground to Nacelle)

NOTE: There should not be an excessive amount of hoist chain on the ground while connecting equipment and loads.

15.2.1 Lift load to so that all materials just clear the ground and verify all loaded hooks are secure.



15.3 Up tower removal

15.3.1 V82 platforms

15.3.1.1 The first person climbing is recommended to have carried up the service hoist kit and will now place one end of the positioning sling to the gearbox lifting eye on the service hoist side and nearest the Main Bearing, by choking it around the eye.



15.3.1.2 The material handling carabineer will then be attached to the other end of the sling by choking the sling as well.

15.3.1.3 Once the load has reached the nacelle attach positioning sling to first bag through the hatch.

15.3.1.4 When the positioning sling is attached to the bag it is now safe to remove bag from 4-way and move bag to the Main Bearing side of the gear stay.

15.3.1.5 Repeat until all bags are removed from 4-way and hatch is closed.

15.3.1.6 15.3.1.6 All bags or lifted items must be secured prior to being removed from the 4-way or hook.

15.3.2 NM legacy turbines, V47, V80, V90 and later platforms



15.3.2.1 Bags shall not be removed from 4-way until hoist hatch is closed or load is secured within the nacelle.

15.4 Lowering Practices: (Nacelle to Ground)

NOTE: 4 way slings must be connected to internal hoist hook prior to loading.

15.4.1 V82

15.4.1.1 Bags shall be staged on the Main Bearing side of the gear stay.

15.4.1.2 Attach material handling carabineer to bag.

15.4.1.3 Secure bag to 4-way and remove material handling carabineer and lower bag through hatch.

15.4.1.4 Continue process until each leg of 4-way is loaded.



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15.4.2 NM legacy turbines, V47, V80, V90 and later platforms**:**

15.4.2.1 Load 4-way prior to opening hoist hatch.

16 Lifting and lowering (Inside the tower):

16.1 General Requirements (all platforms)

16.1.1 Radio communication between ground personnel, spotters, & operator must be used when operating service hoists. Communication protocol must be tested prior to lift.

16.1.2 When lifting or lowering tools and/or equipment inside the tower if it is necessary to guide the load, all personnel must maintain a safety zone below the hatches.

16.1.3 Personnel must be tied off in accordance with applicable fall protection guidelines.

16.1.4 Keep body clear of the chain and hoist components while lifting

16.1.5 Spotter must stand close to the outside walls of the tower when spotting loads through hatches.

16.1.6 All loads must be in approved sealed bags/locked containers and rigged so they will not catch on hatch frames.

16.1.7 Spotter must be dedicated to the task of watching the lift at all times.

16.1.8 Spotter must exit the tower when they are not spotting the load.

16.1.9 When loads are to pass through a hatch special care should be taken to prevent damage to hoist or equipment being moved. If operator does not have a clear view of the load passing through a hatch, a spotter must be used. Spotters must have radio communication with operator.

16.1.10 Loads poorly configured to pass through a hatch must be returned to origin and reconfigured. Never try to force or “shake” a load through a hatch.

16.1.11 Respect the lifting hazard zone; never allow persons, equipment, or transformers to be in the hazard zone.

16.2 Safe Removal of Equipment

16.2.1 When working above six feet (1.8 m) all persons handling loads must be wearing PPE and properly tied off to prevent falls.

16.2.2 Only remove load from hook when load is secured using a properly anchored service hoist kit.

16.2.3 Use safe lifting practices when lifting and setting bags, “lift with legs, not back”.

16.2.4 Avoid twisting and non-ergonomic positions while lifting loads.

16.2.5 If you cannot safely remove the items return the load to ground for reconfiguration.

16.2.6 To prevent personal injury, use 2 people whenever possible for loads that are difficult to handle.



16.3 Manual Material Handling

16.3.1 When moving components or materials heavier than 10 pounds between decks, personnel are required to assess the hazard and use proper lifting techniques where possible to avoid soft tissue injuries.

16.3.2 When moving components or materials heavier than 50 pounds between decks, personnel are required to use a 5-1 pulley system (VT70003312) or similar device with a progress capture or automatic locking system.

16.3.3 The pulley and associated rigging are to be inspected prior to use and annually.

16.3.3.1 Prior to use: by a trained technician.

16.3.3.2 Annually: by a Certified Rigging Inspector.

16.3.4 Loads should be limited to 100lbs or less

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16.3.5 The pulley and associate rigging shall be attached to an engineered anchor point or other structure deemed substantial enough to withstand the intended load.

16.3.6 Where manual material handling poses a hazard to personnel engineering controls will be utilized to design to decrease or eliminate the hazard.

17 APPENDIX: version history

Version No.	Date	Description of Changes
00	2010-03-29	First edition
01	2010-08-30	Additions to section 13
02	2012-10-29	Revised or added sections 2,4,5,6,7,8,9,14,15,16
03	2014-02-25	Revised sections 2, 11, 14, 15
00	2015-02-12	Converted T09 Document (0009-9344) To T03

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RESTRICTED

Crane Safety Program
Quick reference card

Purpose: The purpose for this quick reference card is to be used by site based personnel to check crane companies are following the minimum safety requirements for the crane tasks. For full details, please consult the document named "Crane Safety Program" - DMS No 0049-0574

Pre-mobilization

- [ ] Crane certification available (if needed)
- [ ] Crane components safely transported to crane pad
- [ ] Crane meets job specifications
- [ ] Configuration and capacity identified and accepted
- [ ] Lift Plan incl. Load and capacity charts approved
- [ ] If crane job is subcontracted (2nd tier), this has been approved by Vestas

Crane Operator

- [ ] Crane operator trained in specific model and type
- [ ] Pre-use inspection of crane performed and documented
- [ ] Black box available and working (if applicable)
- [ ] Crane operator aware about full authority during lift

Lift Supervisor

- [ ] Identified to supervise crane and lifting activities
- [ ] Knowledgeable about the different available lifting equipment
- [ ] Lifting equipment inspected
- [ ] Method for attachment of load determined
- [ ] Communication during lift (language, signals) agreed
- [ ] Load weight determined

Rigger

- [ ] Familiar with lift plan
- [ ] Has identified lift points and understand the effect of angles
- [ ] Properly attached taglines and familiar with procedures
- [ ] Check for overhead obstacles

Signaler

- [ ] Clear line of sight always maintained with crane operator
- [ ] Competent in use of agreed signals
- [ ] Clearly communicating via radio
- [ ] Responsible for guiding the crane during move, especially when reversing

Safe Operating Practices

- [ ] Always check warning devices and signals before use
- [ ] Always ensure the new location supports the weight (Ground Conditions)
- [ ] Always keep suspended loads clear of all obstructions
- [ ] Always position the hook directly over the load (center of gravity) before lifting;
- [ ] Always test brakes, by method of a short lift, to ensure control;
- [ ] Before being lifted, loads will be checked for proper balance;
- [ ] Never allow riders on loads or hooks;
- [ ] Never attempt to operate a crane or hoist that is suspected to be unsafe;
- [ ] Never carry loads over or past workers (they must yield right of way);
- [ ] Load charts, or their functioning electronic equivalent, shall be highly visible to the Crane Operator;
- [ ] Crane Hooks shall be the type that can be closed and locked to eliminate the throat opening;
- [ ] All rigging and lifting equipment such as slings, shackles, chains, etc., shall be clearly marked according to their rated capacity;

Rigging and lifting equipment

- [ ] shall be visually inspected for defects by a qualified person (normally the rigger) before each use.
- [ ] Defective rigging and lifting equipment shall not be used, shall be placed in quarantine and be clearly labeled “Unsafe, Do Not Use” or other similar language

Guide ropes (tag lines)

- [ ] shall be used to control loads that can potentially rotate or swing out of control

(please see more details about Guide Ropes in the full Crane Safety Program)

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Wind speed indicator:

- [ ] A device shall be provided to display the wind speed. This device should be mounted at the top of the boom or jib of the crane and used to ensure wind speed is within crane and project specifications. This device shall be calibrated and shall have data logging capability (regional regulations may or may not require). Calibration and documentation of wind speed shall be provided to Vestas upon request;

Crane Safety Devices (Mandatory, Minimum)

- [ ] Limit switch (anti-two blocking device) to shut off power to the hoist mechanism when the lower load block or overhaul ball is hoisted too near the hoist mechanism
- [ ] Load Indicating Device, a system which measures and displays the weight on the hook **or**, Rated Capacity Indicator, Load Moment Indicator (LMI), which displays to the crane operator the weight on the hook, radius, and /or percentage of rated capacity **or**, a Load Movement Indicator (LMI) that is also tied to the crane's control system and will automatically shut off power and set the brakes if an overload condition is reached (also known as a Rated Capacity Limiter)

Positioning Cranes and Loads

- [ ] Crane pads must be inspected for size and soil bearing capacity before any crane components or loads are being placed on it. Soil bearing capacity must be documented by civil works contractor
- [ ] Crane (both main and auxiliary) stabilizers/outriggers must always be fully extended and placed on suitable distribution elements

Roadway closure

- [ ] If public road, assess the traffic and see guidelines in Crane Safety Program

Exclusion Zones

- [ ] If personnel have no specific task in relation to the hoisting operation, they must leave the area
- [ ] Only minimum indispensable machines, containers, vehicles can be inside the exclusion zone
- [ ] The barrier will be placed at a minimum distance equal to the height of the wind turbine plus 40 meters (measured from the center of the foundation section).
- [ ] Only the Lift Supervisor can grant personnel access to the exclusion zone during hoisting operation
- [ ] The exclusion zone/barrier must be clearly marked with, e.g., sign posts and/or signaling tape
- [ ] Road barriers must be jersey barriers or similar
- [ ] The drop zone must be constantly supervised - no persons are allowed under a suspended load

Overhead Power Lines

- [ ] Safe distance must always be respected
- [ ] Voltages of 35 kV or less require minimum clearance of 3 meters (10 feet)
- [ ] At voltages above 35 kV, this distance increases according to the table in the Crane Safety Program

Fall protection

- [ ] Applies to persons who perform assembly, disassembly, maintenance and inspections on cranes
- [ ] A full-body safety harness and two shock absorbing lanyards (or a single 'Y' type lanyard) attached to an anchor point shall be applied
- [ ] Personnel performing this type of work shall be trained in working at heights.
- [ ] Personnel shall be attached to the anchor point 100 percent of the time when a potential fall of 2.0 meters or more exists (local legislation might require this at any height)

Lift Plans

- [ ] Lift plans shall be developed and supervised by a qualified person.
- [ ] Lift Plans are a requirement for any lift performed with a crane
- [ ] It is the responsibility of the Site Manager to ensure a review of the lift plans, by a qualified person, as well as to enforce the requirements of the lift plans whenever the crane company is a direct . subcontractor of Vestas
- [ ] See lift plan minimum requirements in the Crane Safety Program
- [ ] Special/Complex/Critical Lifts require additional details

Personnel Platforms

- [ ] These devices shall be used as a last resort to access elevated work areas
- [ ] Personnel Platforms shall be of the type that are attached to and moved by a crane
- [ ] Personnel platforms arranged by block/shiv and hoists are prohibited
- [ ] See more personnel platform requirements in the Crane Safety Program

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Vehicle Use Policy/Procedure Vestas System Instruction				Document number:0009-0270 INS SUS-IEM-EMR (AME US/CAN) Vehicle Use
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.03.27		Version: 06

Version history

Version No.	Date	Description of Changes
06	2015.03.27	Revised Document to Vestas L5 template, References and DMS #

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1 Policy

- The purpose of this VAME Vehicle Use Policy and Procedure (“Policy”) is to establish procedures by which employees formally acknowledge and accept the responsibilities of operating a VAME Owned, Leased, Rented and Non-Owned Vehicle. Further, it establishes requirements for enforcement of VAME Driver Qualifications. To accomplish this, we are assigning the responsibility for loss prevention to all management and supervisory personnel.
- Execution of this Policy will put VAME in a leadership position for employee safety relative to the operation of its vehicles. The periodic review of Motor Vehicle Reports (MVR) will identify employees with adverse driving records in order to prevent losses from occurring and to preserve VAME’s defensive position should litigation occur. The procedures in this Policy are to assist in maintaining our ability to obtain insurance coverage and assist in reducing the incidents of automobile-related accidents, property damage, injuries, deaths and other costs.
- When employees operate a VAME Owned, Leased or Rented Vehicle, or Non-Owned Vehicles on public and private roadways, they have inherent responsibilities to care for the vehicle in

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their care, obey all federal, state, provincial, and local traffic laws, continuously observe safe and courteous driving practices, and abide by VAME Driver Qualifications set forth herein. Employees have certain operator requirements such as performing pre-operation inspections of the vehicle, security, reporting damages and vehicle incidents in a timely manner, and to not operate vehicles if unsafe or if conditions exist that would result in vehicle damage or bodily injury. These are conditions of employment and required protocol that must be followed in order to drive a VAME Owned, Leased or Rented Vehicle, or Non-Owned Vehicles.

- VAME will perform a MVR background check post-offer, pre-employment on all candidates considered for hire. VAME may conduct periodic reviews of MVRs of current employees, and VWS A/S employees or employees of other sister subsidiaries on temporary assignment to VAME (herein after collectively referred to as “employee” or employees”), as allowed by the applicable law.

2 Scope

The Policy applies to all employees of Vestas-American Wind Technology, Inc., Vestas-Canadian Wind Technology, Inc., and Vestas Wind Systems A/S employees or employees of other sister subsidiaries on temporary assignment to VAME.

3 References

Document No.	Title
0009-0271	Vehicle Operations and Maintenance Guidelines
0008-9827	VAME Company Car Procedure
0037-2940	VAME Vehicle Policy, Record Release and Driver Agreement (Exhibit A)
0042-3182	Incident Reporting (Red button on HSE HUB page) “Report an Incident” (Credit 360)
0037-2941	Vehicle Incident Reporting Process Flow (Exhibit D)
0037-2942	Accident Guidelines (Exhibit G)
0037-2943	PDA Use - Distracted Driving Policy (Exhibit H)

4 Terms and Abbreviations

Term or Abbreviation	Definition
Authorized Driver	Only employees of VAME are allowed to drive vehicles that are Owned, Leased or Rented by VAME. Spouses/significant others, subcontractors, etc., are not considered an Authorized Driver except when allowed according to Section 5.4.
Direct Dispatch	Use of a VAME Owned or Leased Vehicle by site personnel to commute to and from the project site to the employee’s residence. Use of the VAME Owned or Leased Vehicle is not for personal use, except for an incidental stop while traveling between the project site and the employee’s residence.
Driver Review Committee	A Driver Review Committee shall consist of representatives from Service Management, Construction Management, Fleet Strategic Procurement and Planning, Legal/Risk Management, Sustainability/HSE and P&C.
MVR	Motor Vehicle Records (issued by driver licensing authority(ies))
Non-Owned Vehicle	A vehicle owned or leased by an employee receiving a car allowance, or mileage reimbursement, for use in the regular scope and course of their employment with VAME, or an employee who drives their personal vehicle to go for mail, make a deposit, pick up supplies, etc., on an incidental or infrequent basis. The employee’s insurance is primary for both liability and physical damage.

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Term or Abbreviation	Definition
OSHA	Occupational Safety and Health Administration
Owned, Leased and /or Rented Vehicle	A vehicle provided by VAME for use by an employee for company business.
PDA	Personal Digital Assistant – cell phones, Blackberries, Blackjacks, iPhones, etc.
VAME	Vestas-American Wind Technology, Inc., Vestas-Canadian Wind Technology, Inc.
VWS A/S	Vestas Wind Systems A/S

5 General Requirements

5.1 General Requirements

5.1.1 All employees who drive a VAME Owned, Leased or Rented Vehicle, or Non-Owned Vehicle, are subject to the Driver Qualifications and Restrictions below while driving on company business.

5.1.2 Employees who fail to comply with the Driver Qualifications and Restrictions may be subject to disciplinary action, up to and including termination. Disciplinary action can also include, but is not limited to, a warning, increased frequency of MVR checks and/or performance monitoring. Mandatory attendance of a defensive driving course may also be required.

5.1.3 With respect to Violations that appear on an employee's MVR, there is no distinction between a personal driving record and a company driving record. In other words, no distinction is made between MVR Violations occurring on or off the job.

5.1.4 When two or more people are traveling in one vehicle or someone is available at that location, as appropriate, one person must be the spotter whenever backing up the vehicle or pulling into a restricted space (e.g., loading doors). Whenever possible and especially in public areas, park in a manner so that you do not have to back up when a spotter is not available. In all cases, it is the driver's responsibility to visually inspect the area that the vehicle will travel thru before backing up. This section is mandatory when operating any Vestas vehicle due to limited visibility.

5.1.5 Typically, the most qualified and experienced driver of a team should operate the vehicle.

5.1.6 In some cases, VAME and/or the customer have implemented a requirement that may exceed a state or provincial requirement. The higher level requirement in this policy will prevail.

5.1.7 In the event a state or provincial requirement exceeds the requirements, standards or qualifications of this policy, the higher level requirement will prevail.

5.2 Hiring Standards

No candidate will be hired whose job requires use of a VAME Owned, Leased or Rented Vehicle or Non-Owned Vehicle unless all of the criteria listed below are met:

- Minimum age of 18 years.
- Possession of a valid driver's license.
- Signed authorization to conduct a background check on file.
- MVR background check conducted prior to use of a Vestas Owned, Leased, or Rented Vehicle or Non-Owned Vehicle.
- No Major Violations (as set forth in the Violation/Preventable Accident Matrix).
- As shown on the MVR, a driving record in compliance with the Driver Qualifications and Violation/Preventable Accident Matrix as set forth below.

5.3 Driver Qualifications and Restrictions

5.3.1 Driver's License and Registration – The employee must maintain a valid, unrestricted (except for corrective lenses or other correctable conditions) driver's license issued from the state/providence

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where the employee claims residency. Employees are required to immediately report all changes to their driver's license to their Supervisor/Manager.

5.3.2 Seat Belts – Employees must wear seat belts anytime the vehicle is in motion and require all passengers to wear seat belts. This is a **MANDATORY** safety requirement. All local, state, provincial, and federal seat belt laws apply. Do not allow passengers to ride in any area not equipped with seat belts.

5.3.3 Vehicle Operation – Employees must operate vehicles in a safe manner. Obey all applicable federal, state, provincial, and local traffic laws. Abide by all operating procedures stated in the Policy. Do not operate any vehicle with safety deficiencies that could further damage the vehicle or cause personal injury or death or property damage. Use a vehicle only for its intended purpose within the operating limitations established by the manufacturer. Turn on the vehicle headlights any time visibility is reduced or as otherwise required by law. Operate the vehicle with regard to road conditions, visibility, weather and traffic, and maintain a sufficient following distance behind vehicles to avoid accidents. Use defensive driving techniques.

5.3.4 Disabled Owned, Leased and/or Rented Vehicles – Drivers must take necessary precautions to protect themselves and the vehicle if a vehicle becomes disabled. Employees must turn on emergency flashers and move the vehicle to a safe area if possible. Employees must contact their immediate Supervisor and Fleet Planner for assistance. If possible, employees must remain with the vehicle until it has been repaired or until the tow service arrives. If the vehicle must be abandoned, the employee must call their immediate Supervisor and/or Fleet Planner with instructions on placement of the vehicle keys to allow for towing services.

5.3.5 Smoking – Smoking is not permitted in VAME Owned, Leased or Rented Vehicles.

5.3.6 Controlled Substances/Driving Under the Influence – No controlled substances, un-prescribed or illegal drugs, or open alcoholic beverage containers are permitted in a VAME Owned, Leased or Rented Vehicle or Non-Owned Vehicle. The employee must be free of any controlled substances including un-prescribed or illegal drugs, alcohol, or any prescribed drug that may adversely affect the employee's ability to operate the vehicle safely. **Failure to abide by this company rule will result in disciplinary action up to and including termination of employment.** An employee whose driver's license is suspended or who refuses to submit to a drug or alcohol test cannot drive a vehicle while conducting company business. Employees are also required to follow the drug and alcohol policy set forth in the Employment Guide. Depending on the circumstances, a restricted driver's license, limited for example to driving to and from work, may not constitute a valid driver's license for purposes of this Policy. DUI charges which are pled to a lesser charge such as alcohol-related reckless driving also will be treated the same as a Major Violation under this Policy. An employee with a DUI conviction may also need to complete a government-approved driver-training program, at the employee's expense, and will present proof of completion to regain company driving privileges.

5.3.7 Major Violation – A Major Violation as defined in section 5.10.2 within the prior three years may disqualify an employee from driving on company business and may preclude an applicant from being hired for employment or continuing the employee's employment with the company.

5.3.8 Tickets and Towing – Employees are responsible for all parking tickets, traffic citations and towing charges not related to an accident or maintenance, with no cost to VAME, while operating a VAME Owned, Leased or Rented Vehicle or Non-Owned Vehicle. Employees must report all traffic citations to their Supervisor or Manager.

5.3.9 Security and Theft – The employee is responsible for the security of the vehicle. Park vehicles in areas without obstruction to view and in areas with the most traffic, if possible. Close windows, remove keys, and lock all doors when the vehicle is unattended. When possible, secure all loose equipment and property in the trunk or locked truck bed box. The employee shall report theft of vehicle, contents and license tags to the police immediately, then to the Supervisor/Manager and Fleet Planner. The employee is to report all lost vehicle keys to the Supervisor/Manager and Fleet

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Planner. Vestas is not responsible for personal items stolen out of a VAME Owned, Leased or Rented Vehicle or Non-Owned Vehicle.

5.3.10 Passengers – Do not pick up strangers and/or hitchhikers. Do not allow passengers in the Vestas Owned, Leased, or Rented Vehicle unless they are riding in the vehicle as part of Vestas business.

5.3.11 VAME Vehicle Policy, Record Release and Driver Agreement (DMS 0037-2940 Exhibit A) – The employee must sign the VAME Agreement as a condition of operating a VAME Owned, Leased, Rented or Non-Owned Vehicle while on company business.

5.3.12 Use of PDAs – Refer to (DMS 0037-2943 Exhibit H) – PDA Use Distracted Driving Policy .

5.3.13 Violation/Preventable Accident Matrix – All applicants for employment and employees are subject to the Violation/Preventable Accident Matrix set forth below. As an applicant, only the Violation section of the Matrix will apply. Once an applicant becomes an employee, Preventable Accidents while operating a VAME Owned, Leased, and Rented Vehicle or Non-Owned Vehicle for company business purposes will be taken into account as well. Pursuant to the Matrix, an applicant or employee may be precluded from being hired for employment or continuing employment with the company. Nothing in this Policy is intended to nor does create a right to progressive discipline, continued employment, or similar modifications to the at-will nature of the employment relationship.

5.4 Personal Use of VAME Owned or Leased Vehicle

5.4.1 An employee may not use his/her assigned VAME Owned or Leased vehicle outside the course and scope of employment. Use of the vehicle for personal, recreational or other non-business use is strictly forbidden. Exceptions to this provision may apply to VAME Executives according to the VAME Company Car Policy (DMS 0008-9827), and/or service/construction management personnel who have been specifically assigned a leased vehicle or a long term rental (more than 30 consecutive days).

5.4.2 Due to financial and liability risks, only a VAME employee may drive a VAME Owned, Leased or Rented Vehicle. Exceptions to this provision may apply to VAME Executives according to the VAME Company Car Policy (DMS 0008-9827), when needed in the event of an emergency, for safety considerations, or as set forth below (Rental Cars).

5.5 Use of Personal and/or Non-Owned Vehicles

5.5.1 All employees who drive a personal vehicle for company business on a regular basis shall carry their own insurance coverage, including bodily injury and property damage liability with limits of at least $100,000/person – bodily injury, $300,000/occurrence – bodily injury and $50,000/occurrence – property damage. **VAME does not provide coverage for damage to non-owned vehicles (comprehensive and collision coverage to the employee's personal vehicle). This coverage is the responsibility of the employee.** Approved and paid mileage reimbursement anticipates the cost of vehicle insurance, deductibles, wear and tear, etc. Therefore, the costs and expenses are the responsibility of the employee. VAME does provide excess liability coverage for the corporation and the employee while acting in the course and scope of employment. Employees should carry proof of insurance in the vehicle at all times.

5.6 Rental Cars (Short term rental up to 30 consecutive days)

5.6.1 Employees renting a car for company travel are subject to all Travel Policy (DMS 0009-0246) requirements.

5.6.2 Employees should decline the purchase of the rental agency's insurance coverage (also known as collision damage waiver), because VAME insures this exposure when the employee is driving on company business. **This only applies when renting vehicles in the U.S. and Canada. For vehicle rentals outside the U.S. and Canada, refer to the Vestas Travel policy or contact the VAME Legal/Risk Management Department.** However, this may not be the case if anyone other than a VAME employee is driving the vehicle. Prior to renting a vehicle, the employee must

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obtain a proof of insurance card (found on the Hub, or contact the Fleet Planner) that contains reporting information in the event of an accident or claim. Employees must follow the instructions if they are involved in an accident on company business.

5.6.3 Prior to departing the rental agency lot, the employee shall inspect the vehicle with a representative from the rental agency to ensure the vehicle is safe to operate (e.g. inspect the tires, headlights, tail lights, mirrors, head restraints, etc.) and has no obvious damage (e.g. dents, scratches, etc.).

5.6.4 Prior to returning the vehicle to the rental agency, employee shall inspect the vehicle for obvious damage with a representative from the rental agency. If damage not previously reported at the time of check out is found, document the damage and report the damage as described in Vehicle Accident Reporting Procedure below.

5.6.5 Family Member Use – If both the employee and a non-employee spouse or partner will be driving the rented vehicle, the follow applies:

- The vehicle must be rented in the employee's name.
- The rental agency must be advised there are two drivers.
- The employee should determine whether to purchase additional insurance or a collision loss damage waiver to provide coverage for the second driver or for any personal use of the rented vehicle. It is recommended that the employee consult with an independent insurance agent.
- The cost of additional insurance and the cost for additional drivers is not reimbursed by VAME.
- The employee must drive the rental vehicle at all times during company business, i.e., to/from the airport, hotel, meetings, seminars, etc.
- The non-employee is allowed to drive only for non-company related purposes, such as sightseeing, shopping, etc.

5.6.6 A rented vehicle used primarily for business purposes may be used for personal usage, subject to Supervisor/Manager approval. The amount of personal usage is equal to the number of business days the vehicle is used, which consist of up to a maximum of 2 personal days for every 5 business days the vehicle is rented. During the period the rented vehicle is used for personal use, the employee is responsible for purchasing gas.

5.7 Temporary Workers

5.7.1 Prior to allowing an external temporary worker to drive a VAME Owned, Leased or Rented Vehicle, the responsible Supervisor/Manager must contact the Fleet Planner and the Legal/Risk Management Department.

5.8 Vehicle Accident Procedures – Owned, Leased and Rented Vehicles

5.8.1 If an employee is involved in an accident during employment that involves injury or damage to company property or a third-party or third-party property, the employee shall follow the steps outlined below.

- If an accident involves injuries, the employee shall call 911 or the local authorities.
- Employees must take precautions at the accident scene to prevent further accidents. Employees should activate emergency flashers and/or set out safety cones or emergency reflective triangles if exposed to oncoming traffic.
- Employees shall check and report any injuries. (See Vehicle Accident Reporting Procedures below).
- Employees must remain at the accident scene until released by appropriate authorities if applicable.

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- Employees must exchange information with the other driver, including addresses, phone numbers, license plate numbers and the names of insurance companies. The vehicle registration and proof of insurance card should be in the assigned vehicle at all times.
- Employees should not sign or make a statement of responsibility. Statements made in haste or in anger at the accident site may be legally damaging to the employee and the company.
- Employees should try to get the name and phone number of any witness.
- As soon as practical after the accident, preferably while still at the accident site, the employee should make detailed notes of what happened.
- Employees should try to include photos, drawings or diagrams that may be helpful later in remembering circumstances of the accident.
- If the vehicle is operable, the employee should drive it to an authorized dealer's service department or approved repair shop for inspection as soon as feasible.
- If the vehicle is inoperable, the employee should notify a towing service to take the vehicle to an authorized dealer's service department or approved repair shop.
- Regardless of severity, all vehicle accidents will be investigated by the employee's Supervisor, Manager, Fleet Planner and/or Sustainability/HSE personnel. In many cases, a third party investigator also investigates at the incident scene. Preventability of an accident (DMS 0037-2942 Exhibit G – Accident Guidelines) is determined by the Fleet Planner and the employee's Supervisor/Manager. Any disputes will be brought before the Driver Review Committee for final determination.
- As soon as practicable and when allowed by law, the employee may be required to submit to a post-accident drug and alcohol test.

5.9 Vehicle Accident Reporting Procedures – Owned, Leased and Rented Vehicles

Refer to (DMS 0037-2941) Exhibit D - Vehicle Incident Reporting Process Flow in this document.

5.9.1 For bodily injury to an employee or third party, the employee shall protect the scene, render emergency aid and call the authorities. Within 24 hours of the accident, the employee shall notify his/her Supervisor/Manager, notify Sustainability/HSE about the injuries and notify the Fleet Planner about the vehicle damage.

5.9.2 For property damage when no personal injuries are involved, the employee shall notify his/her Supervisor/Manager within 24 hours and then call the Fleet Planner.

5.9.3 Employees involved in an accident must complete a Vehicle Incident Report within the VAME Incident Report form and the report will be submitted to the Fleet Planner.

5.9.4 The Fleet Planner contacts the insurance company or rental car agency regarding the accident.

5.9.5 With respects to Owned or Leased vehicles, site office personnel shall make arrangements with a dealer or repair shop and report appropriate information regarding the repairs to the Fleet Planner. The Fleet Planner will coordinate with the site office personnel regarding payment for repairs. Repairs to a rented vehicle are managed through the rental car agency.

5.9.6 An employee who fails to report an incident involving a VAME Owned, Leased or Rented Vehicle that results in injury or damage to company property, or a third-party or third-party property, within 24 hours may be subject to disciplinary action up to and including termination.

5.10 Disciplinary Proceedings

5.10.1 VAME has a zero tolerance policy against major violations ("Major Violations") as outlined below. One Major Violation may result in IMMEDIATE disciplinary action including, but not limited to, suspension of company driving privileges or termination of employment.

5.10.2 Major Violations include:

- Conviction of driving under suspension, cancellation, or revocation of a license.

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- Conviction of false accident report/perjury.
- Conviction of fleeing or eluding police.
- Conviction of homicide, manslaughter, or assault with a motor vehicle.
- Conviction of leaving the scene of an accident.
- Conviction of obstructing an officer.
- Conviction of the use, possession, illegal activity with a motor vehicle, being under the influence of, or solicitation of intoxicating beverages or illegal drugs while in or operating a VAME Owned, Leased or Rented Vehicle, or Non-Owned Vehicle while being operated for company business purposes.
- Conviction of reckless driving, leaving the scene of an accident or other violations that cause revocation of the employee's license.
- Permitting an unauthorized person(s) to operate a VAME Owned, Leased or Rented Vehicle.
- Operating a VAME Owned, Leased or Rented Vehicle or Non-Owned Vehicle for company business purposes with an invalid driver's license.
- Refusal to comply with a lawful police or fire department order.
- Refusal to submit to drug or alcohol testing when allowed by law in the course of operating a VAME Owned, Leased or Rented Vehicle or Non-Owned Vehicle for company business purposes.
- All other similar violations.

NOTE: VAME reserves the right to seek full reimbursement from the employee for costs and liabilities incurred by Vestas due to willful or negligent behavior of the employee while operating a VAME Owned, Leased or Rented Vehicle or Non-Owned Vehicle for company business purposes.

5.10.3 All employees who drive on company business must comply with this Policy.

5.10.3.1 An employee who is expected to drive a VAME Owned, Leased or Rented Vehicle or Non-Owned Vehicle as part of his/her employment must record any suspension or revocation of his/her license to his/her Supervisor/Managers. An employee who fails to inform his/her Supervisor of any suspension or revocation will have his/her company driving privileges revoked. The employee may also be subject to disciplinary action up to and including termination.

5.10.4 Even if an employee has reported a suspension or revocation of his/her license, his/her duties may be altered or the employee may be subject to disciplinary action up to and including termination.

5.10.5 The disciplinary proceedings are a guide to assist in improving an employee's conduct or performance. These procedures do not create an employment contract with employees.

6 Interested Parties

Service, Construction, Fleet, Risk Management, Legal, P & C and Sustainability/HSE

7 Responsibility

7.1 Supervisor/Manager Responsibility

7.1.1 Supervisors and/Managers shall be responsible for notifying the Fleet Strategic Procurement Specialist, Legal/Risk Management and People & Culture (P&C) as soon as they become aware that any employee is not in compliance with this policy.

7.1.2 The employee's Supervisor/Manager will then notify the employee that he/she is not allowed to drive a VAME Owned, Leased or Rented Vehicle or Non-Owned Vehicle in performance of his/her job duties. Supervisors/Managers shall be responsible for enforcing the prohibition of a driving privilege.

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7.1.3 Each site is responsible for conducting a site orientation for all new and visiting personnel that includes driving safety and site related regulations / conditions / hazards. The orientation should consists of demonstrating capability and site knowledge to an experienced site employee as a passenger - as designated by the responsible manager.

7.1.4 Any visiting personnel to a site must be screened for ability to drive in the local conditions (e.g. hills, icy roads) prior to any travel to support that site (e.g. do not allow someone who has just arrived at the site to drive a vehicle on behalf of the company if the individual is not experienced with the local driving conditions).

7.2 Driver Review Committee

7.2.1 A Driver Review Committee consisting of representatives from Service Management, Construction Management, Fleet Strategic Procurement and Planning, Legal/Risk Management, Sustainability/HSE and P&C shall have the authority to make exceptions to this Policy on a case-by-case basis.

7.2.2 The employee and/or the employee's Supervisor/Manager will make the request for such an exception in writing to the Driver Review Committee.

7.2.3 The renewal of driving privileges to drive a VAME Owned, Leased or Rented Vehicle or Non-Owned Vehicle shall be reinstated when the affected employee's driving record meets the standards as set forth in this Policy. The Driver Review Committee shall review, as necessary; the records of those current employees prohibited from driving a VAME Owned, Leased or Rented Vehicle or Non-Owned Vehicle and shall notify the Supervisor/Manager at the time such driving privileges may be reinstated.

8 Instructions

8.1 Motor Vehicle Records (MVR) and Preventable Accident Criteria

8.1.1 From time to time, VAME may obtain a MVR for VAME employees. A MVR will be obtained before a candidate for employment is offered employment.

8.1.2 The employee, by his/her signature on the VAME Authorization, gives permission for VAME to order and review his/her MVRs.

8.1.3 P&C, in cooperation with the employee's Supervisor/Manager, will document and impose any disciplinary action taken because of a MVR review.

8.1.4 P&C shall notify the Supervisor/Manager regarding the finding of an employee's driving record and/or preventable accident history that meet the Violation/Accident Matrix criteria set forth below. The Supervisor/Manager shall notify the employee. P&C will notify candidates for hire who do meet these criteria.

8.1.5 Notices will not be sent regarding personnel with acceptable driving records.

8.1.6 Following a preventable incident, the employee may be required to complete a specified safety or defensive driving training course prior to being allowed to use a company / rental vehicle.

8.2 Violation/Accident Matrix

Number of MVR Violations in the past 3 years	Number of Preventable Accidents in the past 3 years (While operating a VAME Owned, Leased, and Rented Vehicle or Non-Owned Vehicle for company business purposes)			
	0	1	2	3 or More
0	Clear	Acceptable	Borderline	Poor
1	Acceptable	Acceptable	Borderline	Poor
2	Acceptable	Borderline	Poor	Poor
3	Borderline	Borderline	Poor	Poor
4 or More	Poor	Poor	Poor	Poor

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1 Major Violation	IMMEDIATE DISCIPLINARY ACTION	IMMEDIATE DISCIPLINARY ACTION	IMMEDIATE DISCIPLINARY ACTION	IMMEDIATE DISCIPLINARY ACTION
Violations	Violations are convictions/citations on the MVR and are administered uniformly among employees and candidates. Minor violations (lack of preventative maintenance, inspection, etc.) are weighed as to the reasonable control an employee had over the offense and exercise taken. **Violations of an excessive nature, such as reckless driving, speeding in a construction or school zone, or +25 mph (40kph) over the speed limit count as 2 violations.**			
Borderline	An employee will receive a written warning and a copy of the warning placed in his/her personnel file if the employee is Borderline due to the sufficient number of violations and/or preventable accidents.			
Poor	If an employee has sufficient violations and/or preventable accidents to be considered Poor, VAME reserves the right to take appropriate disciplinary actions up to and including the following: 1. Loss of permission to drive a VAME Vehicle on company business 2. Loss of permission to drive on company business 3. Transfer to a non-driving position with a pay scale equivalent to the non-driving position 4. Suspension 5. Immediate termination			
Major Violation	Immediate personnel action up to and including suspension of driving privileges or termination of employment may occur if any of the following appear as convictions on the MVR or from direct knowledge of the Supervisor/Manager: 1. Conviction of driving under suspension, cancellation, or revocation of a license. 2. Conviction of false accident report/perjury. 3. Conviction of fleeing or eluding police. 4. Conviction of homicide, manslaughter, or assault with a motor vehicle. 5. Conviction of leaving the scene of an accident. 6. Conviction of obstructing an officer. 7. Conviction of the use or possession of illegal drugs or alcohol, or illegal activity with a motor vehicle while operating a vehicle. 8. Conviction of reckless driving, leaving the scene of an accident or other violations that cause revocation of the employee's license. 9. Permitting an unauthorized person(s) to operate a VAME Owned, Leased or Rented vehicle. 10. Operating a VAME Owned, Leased or Rented Vehicle or Non-Owned Vehicle for company business purposes with an invalid driver's license. 11. Refusal to comply with a lawful police or fire department order. 12. Refusal to submit to drug or alcohol testing in the course of operating a VAME Owned, Leased or Rented Vehicle, or Non-Owned Vehicle for company business purposes. 13. All other similar violations.			
Preventable Accident	A preventable accident (see DMS 0037-2942 Exhibit G) is one in which the employee failed to do everything reasonable to prevent the accident. All accidents on the MVR are considered Preventable. If employee/candidate disputes this determination, he/she can provide a written explanation to the Driver Review Committee for consideration.			
Double Jeopardy	If an employee is involved in an accident and receives a violation for that accident, both the violation and the accident count as separate violations on the employee's record.			

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New Employees	Candidates and new hires may be subject to a higher standard. For instance, a rating of Borderline for a new hire may be unacceptable in his/her first six (6) months of employment. Careful consideration should be given to candidates with a rating of Borderline as a single violation or accident received during the course of employment that results in a rating of Poor could jeopardize the driving privileges and/or employment of the employee.

8.3 Appeal of MVR Results

If an employee's MVR shows a record of Borderline, Poor, or Preventable Accidents (as defined in the Violation/Accident Matrix) or contains Major Violations either of which subject the employee to disciplinary action and/or loss of company driving privileges, the employee may file an appeal with P&C within 60 days of the date that the determination is communicated to the employee, requesting that the MVR and determination be reviewed again by the Driver Review Committee. The employee shall obtain all necessary information and submit an appeal in writing to P&C.

9 Training

Activity	Need for Training
Web-based	Upon hire and annually thereafter for employees that drive company owned or leased vehicles or rent vehicles on a quarterly basis.

10 Documentation

Document	Archive Place	Archive Time
MVRs	Employee's personnel file or contracted third party administrator	Duration that personnel file is kept with the employer
Signed VAME Vehicle Policy and Driver Agreement	Employee's personnel file or contracted third party administrator	Duration that personnel file is kept with the employer
Signed Authorization	Employee's personnel file or contracted third party administrator	Duration that personnel file is kept with the employer
Copy of Employee's Drivers License Number	SAP or contracted third party administrator	Duration that personnel file is kept with the employer

11 Document History

Rev. No.	Date	Description of Change
00	2010.02.18	New document
01	2010.02.18	Minor formatting changes
02	2010.12.06	Minor grammatical changes to section 5.3.7
03	2011.01.21	Updated sections 5.3.13 and 8.2
04	2011.02.01	Updated link to Proof of Insurance Cards
05	2013.03.21	Updates throughout the policy. Incorporated Exhibit H – PDA Use – Distracted Driving Policy

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Vehicle Operation & Maintenance Vestas System Instruction				Document number:0009-0271 INS SUS-IEM-EMR (AME US/CAN) Vehicle Operation & Maintenance
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.04.27		Version: 04

Version history

Version No.	Date	Description of Changes
04	2015.03.27	Converted document to L5 format, revised document DMS numbers, Change vehicle inspection from monthly to quarterly

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1 Purpose

The purpose of this is to ensure all employees of VAME are aware of the responsibilities for operating and maintaining Company Vehicles. It also provides management with a guideline when requesting and transferring Company Vehicles

2 Responsibilities

2.1 Vestas Global Fleet Category Manager

2.1.1 Order vehicles through designated leasing agency;

2.1.2 Work with Finance department in disposing of Company Vehicles in the proper manner; and

2.1.3 Ensure new Company Vehicles are delivered in safe and working order and verify vehicle has all the necessary safety components in place.

2.2 Risk Management Specialist

2.2.1 Review and maintain incident report files related to each vehicle;

2.2.2 Work with Health, Safety and Environmental department and sites to verify complete and correct information is documented on accident/incident reports;

2.2.3 Report claims to insurance company and fleet management company for vehicle repair coordination."

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2.2.4 Review and recommend payments to be made by insurance as well as coordinate deductible payments to be made by site.

2.2.5 Authorize repairs above limits; and

2.2.6 Set up new Auto Insurance ID cards.

2.3 Responsibilities of VAME Finance Department

2.3.1 Timely payment of the direct bill for leased vehicles.

2.4 Responsibilities of Site Managers and/or Supervisory Personnel

2.4.1 Before ordering a new vehicle, check the following link to determine if any vehicles that meet your need are available for transfer: X:\Departments\Service\External\Fleet\PHH\Available Service Vehicles For Transfer.xlsx

2.4.2 Request new vehicles for the site based on the criteria specified in the Service New Vehicle Order Form DMS 0051-1923;

2.4.3 Request fuel cards and driver PIN numbers for fuel cards using the Fleet Interactive System;

2.4.4 Report any changes of employees or other circumstances that will affect the assignment of vehicles to the area Plant Manager;

2.4.5 Complete the monthly mileage reporting using Element Wright Interactive Mileage reporting tool;

2.4.6 Ensure those vehicles that are determined by an employee to be unsafe and/or damaged are repaired in a timely manner to limit the amount of vehicle downtime;

2.4.7 Coordinate the completion of Quarterly Site Vehicle Checklist; and

2.4.8 Communicate maintenance reminders to the employees that are responsible for the vehicles.

2.4.9 Ensure recall notices have been addressed;

2.4.10 Set up new maintenance cards

2.5 Responsibilities of VAME Employees

2.5.1 Ensure that maintenance is performed on the vehicle assigned to them according to manufacturer guidelines; and

2.5.2 Communicate with Site/Construction Manager/Authorized Supervisor if they feel the vehicle is not able to be used due to being unsafe and/or damaged.

3 References

Document No.	Title
0008-9923	Travel & Expense Reporting Policy
0009-0248	Corporate Credit Cards
0009-0270	VAME Vehicle Use Policy and Procedure

4 Forms

Document No.	Title
0049-0617	Quarterly Vehicle Inspection Form
0051-1923	Service New Vehicle Order Form
0051-2208	Vehicle Incident Report

5 Scope

This procedure applies to all employees of Vestas-American Wind Technology, Inc. and Vestas-Canadian Wind Technology, Inc. (collectively, “VAME”).

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6 Terms and Abbreviations

Term or Abbreviation	Definition
Assigned Driver	Employee assigned to a Company Vehicle by either the rental agency or manager.
Company Vehicle	Any vehicle owned, rented, or leased by VAME, an employee, or a visiting employee for Vestas-related business, sponsored events, or other authorized purposes.
Employee	Anyone employed by VAME. This definition also includes any employee of Vestas Wind Systems or its subsidiaries working in North America.
Transferring	An act of transferring a Company Vehicle from one employee to another employee. An act of moving a Company Vehicle from one location to another.
Traveling Employee	Anyone employed by Vestas Americas who is visiting or working on a site or project that is not their regularly assigned work site or home base, including Project Technicians and any other employee required to travel in the service of Vestas Americas.
GVW	Gross Vehicle Weight
VAWT	Vestas-American Wind Technology, Inc.
VCWT	Vestas-Canadian Wind Technology, Inc.

7 Program/Requirements

7.1 Operation

7.1.1 Employees operating a Vestas Company Vehicle must ensure that the vehicle is operated in manner as prescribed by the vehicle manufacturer and that vehicles are kept clean and litter free.

7.2 Vehicle Damage

7.2.1 Any damage, both interior and exterior, no matter how minor, that occurs to a Company Vehicle, both while driving or when parked, must be reported to their immediate manager within 24 hours via email or phone message.

7.2.2 Additionally, all accidents and incidents must be documented and reported according to the requirements of VAME Vehicle Use Policy and Procedure 0009-0270.

7.2.3 Fleet vehicle incidents are to be reported to Risk Management using a Vehicle Incident Report DMS 0051-2208 and Incident Management System (Credit 360).

8 Requesting Vehicles

8.1 Service

8.1.1 New Site Setup

8.1.1.1 Before ordering a new vehicle, check the following link to determine if any vehicles that meet your need are available for transfer: X:\Departments\Service\External\Fleet\PHH\Available Service Vehicles For Transfer.xlsx;

8.1.1.2 All new vehicles for a service site must be requested by submitting the Service New Vehicle Order Form DMS 0051-1923 six months prior to need date.

8.1.1.3 Once the order is approved, forward a copy to the Global Fleet Category Manager.

8.1.1.4 Global Fleet Category Manager will place vehicle orders twice a year or as needed.

8.1.2 Existing Site

8.1.2.1 Site/Construction Manager/Authorized Supervisor will assess six months prior to lease end date to determine if a new vehicle is required.

8.1.2.2 Should the Site Manager choose to order a new vehicle; they will follow the steps outlined in the New Site Setup above.

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9 Assignment of Vehicles

9.1 Service

9.1.1 Site Manager will assign a set of technicians to a vehicle. These technicians have the responsibility for ensuring that maintenance is performed, reporting damages that occur to the vehicle according to the VAME Vehicle Use Policy and Procedure, etc.

9.1.2 Note all damages when completing the Quarterly Site Vehicle Checklist (DMS 0049-0617).

9.2 Projects

9.2.1 There must be one employee assigned as the driver for each vehicle. This employee will sign the agreement with the rental agency and assume responsibility for the vehicle. At the time of rental employee will also list “All Vestas Employees” as additional drivers for the vehicle.

9.2.2 The assigned driver is responsible for the day to day operation and maintenance of the vehicle.

9.2.3 The assigned driver is responsible for reporting damages that occur to the vehicle according to Vehicle Use Policy and Procedure (DMS 0009-0270) on a Vehicle Incident Report DMS 0051-2208.

9.2.4 Under extenuating circumstances only should an assigned driver hand over responsibility for their vehicle to another person. Under this situation, the re-assignment must be reported to the employee’s direct supervisor and rental agency.

9.3 Transferring

9.3.1 The transfer of a vehicle to another site must be approved by the area Plant Manager before handover of the vehicle takes place. This must be done in the Fleet Providers Interactive System to ensure that Vestas has all the proper documents for the transfer.

9.3.2 Before transfer of a vehicle, a complete walk around of the vehicle must take place and any safety related damages/operational defects to the vehicle must be documented by a repair quote and submitted to Risk Management for approval. Any safety/operational damages will be repaired prior to transfer taking place.

10 Vehicle Identification

All service vehicles will be marked with a Vestas logo on the door of each side of the vehicle and the corporate designated fleet unit number on back doors or tailgate of vehicle. (Except where it is a hazard to employees to do so)

11 Aftermarket Additions

There are to be no aftermarket additions added to vehicles by the site without prior authorization from Global Fleet Category Manager. Any aftermarket request will need to have legitimate business purposes stated in the request for approval to be granted.

12 Fueling

12.1.1 All fuel for company vehicles used for company business will be purchased using the Element Wright Express fuel cards.

12.1.2 All vehicles will be fueled using regular unleaded or diesel fuel. Premium fuel is not a requirement for Vestas fleet vehicles.

12.1.3 Fuel cards are either:

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12.1.3.1 Vehicle specific and are issued based on the VIN number of the vehicle and should remain in the vehicle at all times; or

12.1.3.2 Cards are employee specific and issued to traveling resources employees and executive management.

12.1.4 In the U.S. and parts of Canada, fueling a vehicle requires accurate current mileage of the vehicle and a driver's assigned PIN.

12.1.5 Driver PIN numbers are assigned by the Element Wright Fleet Interactive System.

13 Maintenance

13.1 General

13.1.1 Fleet leased vehicles are to be maintained according to the manufacturer Vehicle Maintenance Guidelines.

13.1.2 Employees operating a Vestas Company Vehicle must ensure that the vehicle is operated in the manner prescribed by the vehicle manufacturer and that vehicles are kept clean and litter free.

13.1.3 An employee operating a Vestas Company Vehicle is the final authority as to the vehicle's operating status. If an employee determines the vehicle is not safe to operate, the vehicle must be removed from service until the unit is repaired.

13.1.4 All safety discrepancies must be reported to the Site/Construction Manager/Authorized Supervisor immediately for repair action.

13.1.5 Under no circumstances should an unsafe vehicle be operated. Safety discrepancies include but are not limited to:

13.1.5.1 Brakes;

13.1.5.2 Lighting & signals;

13.1.5.3 Steering;

13.1.5.4 Fuel leaks;

13.1.5.5 Tires; or

13.1.5.6 Any other condition that hinders efficient and safe operation of the vehicle

13.1.6 Rental vehicles are to be maintained according to the instructions from the rental agency. Different agencies address maintenance in different ways.

13.2 Fleet Leased Vehicle Maintenance Program

13.2.1 Maintenance Cards

13.2.1.1 Each leased vehicle has a maintenance card issued by Element. If your vehicle does not have one of these cards, contact the Site/Construction Manager/Authorized Supervisor before any maintenance or repairs are done on the vehicle.

13.2.1.2 This card allows employees to have routine maintenance and repairs performed with billing for the charges handled by a direct billing to Vestas.

13.2.1.3 The employee must present the card to the vendor prior to any work being started on the vehicle.

13.2.1.4 The vendor must call the phone number on the back of the card to receive instructions on how to proceed.

13.2.1.5 The Maintenance agreement does not cover the cost of a loaner vehicle.

13.2.2 Maintenance Card Limits

13.2.2.1 The maintenance cards can be used for the amounts listed below:

13.2.2.1.1 Repairs which cost less than $150 can be made without prior authorization.

13.2.2.1.2 $150-$1000 repairs will have to be authorized through leasing agency and an email must be sent to the Fleet Planner detailing the repairs that are being made.

13.2.2.1.3 For repairs which cost over $1000, authorization has to be obtained from Risk Management before repairs can be made.

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14 Towing

14.1 Pulling a vehicle

14.1.1 Tow straps should be utilized. The minimum requirements are:

14.1.1.1 One strap per site (more can be available at the discretion of the Site/Construction Manager);

14.1.1.2 Towing rating of 12,000 pounds;

14.1.1.3 Recommended strap purchases can be found in the McMaster Carr catalog;

14.1.1.4 Straps shall be used according to manufacturer's specifications;

14.1.1.5 Upon three (3) unsuccessful attempts to dislodge the vehicle, contact Site Manager to call for a tow truck; and

14.1.1.6 Tow straps should be used on Company Vehicles only.

14.2 Trailers

14.2.1 The towing of trailers is only allowed by vehicles that are equipped with a tow package and the proper GVW rating.

14.2.2 Employee must have approval from Site/Construction Manager/Authorized Supervisor to tow.

15 Hauling

All items placed in bed of pickup or on trailer must be firmly secured.

16 Gate Securement

16.1 All gates shall be:

16.1.1 Held open by the passenger of the vehicle until the vehicle has completely passed through the gate.

16.1.2 If no passenger, gates shall be secured in an open position.

17 Inspection/Reporting

17.1 Inspection

17.1.1 Each vehicle will have a Quarterly Site Vehicle Checklist completed. The inspection will be done by someone other than the assigned driver(s) of the vehicle. Reports should be signed off by the Site/Construction Manager/Authorized Supervisor and maintained on site.

17.2 Reporting

17.2.1 Mileage Monthly reporting

17.2.2 Site/Construction managers/Authorized Supervisors and Executives must complete a daily record of the miles driven for business and personal miles through the Element online reporting system.

18 APPENDIX: version history

Version No.	Date	Description of Changes
00	2010.02.18	Not used
01	2010.02.18	New Document
02	2010.02.18	Document content updated; revised to include Projects and Service vehicle content, as well as general fleet vehicle maintenance guidelines
03	2014.05.28	Removed Appendix A and B, minor grammatical changes, embedded applicable DMS numbers in document.

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RESTRICTED

Quarterly Vestas Vehicle Inspection Checklist

1. Vehicle Information:

State: | City: | Site Cost Center: | Date of Inspection:

Unit Number: | VIN Number: | License Plate #: | Registration Expiration:

Beginning Odometer: | Ending Odometer: | Fuel Used: | Site Supervisor:

Primary Driver: | Secondary Driver: | Date of last service: | Description of last service:

"✓" if the item passes inspection criteria. For any items that fail the inspection criteria, be sure to make appropriate corrections right away or as soon as safely possible.)

✓

2. Paperwork:

i. State registration card is not expired or missing: ☐

ii. Is the registration decal is in place and within expiration date?: ☐

iii. Vehicle has current insurance card? ☐

iv. Vestas decals and unit number are on the vehicle? (except where they pose a risk)? ☐

v. Vestas fuel & maintenance cards are located in the vehicle? ☐

3. Interior:

i. Does the vehicle's horn work? ☐

ii. Does the defroster blow hot air (front and rear)? ☐

iii. Is emergency equipment (triangle, flashlight flares, etc) located in the vehicle? ☐

iv. Are all materials in the first aid kit within their expiration date? ☐

v. Are spill kit materials located in the vehicle (pig mats, absorbent materials, bags, etc) if applicable? ☐

vi. Has the fire extinguisher been inspected for the month? Is it within its respective annual inspection? ☐

vii. Are the vehicle's seats free of holes, stains, burns, etc? ☐

viii. Are all seatbelts present, snap correctly and are free of any frays? ☐

vxi. Housekeeping: cab is void of trash and generally clean inside; windows, floors, compartments. ☐

vx. Ensure no loose objects (heavy, sharp, etc) are stored in cab as they may cause injury during roll-over incidents ☐

4. Windshield, Window & Wipers:

i. Are all windows and windshields free of breaks, cracks or scratches that could impair your vision? ☐

ii. Do window controls function correctly (check handles & push buttons): ☐

iii. Are both wipers in functioning order and not in need of replacement? ☐

iv. Are both mirrors free of cracks, breaks or scratches to a degree that impairs vision? ☐

5. Under the Hood and Fluids:

i. Are all fluids under the hood filled to the appropriate level? ☐

ii. Is the windshield wiper fluid filled to the appropriate level? ☐

iii. Is the battery indicator light glowing (color off signifies battery needs replacement)? ☐

iv. Are the battery terminals clean, tight and held down securely? ☐

v. Are hoses under the hood free of cuts, cracks, leaks, bulges, chaffing and deterioration? ☐

6. Lights:

i. Do both high and low beams operate and are free of cracks, condensation? ☐

ii. Are tail lights intact and function correctly? ☐

iii. Are brake lights intact and function correctly when brakes are applied? ☐

iv. Are the left and right turn signals intact and function correctly? (Yellow lights in front, red lights in rear): ☐

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v. Are backup/reverse lights are intact and function correctly? ☐

vi. Are four-way flashers/emergency lights intact and function correctly? ☐

vii. Are the license plate lights intact and stay illuminated? ☐

7. Brakes:

i. Doe the Foot pedal travel less than halfway to the floor? ☐

ii. Does the emergency brake function correctly? (test by applying it and gently applying pressure on the gas pedal), brake should hold vehicle in place: ☐

8. Exterior:

i. Are exterior components of vehicle intact? (no missing parts, sharp edges, etc.): ☐

ii. Do all latches and locks on tool boxes function in the closed position? (if applicable) ☐

Click here to insert exterior changes from last inspection. Be sure to include dents, scratches, cracks or other relevant deformities.

9. Tires

i. Are all tires in acceptable condition? (free of embedded objects, bulges, cuts, and tread of 1mm ore more): ☐

ii. Are lug nuts torqued to OEM specifications? Provide verified torque value ☐

iii. Is the vehicle's spare tire, jack and lug wrench available? and properly stored? (Spare tire must be inflated): ☐

iv. Is tire pressure at the manufacturer's recommended level for all tires? ☐

10. Tools & Equipment

i. Inspect all lift bags/climb bags for damage. If damaged remove from service for repair or quarantine. ☐

ii. Inspect all corded electric tools and power cords for assured grounding inspection tape. Tape should be applied only to the male end of the cord. Remove all old tape. ☐

iii. Inspect all chemical containers for proper labeling of contents. Apply label if missing or incorrect. ☐

iv. Inspect containers or buckets for signs of oil (if used for oil). Apply sign if missing. ☐

v. Ensure respirators are properly stored in some sort of sealed container (zip lock bag, coffee container, etc.) ☐

vi. Verify controlled descent device inspection complete per policy ☐

vii. Verify all rigging has appropriate tag & serviceable ☐

viii. Ensure all buckets and containers have lids and caps to prevent spillage while traveling ☐

11. Trailers (if applicable): State of origin: License #:

Trailer VIN/ID #: Registration Exp.:

i. Is tire pressure at the manufacturer's recommended level for all trailer tires? ☐

ii. Are wheel bearings tight and free from any wobble effect? ☐

iii. Does the locking hitch mechanism function effectively (locks the hitch)? ☐

iv. Are all lights operating properly (brake lights when brake is applied, turn signals, etc)? ☐

v. Do the brakes on the trailer function correctly (where applicable)? ☐

vi. Are safety chains present and in good condition (clips/latches function correctly)? ☐

vii. Are lug nuts on all tires are torqued to manufacturer specifications? ☐

viii. Is the trailer floor in acceptable condition (no holes/damage)? ☐

ix. Is the registration for the trailer current (where applicable)? ☐

x. Placard is present (as required by state of origin)? ☐

xi. Equipment present is properly secured to trailer? ☐

Submit

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Vehicle Policy Record Release and Driver Agreement Exhibit A				Document ID 0037-2940 INS SUS-CMT-MRP (AME US/CAN) Record Release
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.04.08		Version: 01

As an employee of Vestas-American Wind Technology, Inc. or Vestas-Canadian Wind Technology, Inc. (VAME) or as an employee of another Vestas Wind Systems, A/S or other sister subsidiary temporarily assigned to work while in North America, I acknowledge my understanding of the VAME Vehicle Use Policy and Procedure. I have a valid driver's license and agree to notify my Supervisor/Manager immediately upon any suspension, revocation or other loss of driving privileges.

Should I lose my driving privileges, I also understand that I will be prohibited from:

- Operating a VAME Owned, Leased or Rented Vehicle or Non-Owned Vehicle for company business.

I agree NOT to:

- Allow unauthorized individuals to drive a VAME Owned, Leased or Rented Vehicle.
- Operate a VAME Owned, Leased or Rented Vehicle, or Non-Owned Vehicle for company business purposes:
  - While under the influence of alcohol or drugs,
  - While experiencing the effects of illness or fatigue,
  - At speed in excess of the posted or observed speed limits, or in a careless or reckless manner, or
  - While operating a PDA device, unless hands free capabilities are utilized when allowed by law. (Refer to Exhibit H – PDA Use – Distracted Driving Policy for further guidance).

I DO agree to:

- Wear seat belts and require passengers to use seat belts any time the vehicle is in motion,
- Report all accidents to appropriate police authority, Supervisor/Manager, and Fleet Planner immediately, and
- Report all cases of vehicle damage or defects excluding normal wear and tear.

I agree that I have inherent responsibilities for safe operation, care, and security of the vehicle entrusted to me. I accept those responsibilities and agree to obey all federal, state, provincial, and local traffic laws and comply with the VAME Driver Qualifications as stated in the VAME Vehicle Use Policy and Procedure, which I have read and understood. Further, I will operate the vehicle in a safe and courteous manner that reflects favorably on the image of VAME. I understand that abiding by this agreement is a condition of my employment and violation of any of these policies or procedures will result in disciplinary action up to and including termination of my employment. By signing this agreement, I acknowledge that an employment contract has not been created. Nothing in this Agreement or the VAME Vehicle Use Policy and Procedure is intended to nor does modify the at-will nature of my employment.

_____ _____/_____

Employee Name (Please Print) Signature Date

_____ _____

Date of Birth Driver's License Number / Issue State

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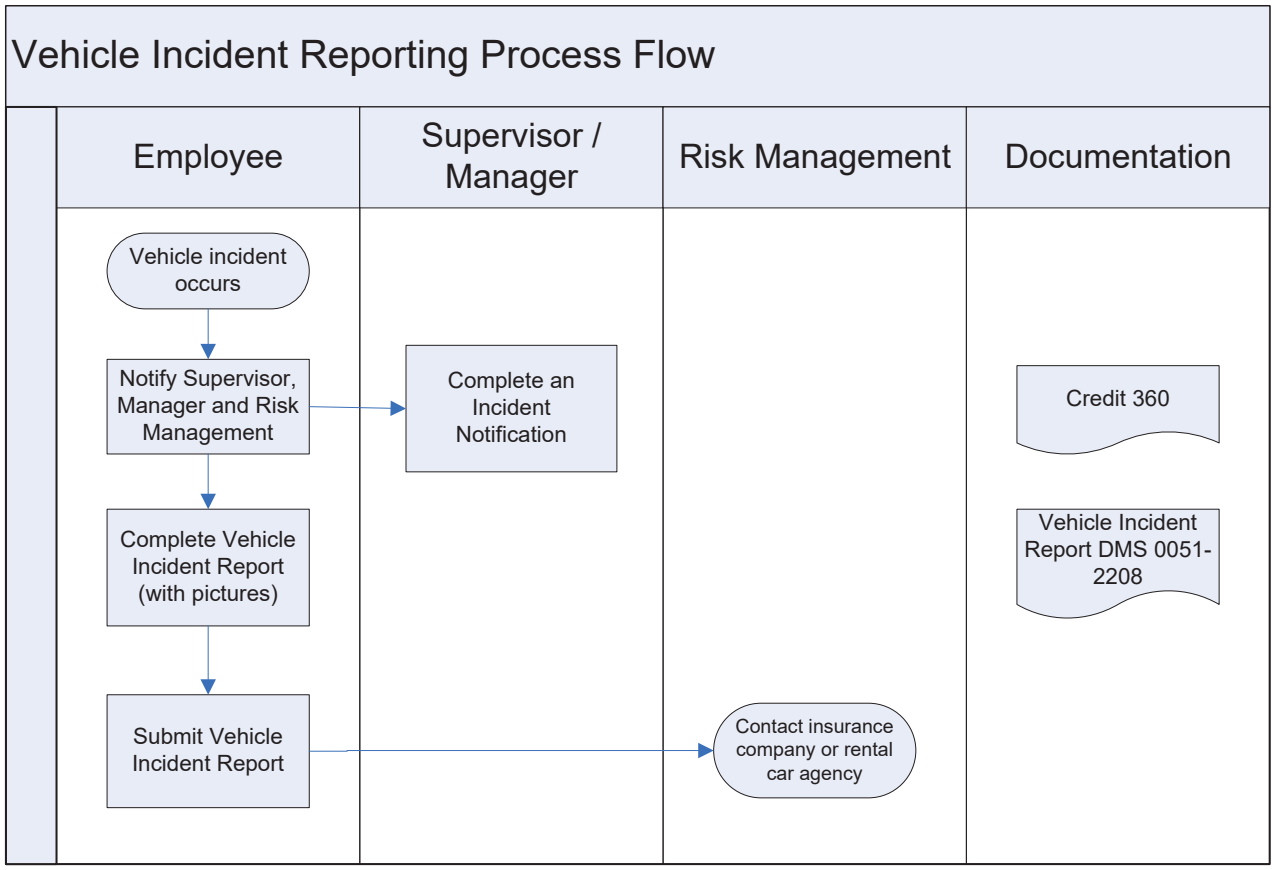
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Vehicle Incident Reporting Process Flow Exhibit D				Document ID: 0037-2941 INS SUS-PLN-LOT (AME US/CAN) Incident Reporting
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.04.108		Version: 01

(Applies to Owned, Leased and Rented Vehicles or Non-Owned Vehicles **while being operated for company business purposes**)



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Accident Guidelines EXHIBIT G				Document ID: 0037-2942 INS SUS-PN-LOT (AME US/CAN) Accident Guidelines
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.04.08		Version: 01

Accident Guidelines

The American National Standards Institute (ANSI) and the National Safety Council both use the following definition of a motor vehicle accident.

"A Motor Vehicle Fleet Accident is any occurrence involving a fleet motor vehicle which results in death, injury, or property damage, unless such fleet vehicle is properly parked. Who was injured, what property was damaged or to what extent, where the accident occurred, or who was responsible is not a factor."

To clarify and interpret that definition, ANSI standards further state:

"Whether accidents occur because of any one driver's fault, mechanical failure, or other 'blame placing' factor is not to be considered in determining whether an event is a motor vehicle fleet accident. Likewise, the rules of any award program which may be based on 'preventability' or other such factors have no bearing in determining whether any particular event is to be considered a motor vehicle fleet accident."

The amount of damage or the cost of repair shall not be a factor. The definition includes any property damage. This does not mean, however, that ordinary contact of bumpers while parking vehicles, or any other such contacts that over a long period of time cause an accumulation of small scratches of the normal wear and tear type, shall be reported. A bending, crushing, or breaking of a bumper is not a "wear and tear" event.

Concept of Preventability

The Risk Management Specialist and Site/Construction Manager/Authorized Supervisor will investigate and review each accident that occurs to determine whether the driver took every reasonable action possible to avoid the accident. Any disputes or appeals will be brought before the Driver Review Committee for final determination. If the employee did in fact take every reasonable action possible to prevent the accident, then the accident is non-preventable on his/her part. If the employee could have taken any such action and did not, then that accident must be determined as preventable.

When establishing the preventability or non-preventability of an accident, it is not enough to ascertain if the employee was violating any traffic law or regulation. The responsibility of an employee to avoid accidents goes beyond mere compliance with traffic laws. He/she must follow the Defensive Driving Code - to drive in such a way that he/she commits no errors in judgment, and so controls his/her vehicle to make adjustments for changes in road, weather, and traffic conditions, and that the mistakes of other drivers do not involve or trap him/her in an accident.

A Defensive Driver is not coerced into an accident by the unsafe action of pedestrians and other drivers. By being alert, he/she sees the need for preventative action in advance and takes the necessary precautions to prevent the accident. As a defensive driver, he/she knows when it is necessary to slow down, stop, or yield his right of way to avoid involvement.

An employee is not to confuse preventability with chargeability. Preventability is what the employee should have done to avoid an accident. Chargeability, on the other hand, is the action taken by the courts and/or law enforcement agencies.

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Causes of Preventability

1. Employee did not have his vehicle under control.
2. Employee was not operating at a speed consistent with the existing conditions of road, weather, and traffic.
3. Employee failed to control his/her speed so that he/she could stop within an assured safe distance.
4. Employee misjudged available clearance.
5. Employee failed to yield right-of-way to avoid accident.
6. Employee failed to accurately observe and adjust to existing conditions.
7. Employee was in violation of company operating rules or special instructions, the regulations of any federal or state regulatory agency, or any applicable traffic laws or ordinances.

Accident Types

1. Alleys, Driveways, and Plant Entrances

Accidents involving traffic originating from alleys, driveways, plant entrances, and other special intersection locations should be carefully analyzed to determine what measures the employee should take to avoid an accident. Failure to slow down, sound a warning, or to yield to another vehicle, can be considered cause to judge such an accident preventable.

Also considered preventable if:

a. Employee failed to signal when pulling out from curb.
b. Employee failed to check traffic before pulling out from curb.
c. Employee failed to look back to check traffic if he was in a position where mirrors did not show traffic conditions.
d. Employee attempted to pull out in a manner which forced other vehicle to change speed or direction.
e. Employee failed to make full stop before entering from a side street, alley, or driveway.
f. Employee failed to make full stop before crossing sidewalk.
g. Employee failed to yield right-of-way to approaching traffic.

2. Backing

Practically all backing accidents are preventable. An employee is not relieved of his/her responsibility to back safely when a guide is involved in the maneuver. A guide cannot control the movement of the vehicle therefore; the driver must check all clearances for himself/herself.

Also considered preventable if:

a. Employee backed up when backing could have been avoided by better planning of his route.
b. Employee backed into traffic stream when such backing could have been avoided.
c. Employee failed to get out of cab and check proposed path of backward travel.
d. Employee depended solely on mirrors when it was practicable to look back.
e. Employee failed to get out of cab periodically and recheck conditions when backing a long distance. Conditions include trailer doors and their securement while backing in or pulling away from loading area.

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f. Employee failed to sound horn while backing.
g. Employee failed to check behind vehicle parked at curb before attempting to leave parking space.
h. Employee failed to use or relied solely upon a spotter to help him back up.
i. Employee backed from blind side when he could have made a sight-side approach.

3. Being Passed

Sideswipes and cut-offs involving an employee while he/she is being passed is preventable when he/she fails to yield to the passing vehicle by not slowing down or moving to the right where possible.

Also considered preventable if:

a. Employee failed to stay in his/her own lane and hold speed or reduce it to permit safe passing.

4. Fixed Object

Collisions when fixed objects are involved are preventable. They usually involve failure to check or properly judge clearances. New routes, strange delivery points, resurfaced pavements under viaducts, inclined entrances to docks, marquees and signs projecting over traveled section of road, and similar situations are not, in themselves, valid reasons for excusing an accident from being preventable. He/she must be constantly on the lookout for such conditions and make the necessary allowances.

Also considered preventable if:
a. Employee was not entirely in his proper lane of travel.
b. Employee did not check or properly judge clearances.

5. Front-End Collisions

Regardless of the abrupt or unexpected stop of the vehicle ahead, the employee can prevent front-end collisions by maintaining a safe following distance at all times. This includes being prepared for possible obstructions on the highway, either in plain view or hidden by the crest of a hill or curve of a roadway. Over-driving headlights at night is a common cause of front-end collisions. Night speed should not be greater than that which will permit the vehicle to come to a stop within the forward distance illuminated by the vehicle's headlights.

Also considered preventable if:
a. Employee failed to maintain safe following distance and have his/her vehicle under control.
b. Employee failed to keep track of traffic conditions and note slowdown.
c. Employee failed to ascertain whether vehicle ahead was moving slowly, stopped, or slowing down for any reason.
d. Employee misjudged rate of overtaking.
e. Employee came too close before pulling out to pass.
f. Employee failed to wait for car ahead to move into the clear before proceeding
g. Employee failed to leave sufficient room for passing vehicle to safely get back in line.

6. Grade Crossing

Collisions with fixed rail vehicles, such as trains, street cars, etc., occurring at grade crossings, in traffic, in a rail yard, switch area, or on private property are the responsibility of the employee to prevent. When a vehicle is parked across a rail

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siding, the employee must first determine if it is safe and permissible and, furthermore, must stand by in case conditions change by the movement of rail cars during parking interval.

Also considered preventable if:
a. Employee attempted to cross tracks directly ahead of train or streetcar.
b. Employee ran into side of train or streetcar.
c. Employee stopped or parked on or too close to tracks.

7. Intersections

It is the responsibility of the employee to approach, enter, and cross intersections prepared to avoid accidents that might occur through the action of other drivers. Complex traffic movement, blind intersections, or failure of the "other driver" to conform to law or traffic control devices will not automatically discharge an accident as "not preventable." Intersection accidents are preventable even though the employee has not violated traffic regulations. His/her failure to take precautionary measures prior to entering the intersection is a factor to be studied in making a decision. When an employee crosses an intersection and the obvious actions of the "other driver" indicate possible involvement by reason of his/her excess speed, crossing his/her lane in turning, or coming from behind a blind spot, the decision based on such entrapment should be preventable.

Also considered preventable if:
a. Employee failed to control speed, so that he could stop within available sight distances.
b. Employee failed to check cross-traffic and wait for it to clear before entering intersection.
c. Employee pulled out from side a street in the face of oncoming traffic.
d. Employee collided with person, vehicle, or object while making right or left turn.

8. Lane Encroachment

A safe driver is rarely a victim of entrapment by another driver when changing lanes. Similarly, entrapment in merging traffic is an indication of unwillingness to yield to other vehicles or to wait for a break in traffic.

Blind spots are not a valid excuse for lane encroachment accidents. Employees must make extra allowances to protect themselves in areas of limited sight distances. Squeeze plays causing involvement with parked cars, pillars, and other road structures, can be prevented by dropping back when it is apparent that the other driver is forcing the issue or contacting a common portion of the road.

Also considered preventable if:
a. Employee failed to yield right-of-way when necessary to avoid an accident.

9. Mechanical Failure

Any accident caused by mechanical failure that reasonably could have been detected by the employee, but went unheeded, should be judged preventable. It is the employee's responsibility to report unsafe vehicle conditions for repairs and to obtain immediate repairs where continued operation might result in an accident.

An accident caused by mechanical failure that results from abusive driving should be considered preventable:
a. Defect was of a type which the employee should detect in making pre-trip or en-route inspection of the vehicle.
b. Defect was of a type which the employee should detect during the normal operation of the vehicle, such as the brakes.

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10. Towing & Hauling

Projecting loads, loose objects falling from the vehicle, loose tarpaulins or chains, doors swinging open, etc. resulting from unsafe vehicle operation, are preventable by employees. Damage to fueling equipment is preventable.

11. Non-Collision

Many accidents, such as overturning, jack-knifing, or running off the road, may result from emergency action by the driver to preclude being involved in a collision. Examination of his/her driving procedure prior to the incident may reveal speed too fast for conditions, or other factors. The employee's action prior to involvement should be examined for possible errors or lack of defensive driving practice.

Also considered preventable if:

a. Employee did not adjust his driving to conditions.

12. Opposing Vehicles

Even though an opposing vehicle enters the employee's traffic lane, it may be possible for the employee to avoid the collision. For example, if the opposing vehicle was in a passing maneuver and the employee failed to slow down, stop, or move to the right to allow the vehicle to re-enter his/her own lane, he/she has failed to take actions to prevent the occurrence. Failing to signal the opposing driver by flashing the headlights or sounding the horn should also be taken into account.

Also considered preventable if:

a. Employee was not entirely in his/her proper lane of travel.
b. Employee did not pull to his/her right and slow down and stop for vehicle encroaching on his/her lane of travel when such action could have been taken without additional danger.

13. Parking

Unconventional parking locations, including double parking, failure to properly place warning devices, etc. generally constitute evidence for judging an accident preventable.

Roll-away accidents from a parked position normally should be classified preventable. This includes unauthorized entry into an unlocked and unattended vehicle, failure to properly block wheels, not in parking gear, to turn wheels toward curb to prevent vehicle movement, or park vehicle into the wind.

A vehicle damaged by falling objects is a preventable accident. While parked at or near a wind turbine, precautions shall be taken to park the vehicle in accordance with the drop zone guidelines.

14. Passing

Failure to pass safely indicates faulty judgment and the possible failure to consider one or more of the important factors an employee must observe before attempting the maneuver.

Accidents are considered preventable if:

a. Employee passed where view of road ahead was obstructed by hill, curve, vegetation, traffic, adverse weather conditions, etc.
b. Employee attempted to pass in the face of closely approaching traffic.
c. Employee failed to signal change of lanes.
d. Employee pulled out in front of other traffic overtaking from rear.
e. Employee cut-in short returning to right lane.

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15. Pedestrians

Traffic regulations and court decisions generally favor the pedestrian hit by a moving vehicle. An unusual route of a pedestrian at mid-block or from between parked vehicles does not necessarily relieve a driver from taking precautions to prevent such accidents. Whether speed limits are posted or the area is placarded with warning signs, speed too fast for conditions may be involved. School zones, shopping areas, residential streets, and other areas with special pedestrian traffic must be traveled at reduced speeds that are safe for the particular situation. Bicycles, motor scooters, and similar equipment are generally operated by young and inexperienced operators. The employee who fails to reduce his/her speed when this type of equipment is operated within his sight-distance has failed to take the necessary precautions to prevent an accident. Keeping within posted speed limits is not taking the proper precaution when unusual conditions call for voluntary reduction of speed.

16. Rear-end Collisions

Investigation often discloses that the employee's risk for being struck from behind is a result of failing to maintain an added margin of safety in his own following distance. Rear-end collisions preceded by a roll-back, an abrupt stop at a grade crossing, when a traffic signal changes, or when the driver fails to signal a turn at an intersection, should be charged preventable. Failure to signal intentions or to slow down gradually should be considered preventable.

Also considered preventable if:

a. Employee was passing slower traffic near an intersection and had to make a sudden stop.
b. Employee made sudden stop to park, load, or unload.
c. Vehicle was improperly parked.
d. Employee rolled back into vehicle behind while starting on grade.
e. Employee failed to increase following distance in the attempt to control a tailgater.

17. Weather

Adverse weather conditions may be contributing factors, but not a valid excuse for being involved in an accident. Rain, snow, fog, sleet, or icy pavements have never caused an accident. These conditions merely increase the hazards of driving. Failure to adjust driving to the prevailing weather conditions could be cause for declaring an accident preventable.

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Distracted Driving Policy EXHIBIT H				Document ID: 0037-2943 INS SUS-CMT-MRP (AME US/Can) Distracted Driving
Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.04.08		Version: 01



In order to increase employee awareness, improve safety and eliminate unnecessary risks behind the wheel, VAME has enacted this Distracted Driving Policy as part of the VAME Vehicle Use Policy and Procedure DMS 0009-0270. This policy applies to any employee operating a company vehicle, rented vehicle while on company business or personal vehicle while on company business, and contains the following principles:

- Employees may use hands free devices to place and receive phone calls only when allowed by law. Even when laws allow such behavior, Vestas discourages against conducting phone conversation while the vehicle is in motion.

- Employees may not use a Personal Digital Assistant (PDA/Smartphone) while operating a vehicle, whether the vehicle is in motion or stopped at a traffic light or stop sign, to read or respond to emails, instant messages, and text messages. If the employee needs to use their PDA to read or respond to messages, they must pull over safely to the side of the road or another safe location.

- Additionally, Vestas promotes the following actions when operating a vehicle:
  - Turn PDA off or put them on silent or vibrate before starting the car.
  - Consider modifying voice mail greetings to indicate that you are unavailable to answer calls or return messages while driving.
  - Inform clients, associates and business partners of this policy as an explanation of why calls may not be returned immediately.

- Failure to abide by this policy and the consequences associated with violating any laws, receiving a citation or being involved in an accident will be taken into account when determining any disciplinary actions to the employee as outlined in the VAME Vehicle Use Policy and Procedure.

By signing the VAME Vehicle Policy, Release and Driver Agreement DMS 0037-2940 (Exhibit A to the VAME Vehicle Use Policy) I acknowledge that I have received a written copy of this Distracted Driving Policy, that I fully understand the terms of this policy, that I agree to abide by these terms, and that I am willing to accept the consequences of failing to follow the policy.

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T03 0037-2943 Ver 01 - Approved - Exported from DMS: 2016-08-29 by RIREG

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Owner: BPO.DEL.SUS
Valid from: 2015.04.08
Version:00

Vehicle Incident Report

Date of Incident:

Time: On/Off Site?: Select...

Fleet Vehicle/Rental Vehicle Select...

Fleet Vehicle Unit Number: Rental Company: Select...

Location where vehicle rented: Rental Location Phone:

State: City:

Description of the Event:

Address of where incident happened: (Please provide physical location or intersections and city/state)

CONDITIONS(Check all that apply)

Light Conditions:	Weather:	Road Surface:	Road Type:
Select...	Select...	Select...	Select...
Seatbelt Worn?:	**Cell Phone Being Used:**	**Vehicle used for business?:**	**Speed:**
Select...	Select...	Select...	Select...
Number of Persons Involved	Reason for Driving/Operating:		Posted Speed Limit: Select...

EMPLOYEE INFORMATION

Full Name: Cost Center:

Home Address: City:

State: Zip code: Phone Number:

Driver's License #: State: DOB

Was driver injured?: Select. Was driver admitted to the hospital?: Select.

VEHICLE INFORMATION

Year: Make: Select... Model: Type: Select... Color:

VIN: License Plate #: License State:

Areas(s) damaged:

Is vehicle drivable? Select Is there a quote for repairs? Selec Did airbag deploy? Select.

OTHER DRIVERS/VEHICLES/PARTIES INVOLVED

Driver Name: Vehicle Owner (if different than driver)

Address: Name:

City: Address:

State: Zip code: City:

Phone: State: Zip code:

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Driver's License #: Phone :

State:

Insurance Company: Policy Number:

Insurance Company Phone: Vehicle VIN:

Vehicle Year: Make: Model:

POLICE INFORMATION

Incident Reported?: S Report Number: Citation Issued?: S Citation Number:

Officer Name: Badge Number:

Station Address: City:

State:

WITNESSES

Full Name:

Driver's License #: State:

Home Address: City:

State: Zip code: Phone Number:

WITNESSES #2

Full Name:

Driver's License #: DL State:

Home Address: City:

State: Zip code: Phone Number:

File Attachment | File Attachment | File Attachment | File Attachment

Submit

TO BE COMPLETED BY CORPORATE

Insurance Claim Number:

Rental Company File Number:

Total Cost of Repairs: Vestas Cost: Express 4X4 Savings:

Cause of Accident: Select...

Status of Claim: Select...

Method of Payment: Select... PO Number:

Third Party Claimant Involved Select...

MVR Ordered Select...

T03 0052-0209 Ver 00 - Approved - Exported from DMS: 2016-06-04 by RIREG

VAWT Powered Industrial Truck Vestas System Instruction				Document ID: 0049-0614 INS SUS-MET-MAI (AME US) Powered Industrial Truck
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2016.06.02		Version: 02

Version history

Version No.	Date	Description of Changes
02	2016.06.02	Revised DMS 0049-0617 to 0049-0623

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1 Purpose

To ensure that VAWT employees who operate Powered Industrial Trucks (PITs) have adequate knowledge to protect themselves and others from accidents and injuries.

2 Responsibility

2.1 Site/Construction Manager/Authorized Supervisor

2.1.1 Maintain records certifying that each employee operating a PIT has successfully completed PIT safety training and practical evaluation;

2.1.2 Ensure employees who use PIT are authorized and competent to do so;

2.1.3 Ensure the employees are completing the PIT Inspection Form found in (DMS# 0049-0615);

2.1.4 Ensure proper maintenance and repairs of the PIT are carried out per manufacturer's instructions.

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2.1.5 Maintain one year of PIT inspection records on site.

2.1.6 Ensure periodic maintenance is performed on the PIT per the manufactures recommendations.

2.1.7 Perform a facility hazard assessment.

2.2 Employee

2.2.1 The employee who operates PITs must be authorized, competent and have a certificate of training to operate appropriate type of PIT.

2.2.2 Inspect equipment before start of operation on the PIT and every shift thereafter to ensure the safe operating condition of the equipment.

2.2.3 Complete the PIT Inspection Form (DMS# 0049-0615) prior to operating the PIT.

2.2.4 Report any defects and/or conditions that may affect the safe operation of the PIT to the Site/Construction Manager/Authorized Supervisor.

2.2.5 Must operate the PIT safely, maintain full control, and comply with the laws governing the operation of a PIT.

3 References

Document No.	Title
29CFR1910.176	General Material Handling
29CFR1910.178	OSHA Powered Industrial Trucks

4 Scope

This program applies to all personnel required to operate a powered industrial truck while working under the direction inside or outside a VAWT.

5 Terms and abbreviations

Term or Abbreviation	Definition
PIT	Powered Industrial Truck
DMS	Document Management System

6 Forms

Document No.	Title
0049-0615	PIT Inspection Form
0049-0623	PIT Hazard Assessment & Inventory
0049-0616	PIT Operator Practical Evaluation

7 Powered industrial truck inventory

The unique characteristics for each vehicle that is available for use at this plant or individual facility must be identified on the PIT Hazard Assessment/Inventory form (DMS# 0049-0623).

8 Training

8.1 Employee Training Status

Except for training purposes, only trained and competent employees are permitted to operate the facilities powered industrial trucks. The Site/Construction Manager or designee will identify any newly hired employees required to operate a powered industrial truck. Training and evaluation will be completed prior to allowing them to operate this equipment unsupervised.

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8.2 Employee Capability

8.2.1 Before training a newly hired employee, the hiring manager or supervisor will determine if the potential powered industrial truck operator is capable of performing the duties necessary to be a competent and safe driver.

8.2.2 His/her Judgment will be based on physical and mental abilities of the employee to perform job functions that are essential to the operation of powered industrial trucks.

8.2.3 These capabilities include the level at which the operator must:

8.2.3.1 See and hear within reasonably acceptable limits, including the ability to see at distance and peripherally. In certain instances, it is also necessary for the driver to discern different colors, primarily red, yellow and green.

8.2.3.2 Endure the physical demands of the job.

8.2.3.3 Endure the environmental extremes of the job or task, such as the ability of the person to work in areas of excessive cold or heat.

8.2.3.4 An operator must be able to climb onto and off of a truck, to sit in the vehicle for extended periods of time, and to turn his/her body to look in the direction of travel when driving in reverse.

8.3 Initial Training

8.3.1 During an operator's initial training, the employee shall receive both; classroom instruction (or E-learning) and practical training.

8.3.2 General hazards that apply to the specific powered industrial truck operation;

8.3.3 Specific hazards associated with operation of the PIT in the facility identified in the PIT Hazard Assessment/Inventory form (DMS# 0049-0623);

8.3.4 Practical training will include:

8.3.4.1 Operator instructions

8.3.4.2 Maintenance

8.3.4.3 Inspection

8.3.4.4 Hazards

8.3.4.5 Practical equipment operation and

8.3.4.6 Operator practical evaluation within facility

8.4 Training Certification

8.4.1 After an employee has successfully completed the training program, the instructor will determine whether the potential driver is competent to safely operate a powered industrial truck.

8.4.2 Trainee must take a performance test or practical exercise by which the instructor(s) will decide if the training was adequate.

8.4.3 All powered industrial truck trainees are to be trained and tested on the equipment they will be driving.

8.5 Performance Evaluation

8.5.1 Each certified powered industrial truck operator is evaluated once every three year to verify that the operator has retained and uses the knowledge and skills needed to drive safely.

8.5.2 The Site/Construction Manager/Authorized Supervisor shall arrange for an evaluation:

8.5.2.1 If the operator is lacking the appropriate skills and knowledge

8.5.2.2 When an operator has an incident, near miss, or some unsafe operating procedure is identified, he/she will be retrained.

9 Inspections

9.1 Pre-shift Inspection Procedures

9.1.1 VAWT requires its operators to perform pre-shift safety equipment checks on powered industrial trucks, prior to the beginning of each shift. The PIT shall be inspected, to ensure

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T03 0049-0623 Ver 02 - Approved - Exported from DMS: 2016-06-03 by RIREG

the vehicle is safe to operate. A daily PIT inspection checklist will be used to perform this pre-shift check.

9.1.2 The PIT Inspection form (DMS# 0049-0615) shall be located on or near the PIT.

9.1.3 No blank spaces are allowed on the form. If an item does not apply, mark it N/A for “Not Applicable”.

9.1.4 The operator must complete the comment section if there are any operational or visual defects. (Be specific)

9.1.5 Any irregularities are to be reported to the Site/Construction Manager/ Authorized Supervisor. Repairs will be made before the truck becomes unsafe to operate. No powered industrial truck will be used if the pre-shift inspection identifies any safety hazards.

9.1.6 PIT Inspection forms will be retained for each PIT, for a period of one year.

9.1.7 The Site/Construction Manager/ Authorized Supervisor or designee will review a representative sampling of these checklist forms as part of the month site inspection to ensure the forms are being completed correctly.

9.2 Periodic Inspection Procedure

9.2.1 Periodic inspections will be completed in accordance with the powered industrial truck's maintenance or service schedule.

9.2.2 Maintenance schedules are expressed in days operating, or running hours.

9.2.3 Certified factory technicians shall perform the inspection when any maintenance or repairs have been completed.

10 Operating procedures

Under no circumstances shall a VAWT employee be permitted to operate a powered industrial truck unsupervised, until he/she has successfully completed the powered industrial truck training program and received a practical evaluation on the sites PIT. This requirement includes all newly hired operators regardless of claimed previous experience.

10.1 Load Lifting and Carrying

10.1.1 Powered industrial trucks load capacity is indicated on the rating plate. This capacity must never be exceeded.

10.1.2 All operators shall follow established the load lifting and carrying procedures:

10.1.2.1 Lift the load only high enough to transport typically six to twelve inches from the floor or ground.

10.1.2.2 Never transport an elevated load.

10.1.2.3 Always center the load on the forks.

10.1.2.4 Pallet loads must always be secure.

10.1.2.5 When the load obstructs drivers’ vision, the load will be transported in reverse.

10.1.2.6 All truck or trailers being loaded or unloaded shall have the parking brake set and the wheels chocked before a truck enters these vehicles.

10.1.2.7 Our operator’s shall stop at blind corners and before passing through doorways to ensure that area is clear to enter.

10.1.2.8 Use extra caution when operating a PIT on ramps and maintain the load uphill of the PIT whenever possible.

10.1.2.9 Powered industrial trucks are not to be left running and unattended.

10.2 Battery Charging and Changing

10.2.1 Batteries present a hazard because they contain corrosive chemical solutions, either acid or alkali.

10.2.2 During recharging, a worker may be exposed not only to the acid solution, but also to hydrogen gas, which is produced during the recharging process.

10.2.3 Good housekeeping procedures are essential. The area shall be kept clean and free of any combustible materials.

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10.2.4 The VAWT has installed the following safety features:

10.2.4.1 Eye-wash station for workers who transfer acid or other corrosive products;

10.2.4.2 A hose for flushing and neutralizing spilled electrolyte;

10.2.4.3 The charging apparatus is protected to prevent damage from vehicles;

10.2.4.4 Smoking is prohibited and identified as such in charging areas;

10.2.4.5 No open flames, sparks, or electric arcs allowed in the charging area during charging activities; and

10.2.4.6 Always follow the manufacturer recommendations for charging or changing a battery.

11 Pedestrians

Powered industrial truck operators are responsible for pedestrians and stopping operations anytime personnel unknowingly enter a hazardous situation.

11.1 PIT Operator Requirements:

11.1.1 Be constantly alert to pedestrian traffic and give pedestrians the right of way.

11.1.2 Utilize the horn before turning a corner or entering a “blind” area such as passing through a doorway.

11.2 Pedestrians Requirements:

11.2.1 Always be alert to forklift traffic.

11.2.2 Look both ways before entering an aisle way.

12 Maintenance

Proper upkeep of equipment results in day to day reliability. Keeping up with the manufacturer's recommended maintenance and lubrication schedules, and completing the proper records, will also increase our trucks' longevity and safety of operators.
Refer to the manufacturer's operator instruction manual(s) periodic maintenance schedules; annual inspections shall completed by a factory-trained-technician, or a dealer. The PIT Operation and Maintenance manual shall be located on the PIT.

13 APPENDIX: version history

Version No.	Date	Description of Changes
00	2013.02.08	New document
01	2013.02.13	Fixed formatting
00	2015.03.25	Converted T09 Document (0036-8271) to T03, revised DMS numbers
01	2015.05.21	Revised Title Bar

T03 0052-0220 Ver 02 - Approved - Exported from DMS: 2016-06-03 by RIREG

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Daily Forklift Inspection

TRUCK NO._____ **DEPT._____**

SHIFT: _____ **WEEK OF:_____** **ENGINE HOURS (First Day only):_____**

	PLEASE INITITAL								*PLEASE INITITAL*						
Visual checks	M	T	W	T	F	S	S	Operational Checks	M	T	W	T	F	S	S
* **General inspection:** body damage, hydraulic hoses, leaks, overhead guard								* **Engine:** runs smoothly, no leaks, idles							
* **Check fluids:** radiator, engine, hydraulic oils, brakes								* **Steering**: operates smoothly, nonbinding							
Operator Restraint: damage, mounting, operational								* **Service Brake:** stops smoothly, doesn't grab							
Warning Decals/ Operator's Manual: present, readable								**Parking Brake:** operational, properly adjusted							
* **Tires/Wheels:** wear, damage, nuts tight								**Seat Brake:** (if equipped): operational							
Head/Tail/Working Lights: damage, mounting, operation								**Horn**: operation, audible							
Battery: connections loose, charge, electrolyte low								**Backup Alarm:** (if equipped): operational, audible							
* **Forks**: not bent, worn, or modified, stops OK								**Warning Lights:** (if equipped): operational, visible							
Load Back Rest: not bent, cracked, loose, or missing								* **Controls; Lift/Lower, Tilt:** operates smoothly, minimal drift							
Data Plate: present, readable								**Gauges/Instruments:** operational, readable							
Supervisor Initials								**Supervisor Initials**							

*** Line items that could restrict Lift truck Usage**

REPORT ANY AND ALL DEFECTS TO THE SUPERVISOR OR FOREMAN-IMMEDIATELY

Employee Name or Number	Time	Date	Detail Any Damage	Status of Repair

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PIT Hazard Assessment Inventory

Date:	
Name:	
Job Position:	
Site Location:	

Hazard	Resolution/Precaution

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Owner: BPO.DEL.SUS
Valid from: 2015.03.25
Version:00

PIT Hazard Assessment Inventory

Document ID: 0049-0623
INS SUS-IEM-EMR (AME US/CAN)
PIT Hazard Assessment/Inventory

Date:	######
Name:	0
Job Position:	0
Site Location:	0

Make and Class	Type/Model	Serial Number
Hyster	Electric Sit down rider	Example

T03 0049-0623 Ver 00 - Approved - Exported from DMS: 2016-06-03 by RIREG

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Performance Test for Forklift Operators

EMPLOYEE:		
Date:		
Time:		
Discription of Task	Pass	Fail
1. Shows familiarity with truck controls.		
2. Gave proper signals when turning.		
3. Slowed down at intersections.		
4. Sounded horn at intersections.		
5. Obeyed signs.		
6. Kept a clear view of direction of travel.		
7. Turned comers correctly - was aware of rear end swing.		
8. Yielded to pedestrians.		
9. Drove under control and within proper traffic aisles.		
10. Approached load properly.		
11. Lifted load properly.		
12. Maneuvered properly.		
13. Traveled with load at proper height.		
14. Lowered load smoothly/slowly.		
15. Stops smoothly/completely.		
16. Load balanced properly.		
17. Forks under load all the way.		
18. Carried. parts/stock in approved containers.		
19. Checked bridgeplates/ramps.		
20. Did place loads within marked area.		
21. Did stack loads evenly and neatly.		
22. Did drive backward when required.		
23. Did check load weights.		
24. Did place forks on the floor when parked, controls neutralized, brake on set, power off.		
25. Followed proper instructions for maintenance - checked both at beginning and end.		
26. Performed hazard assessment for the task		
27. Removed any potential hazards from travel route		
Rating (circle)	Pass	Fail

Evaluator: _____

Note: _____

_____

_____

_____

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Subcontractor Safety Plan				Document ID: 0049-0608 INS SUS-SAF-OPC (AME US) Subcontractor Safety
Owner(s): BPO.Del.SUS	Author(s): JAPOW	Valid from: 2015.03.24		Version: 00

Version history

Version No.	Date	Description of Changes
00	2015.03.24	Converted T09 Document (0008-6835) to T03 document, Revised DMS #'s

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1 Purpose

This document helps to insure alignment between Vestas and its subcontractors. Any discrepancies between the Vestas Safety Program and that of its subcontractors shall be discussed and remedied prior to subcontractor work on site.

2 Responsibilities

2.1 Senior Management

2.1.1 Ensure effective program development and implementation.

2.1.2 Provide Site/Construction Management/Authorized Supervisor with adequate resources and support to carry out program responsibilities and obligations.

2.1.3 Require adherence to all policies, procedures, practices and rules related to the use of Subcontractors.

2.1.4 Oversee and evaluate site supervisor performance.

2.2 Site/Construction Manager/Authorized Supervisor

2.2.1 Provide any site specific information where the subcontractor(s) will be performing work;

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2.2.2 Provide an orientation to subcontractors using the VAWT/VCWT Orientation checklist found in DMS 0049-9842;

2.2.3 Ensure all personnel under Vestas supervision:

2.2.3.1 Adhere to all policies, procedures and rules related to Subcontractor Management.

2.2.3.2 Received training from a competent person:

2.2.3.3 Acknowledge and have adequate knowledge and skills to perform their duties.

2.2.3.4 Follow the Vestas Safety programs.

2.2.3.5 Complete required Vestas documentation.

2.2.4 Maintain written plans or procedures that, at a minimum, comply with all local, state, provincial and federal laws and regulations that apply to the facility

2.2.5 Comply with the most stringent requirement established either by local law or by this program.

2.2.6 Initiate an incident investigation whenever subcontractor personnel are involved.

2.2.7 Exercise the ability to stop work at any time safety is being questioned and/or compromised.

2.2.8 Monitor, evaluate and document subcontractor performance during and immediately following the completion of the contract.

2.3 Quality, Safety & Environmental (QSE)

2.3.1 Develop and monitor implementation of the Subcontractor Plan.

2.3.2 Ensure efficient and effective subcontractor instruction and training are conducted.

2.3.3 Propose and implement improvements to the Subcontractor Plan.

2.4 Vestas Global Sourcing

2.4.1 Analyze subcontractor capability and competency for the required product or service.

2.4.2 Procurement will assess the product specification or service scope of work and determine whether a previously qualified vendor is capable of providing the given product or service.

2.4.3 Procurement will review any available past performance records, contracts, and other data such as TRIR, EMR DART and Fatalities to verify the Vendors' have the capability and competency necessary to safely provide the product or service.

2.4.4 It is the responsibility of the bidding subcontractors to provide complete health and safety information required by Vestas, when their bid proposal is submitted.

2.5 Subcontractor Safety Representative

2.5.1 The Subcontractor Safety Representative shall:

2.5.2 Provide quality safety training programs for subcontractor employees and representatives,

2.5.3 Implement protective measures to prevent damage of equipment, injury and/or illness to its employees and representatives performing work at site, as well as other impacted persons in the Subcontractor's area of responsibility.

2.5.3.1 Stop work when an imminent danger situation exists.

2.5.4 Additionally, this person may be authorized to implement changes regarding the Subcontractor Environmental, Health & Safety Programs including:

2.5.4.1 Administration,

2.5.4.2 Quality of life issues,

2.5.4.3 Unsafe acts and conditions, and

2.5.4.4 Employee non-compliance, disciplinary and last chance programs.

2.6 Subcontractor Employees

2.6.1 Encourage and maintain an Injury and Illness Free Workplace at all times.

2.6.2 Consistently follow those policies, procedures and guidelines set forth by their individual company, Vestas and Local Regulations.

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3 References

Document No.	Title
0049-0545	VAWT Drug Free Workplace
0029-4864	Training Requirements
0049-0544	Training Matrix
0049-0547	Safety Meetings
0049-0549	Job Safety Analysis
0049-0685	Pre-Task Plan
0042-3182	Incident Management
0049-2056	Code of Safe Practices
0049-2063	Hazard Communication
0049-2070	Personal Protective Equipment Plan
0049-0695	Hearing Conservation Program
0049-0571	Fall protection Program
0049-0580	Control of Hazardous Energy
0049-2053	HAZMAT Handling Storage
0009-0270	Vehicle Use Policy

4 Scope

The provisions of this procedure apply to all Vestas Vendors, Contractors, Subcontractors and Short Service Personnel.

4.1 QSE Goals and Expectations

Vestas - American Wind Technology, Inc. **(VAWT)** expects and requires that Subcontractors develop and implement Sustainability programs and management systems that accomplish the following:

4.1.1 Encourage, promote and establish goals and expectations that the Subcontractor and its subcontractors, suppliers, and all their respective employees, agents and representatives will enter into this project with a desire to create and maintain an **Injury Free Workplace** and a working environment.

4.1.2 Establish and maintain management commitment, resources, training, site supervision, and personnel to provide quality work that insures the safety and well-being of the people working at site and the protection of the environment at construction, service sites, office locations and warehouses.

4.1.3 The Subcontractor shall comply with the suggestions and requirements set forth in these Subcontractor Environmental, Health, and Safety Requirements (this document). The subcontractor is further obligated and responsible to ensure its employees and representatives that enter the site embrace the above goals and expectations and comply with the requirements set forth in this document.

4.1.4 Subcontractor non-compliance with the requirements set forth in this document may result in cancellation, termination, or suspension of the subcontract, in whole or in part, and allow Vestas American Wind Technology, Inc., to complete the work at the Subcontractor's cost.

4.1.5 The Subcontractor shall enforce the provisions of this document in any contract with its subcontractor's, and its subcontractors shall extend these requirements to their subcontractors.

4.1.6 At minimum, the Subcontractor Environmental, Health & Safety programs shall meet or exceed the requirement outlined in this document. Where conflicts occur, the most stringent provision shall apply.

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5 Terms and Abbreviations

Term or Abbreviation	Definition
PFAS	Personal Fall Arrest System [Harness, Lanyard]
PPE	Personal Protection Equipment
GFCI	Ground-Fault Circuit Interrupters.
JSA	Job Safety Analysis
VAWT	Vestas American Wind Technology
TRIR	Total Recordable Injury Rate
EMR	Experience Modifier Rate
HAZCOM	Hazard Communication
EAP	Employee Assistance Program
IR	Incident Report (QSE Notification)
SDS	Safety Data Sheet
PTP	Pre-Task Plan
DMS	Document Management System

6 Forms

Document No.	Title
0049-0612	Subcontractor Management: Personal Protection Equipment Verification
0049-0611	Subcontractor Management: Vehicle Identification
0049-0609	Subcontractor Management: Training Verification
0049-0610	Subcontractor Management: Certificate of the Start of Work
0049-0562	VAWT/VCWT Orientation Checklist

7 Federal and State OSHA Compliance

The Subcontractor, and its employees and representatives, will comply with all applicable Federal and State Environmental, Health & Safety regulations as outlined in 29 CFR 1910 and 1926.

NOTE: When the above standards are exceeded by VAWT in this document, and/or in other VAWT Environmental, Health & Safety practices and procedures, the Subcontractor, and its employees and representatives, will comply with those higher standards.

8 Subcontractor Safety Personnel

8.1 Requirements

8.1.1 Subcontractors with less than ten employees performing work at a construction or service sites will designate a Site Safety Representative.

8.1.1.1 The assigned Subcontractor Safety Representative may be a Supervisor, foreman or working member of the crew.

8.1.1.2 This Safety Representative is directly responsible for implementing and maintaining a site specific Subcontractor Environmental Health & Safety Programs which are designed to meet the goals, expectations and requirements set forth in, these Subcontractor Environmental Health & Safety Requirements.

8.1.2 For subcontractors with ten or more employees on site, in addition to the requirements above, a Subcontractor Safety Professional will be available to respond to site Safety and Health issues.

8.1.2.1 This Safety Professional, which may be the Subcontractor's Safety Director, Manager or Safety Consultant, is not required to be on site full time.

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8.1.2.2 The Safety Professional's responsibility includes assisting the Subcontractor's Site Superintendent/General Foreman and Site Safety Representative in implementing and maintaining the site-specific Subcontractor Environmental Health and Safety process, designed to meet the goals, expectations, and requirements outlined in this document.

8.1.2.3 Prior to Subcontractor's start-up of work, VAWT will provide the Safety Professional's point of contact information.

8.1.3 If the site requires the staffing of a full-time Subcontractor Safety Representative, the qualifications of the selected individual will be submitted, in writing, to VAWT.

8.1.4 If during the course of work on site, the Subcontractor's Safety Representative is not carrying out his/her obligations to ensure compliance with the Subcontractor's Environmental, Health & Safety Programs and/or the requirements set forth in this document, VAWT will report the matter to the Subcontractor. The Subcontractor shall take immediate corrective action to ensure its Safety Representative carries out his/her duties and responsibilities as required by this document.

8.1.5 Should the unsatisfactory performance continue VAWT will direct the Subcontractor to replace its Safety Representative.

9 Program Policies, Practices and Procedures

9.1 Program Development

9.1.1 The Subcontractor shall develop and enforce Environmental, Health & Safety requirements, policies, practices, and procedures for the Subcontractor's employees and representatives' to encourage, promote, and establish an Injury Free Workplace. Such programs shall include the enhancement of worker quality of life issues and the protections and preservation of the environment from the construction process on site.

9.1.2 To attain this high level of performance, the subcontractor shall train and review its employees and representatives with the requirements of this document and the Subcontractor's Environmental Health and Safety practices and procedures. The Subcontractor Environmental Health and Safety Process will include those programs necessary to perform Injury Free Work and comply with Federal, State and Local regulations. As a minimum requirement, the Subcontractor will provide procedures and training, and ensure compliance with the Environmental, Health and Safety Practices and Procedures noted and entailed on the Subcontractor Checklist.

9.1.3 The Subcontractor shall review and integrate the required task specific programs as outlined in the Subcontractor Checklist, into their Site Environmental Health and Safety Process. All applicable programs shall comply with Federal, State and Local rules and regulations, and VAWT Environmental, Health and Safety practices and procedures.

9.1.4 The Subcontractor shall provide employees with training in hazard recognition and identification and the authorization necessary for them to take immediate corrective action of noted unsafe practices and/or conditions.

10 Discipline Policy

10.1 Compliance

10.1.1 The Subcontractor, its employees and representatives are required to comply with all aspects of this document.

10.1.2 Failure of the Subcontractor or its employees or representatives to adhere to, and comply with, the requirements of this document, will subject such persons to the Vestas discipline policy.

10.1.3 The Vestas discipline policy utilizes a three step process for minor infractions.

- ***1st Step - Verbal Warning:*** The verbal warning shall be considered administered upon acknowledgement and signing of the contract. This warning shall be communicated by the Subcontractor to all its employees and representatives prior

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to commencing work on site. The verbal warning will again be communicated, and acknowledgement documented, during the Subcontractor employee and representative site orientation.

- ***2nd Step - Written Warning:*** The second step in the process is the written warning by the Subcontractor to its employee and/or representative. A copy of the written warning will be submitted to the Site/Construction Manager for review and appropriate action. Such action by a VAWT manager, may result in, but not limited to, employee and/or representative re-orientation and/or retraining, removal from site or other appropriate action as deemed necessary.
  - Re-orientation and retraining will be conducted by the Subcontractor and be attended by both the violator and his/her Supervisor or Foreman.
  - This re-orientation and retraining will provide the employee and/or representative with a review of the Environmental, Health & Safety practices and procedures to ensure an Injury Free Workplace.
- ***3rd Step - Immediate Removal:*** Repeat of minor or major infractions of VAWT and/or Subcontractor Environmental Health & Safety practices and/or procedures will result in the immediate removal of the violator from site.
  - VAWT reserves the right to demand the removal of a Subcontractor employee or representative for the violation of any Environmental Health & Safety standard that results in imminent danger to the employee and/or others.
  - Immediate removal from site may include transfer, suspension, or termination of the employee, depending on the severity of the violation.
  - Upon determination for immediate removal, it is the Subcontractor's responsibility to expeditiously remove the employee from site, with a minimum impact on the order and production.
  - Any Supervisor, General Foreman, Superintendent, or Construction Manager who forces or directs any employee to violate an Environmental, Health & Safety practice and/or procedure, will be removed from site.

11 Drug Free Workplace Program

VAWT participates in a Drug Free Workplace Program, which is currently administered by a third party. The Subcontractor is responsible to ensure it has its own program in place, prior to performing work with VAWT. It should be noted that the Subcontractor cannot take part in VAWT's Drug Free Workplace Program in lieu of their own program.

12 Subcontractor Drug Free Workplace Program Scope

12.1.1 Subcontractors will ensure all their employees and representatives performing work on site, are drug and alcohol free.

12.1.2 To support the intent of VAWT's Drug Free Workplace, the Subcontractor will have an internal written, substance abuse program, which addresses, at minimum, the guidelines and requirements outlined in this document.

12.1.3 VAWT's QSE representative will review, approve, and file the Subcontractor program prior to the commencement of any work on site.

NOTE: The Subcontractor shall include the provisions of this Drug Free Workplace program requirement in every subcontract and require that his subcontractors include it in their contracts so that such provisions will be binding upon each subcontractor.

12.2 Testing Frequency and Methods

The Subcontractor Drug Free Workplace program will provide for one of the following drug screening frequency and methods.

12.2.1 **Method One: Random Drug Screening:** Employees are selected at random for testing a minimum of twice during each calendar year.

12.2.2 **Method Two: Scheduled Drug Screening:** Employees are tested at minimum once every six months during a twelve-month period.

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12.3 Program Minimum Test Panel Standards

The Subcontractor Drug Free Workplace program must employ the urine drug panel procedure. This procedure tests for the controlled substances listed below.

12.4 Drug Testing Cut-off Levels:

Substance or Class	Initial Screening Cutoff	Confirmation Cutoff
Amphetamines	1000 ng/mL	500 ng/mL [1]
Barbiturates	200 ng/mL	200 ng/mL [2]
Cocaine	300 ng/mL	150 ng/mL
Ethanol (alcohol)	0.02 g/L	0.02 g/L [3]
	0.02 g/210 L	0.02 g/210 L [4]
Marijuana (THC)	50 ng/mL	15 ng/mL [5]
Opiates	2000 ng/mL [6]	2000/10 ng/mL [7]

[1] If methamphetamine only exceeds 500 ng/mL, specimen must also contain amphetamine at a concentration greater than or equal to 200 ng/mL

[2] Confirmation metabolite: benzoylecgonine

[3] Cut-off for alcohol in urine

[4] Cut-off for alcohol in breath

[5] Confirmation metabolite: delta-9-tetrahydrocannabinol-9-carboxylic acid

[6] Gas chromatography/mass spectrometry cut-off for codeine/morphine

[7] Confirmation cut-offs for codeine/morphine and 6-acetylmorphine

12.4.1 These levels are subject to change without notice based on changes in the “Procedures for Transportation Workplace Drug and Alcohol Testing Programs,” 49 CFR Part 40. Other drugs may be tested for under special circumstances.

12.4.2 The substances and screening thresholds (cut-off values), in the Subcontractor’s Drug Free Workplace program, will be consistent with the above outlined minimum requirements.

12.5 Pre-Construction Verification Requirements

Verification will be made in writing to VAWT that each of the Subcontractor’s employees and representatives has been identified as drug and alcohol free prior to the commencement of work by the Subcontractor’s employees and representatives. This requirement may be met in one of the following two ways.

12.5.1 Distribute drug free certification cards to each employee and representative and provide VAWT with copies of each card. The card must include Subcontractor and employee/representative names, and date of current test and/or expiration date of drug free card.

12.5.2 Submit on company letterhead, a complete list of the certified drug and alcohol free employees and representatives. The listed information will include the employee/representative names, and date of current test and/or expiration date of drug free status. VAWT reserves the right to obtain additional information to confirm Subcontractor compliance.

Note: No Subcontractor employee or representative will be authorized to perform work on site until proof of a current and valid (within six months or less) drug screen is provided.

12.6 Incidents and Reasonable Suspicion

12.6.1 Adequate provisions will be included in the Subcontractor Drug Free Work Place program for employee testing for drugs and alcohol:

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12.6.1.1 If an employee is involved in an incident and/or where reasonable suspicion of impairment is indicated.

12.6.1.2 When involved in an incident resulting in injury and treatment by a physician, an employee will be tested prior to being released to return to work.

12.6.1.3 When behavior and fitness for duty concerns are observed, and employee will be removed from the site and tested for reasonable suspicion of impairment, prior to being released to return to work.

12.6.1.4 Refusal to take a required drug test or failure of a drug test will result in disciplinary action. Refusal to test includes, but is not limited to, adulteration or substitution of a urine sample.

12.7 Positive Test Results

12.7.1 Any Subcontractor employee or representative whose drug screen results indicate a positive test for substance abuse shall be immediately removed from site. The Subcontractor has the full responsibility to remove that employee or representative in a prompt and orderly manner.

12.7.1.1 An employee who has been removed from the site for a positive test will not be permitted to return to work until the Subcontractor's authorized Employee Assistance Program (EAP) and/or its Drug Free Workplace counseling service have released him, in writing.

12.7.1.2 VAWT reserves the right to deny an employee's return to work for refusal to submit to a drug test or on a case-by-case basis.

12.8 Financial Obligations

12.8.1 All costs connected with the development, implementation and administration of the Subcontractor's Drug Free Workplace program, will be the sole responsibility of the Subcontractor. These costs include, but are not limited to the following:

12.8.1.1 Employee pay and benefits for the time to and from the collection site;

12.8.1.2 Transportation to and from the collection site;

12.8.1.3 Collection of the sample and laboratory analysis; or

12.8.1.4 Other services related to the Subcontractor Drug Free Workplace program.

12.9 Subcontractor Non-Compliance

12.9.1 In the event of Subcontractor non-compliance with all the conditions outlined in the sections above, the Subcontract/Subcontractor's contract may be canceled, terminated, or suspended, in whole or in part. Subsequent to this action, VAWT may complete the work and invoice the cost to the Subcontractor.

12.10 Procedure Guidance

12.10.1 In the event there is reasonable suspicion of impairment, behavior or fitness for duty concerns are observed, or a Vestas subcontractor is involved in an incident resulting in injury and treatment by a physician, the subcontractor's management should be contacted to ensure patient confidentiality and privacy sensitivities are respected and handled appropriately.

12.10.2 Subcontractor management contact information shall be posted in construction trailers and/or service buildings or otherwise made available to site management to ensure compliance with the Drug Free Workplace Program.

13 Training Requirements

13.1 Site Induction/Safety Orientation

13.1.1 Subcontractor employees and representatives entering the site for the first time must attend the jobsite safety orientation before that employee or representative performs any work. Every new employee will complete a VAWT/VCWT Orientation Checklist or DMS 0049-0562 one meeting the intent of this requirement.

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13.2 First Aid/CPR

13.2.1 All Subcontractors must have and maintain certification in First Aid/CPR/AED/Trauma at Height in accordance with Vestas specifications, through an approved program.

13.2.2 Vestas specifications include:

- First Responder – Roles and Responsibilities
- Bleeding and control of shock
- Crushing/amputation injury
- Heat exhaustion/heat stroke
- Medical emergency - Heart Attack
- Chemical overexposure
- Hypothermia/frostbite
- Suspension Trauma
- Head, neck and spinal injury
- Strained knee/ankle - slip, trip fall
- Electric shock with burns
- Back injury – overexertion
- Fall from height – multiple impact injuries

13.2.3 Training will be conducted and certified through EMP America, American Red Cross, or other recognized programs.

13.2.4 Proof of current training will be provided to VAWT and document on form DMS 0049-0609 – Subcontractor Management: Training Verification.

13.3 Hazard Communication (Haz-Com)

13.3.1 Subcontractors' employees and representatives must be properly trained in, and informed of, the identification and characteristics of potential health risk and hazards, and the safe use and handling of all hazardous chemicals, materials, and substances they will handle and work with, or will possibly come in contact with on the jobsite.

13.3.1.1 The Subcontractor shall conduct follow-up training and provide updated information with the introduction of any new hazardous chemical, material, or substance to the jobsite, or as otherwise indicated.

13.3.1.2 VAWT will be provided with copies of the Subcontractor (Haz-Com) training documentation and document on form DMS 0049-0609 - Subcontractor Management: Training Verification.

13.4 Personal Protective Equipment (PPE)

13.4.1 The worker will be trained on all required PPE including fall protection devices and shall include the proper: care, wear and use of personal protective equipment, specifically the harness, lanyard and other equipment used for fall restraint and arrest applications.

13.4.2 The worker shall verify all PPE used onsite using form DMS 0049-0612 - Subcontractor Management: Personal Protection Equipment Verification.

13.4.2.1 The worker shall be made aware of his/her obligation to wear and use PFAS and associated equipment when the work task dictates.

13.4.2.2 A worker observed not practicing 100% tie off at all times, will be subject to **immediate removal from the site**.

13.4.2.3 The worker will acknowledge his/her understanding of this policy, and responsibility to work accordingly, by signing a statement to that effect.

13.5 Material Handling

13.5.1 Each Subcontract employee shall attend a recognized course in correct lifting and carrying techniques.

13.6 Working at heights/Rescue/Evacuation

13.6.1 All persons prior working inside or outside the turbine where their work will require them to work at heights 2 meters (6 feet) or more off the ground, must show completion of **Working at Heights** training.

13.6.2 Classroom Specific Requirement:

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- Recognize the need for situational awareness
- Conduct dynamic risk assessments around the dangers of working at height
- Identify how to access regulatory and best practice standards and guidelines
- Three primary vertical rescue challenges
  - Self-rescue – evacuation
  - Assisted rescue – ladder rescue with suspension trauma mitigation
  - Assisted rescue – over the edge rescue the unreachable
- General considerations for rescue
- General procedure for casualty recovery
- Medical implications of suspension
- Rescue equipment use, care and inspection

13.6.3 Practical Exercise Specific Requirements:

- Practical exercises/tasks for working at height,
- Evacuation from the hub
- Use of a controlled descent device (s) and
- At least one rescue exercise.

NOTE: Vestas reserves the right to verify that the contractor's/subcontractor's employees have the required competence for using the Vestas rescue equipment.

13.7 Confined Space

13.7.1 Specific Requirement – Confined Space:

- Vestas Confined Space Entry Written program requirements
- Vestas confined space Hazard Assessment
- Management of confined space entry hazards
- Selection and correct use of appropriate PPE
- Overview of respirator protection requirements
- Supervisor responsibilities, Entrant Responsibilities, Attendant Responsibilities
- Gas monitor operation workshop
- Ventilation and extraction system use
- Permit entry procedures
- Practical Entry Simulations (on relevant equipment)
- Non-entry Rescue simulations (on relevant equipment)
- Organization and command of a confined space rescue team
- Rescue Preplanning
- Injured Patient packaging simulations (on relevant equipment)
- Self-Rescue scenario
- Entry Rescue training scenarios

13.8 Control of Hazardous Energy (COHE)

13.8.1 Specific Requirements for - COHE

In addition to any COHE training the subcontract employee has attended they must complete Vestas LOTO Level 0 & 1 training prior to performing work that requires placement of locks and tags.

13.9 Foreman Training/Meetings

13.9.1 Depending on the subject requirements, schedule and scope of work, Subcontractor Foremen/Supervisors may be required to attend a weekly Foremen Training and/or Meeting administered by VAWT.

13.9.1.1 Training sessions and meetings will be limited to a maximum of one (1) hour per week.

13.9.1.2 Training and meetings will primarily focus on required Environmental, Health & Safety training, Injury Free Workplace issues, and planning for the upcoming phases on site.

13.10 Subcontractor Assistance

13.10.1 Upon written request from the Subcontractor, VAWT may assist the Subcontractor in training of Subcontractor's employees and representatives in specific areas of Environmental, Health & Safety to enhance the Injury Free Workplace process.

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13.10.2 Such training will be limited to those areas deemed by VAWT to be consistent with its responsibility as CM/EPC and mutually beneficial to the general workforce.

13.11 Global Wind Organization Training

Any training after March 1, 2013 must be delivered by providers approved by the Global Wind Organization (GWO) / Renewables UK / Vestas AME Sourcing & Sustainability or as per the agreed GWO roll out by Vestas in the country of operation.

13.11.1 Contractor/Subcontractor is expected to provide proof of training and competency consistent with the scope of work prior to being awarded the contract.

13.11.2 In addition, training documentation for each individual shall be provided to the site manager/construction manager in advance (minimum of two weeks) of arriving on site to begin work.

13.11.3 Where required by the customer, a safety logbook for each contractor/subcontractor employee, detailing their training history, shall be available for review.

14 Meeting Requirements

14.1 Pre Job Kick-off Meeting

14.1.1 Prior to commencement of work on site each Subcontractor shall send a management representative to the VAWT a pre-job kick-off meeting.

14.2 Training/Meeting Matrix

14.2.1 The VAWT Training and Meeting Matrix (DMS 0049-0609) is provided to outline the minimum training and meeting expectations for the site.

14.2.2 The Subcontractor shall review and integrate these training and meeting expectations into their Environmental Safety and Health Program.

14.2.3 Should additional training and meeting requirements become necessary, Vestas will advise the Subcontractor.

14.2.4 The Subcontractor shall provide adequate proof of training (certificates/cards/documents) and document on form DMS 0049-0609 – Subcontractor Management: Training Verification.

14.3 VAWT Weekly Safety Meeting

14.3.1 In keeping with its commitment to an Injury Free Workplace, VAWT will conduct a weekly safety meeting which will be attended by **all** Subcontractor employees and representatives on site.

14.3.1.1 The meeting will be limited to 1 hour.

14.3.1.2 Meetings will be conducted every Monday morning at shift start, unless the VAWT Manager directs otherwise.

14.4 Subcontractor Weekly Tailgate/Tool Box Safety Meeting

14.4.1 Subcontractors (with the exception of labor augmentation) will administer a separate Weekly Tailgate/Toolbox Safety Meeting, to address Environmental, Health & Safety issues specific to their trade, scope, and phase of work.

14.4.2 The Subcontractor will submit a copy of the safety meeting minutes and the names of those in attendance to VAWT weekly.

15 Documentation

Each subcontractor will be required to maintain the following documentation on the jobsite and provide VAWT with copies of such records as noted below.

15.1 Incident Reports (IR)

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15.1.1 Subcontractors shall record all injuries and illnesses resulting from incidents on the job, regardless of severity and level of subsequent treatment.

15.1.2 An IR shall be filed with VAWT for all incidents resulting in injury, property damage, and near misses with serious potential for either.

15.1.3 Verbal notification of the incident shall be made immediately after the occurrence of the incident, followed by a written report submitted to VAWT within 24 hours.

15.2 OSHA- Form 300 Log

15.2.1 OSHA Form 300 record able injury log shall be kept on file in the Subcontractor's office.

15.3 Weekly Safety Meeting Minutes

15.3.1 Each Subcontractor (with the exception of labor augmentation) will provide VAWT with a copy of the Subcontractor's weekly safety meeting minutes within twenty-four (24) hours of the safety meeting.

15.4 Assured Grounding Notice

15.4.1 Site/Construction manager will be provided with a notice from the Subcontractor indicating completion of the quarterly assured ground testing of any electrical power tools, corded devices and extension cords used at site. . The notice will be submitted before work begins and within one week of completion of the testing.

15.5 Safety Data Sheets (SDS)

15.5.1 Subcontractor's employees and representatives will not bring, come in contact with, use, move, disturb, generate, store, transport or otherwise in any way deal with hazardous substances at site without the prior knowledge of the VAWT Construction Manager.

15.5.1.1 VAWT will be provided with the SDS for all hazardous substances before the Subcontractor's employees and representatives bring, move, disturb, generate, store, transport or otherwise deal with any such substances at site.

15.5.1.2 The Subcontractor will keep an active file of all SDS used by that subcontractor.

15.6 Certification of the Start of Work

15.6.1 The Subcontractor (with the exception of labor augmentation) must submit the safety plan to VAWT Site Manager and QSE representative prior to starting work.

15.6.2 The subcontractor will submit on form DMS 0049-0610 Certification of the Start of Work to Site Management for review and approval before beginning work on site.

15.7 Job Safety Analysis (JSA):

15.7.1 This process will be used to identify the steps of the job, inherent hazards and a description of how the work will be performed safely.

15.7.2 The Subcontractor will utilize the JSA to train all affected workers prior to commencing work.

15.7.3 JSA's will be submitted to VAWT for review and approval prior to starting work (with the exception of labor augmentation).

15.8 Pre Task Planning (PTP):

15.8.1 Using the JSA, pre-task planning will be conducted daily by the supervisor and crew, to further identify the current task, working conditions and preventive measures to be taken to protect workers.

15.9 Daily Diaries

15.9.1 A Subcontractor (with the exception of labor augmentation) Daily Job Diary shall be completed and submitted to VAWT on a daily basis by the supervisor/foreman of each crew working on site. The report consists of total manpower, man-hours worked, and limitations to performance of work, location of work and safety issues noted.

15.10 Vehicle Identification

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15.10.1 The Subcontractor will document vehicle used on site, for site activities using The Vehicle Identification DMS 0049-0611 and shall be maintained while work is being conducted onsite.

16 Incident, Injury and Emergency Procedures

16.1 Incidents and Injury Reporting:

16.1.1 Subcontractors shall immediately report to VAWT all incidents and injuries affecting their employees and representatives. Any first-aid services will be recorded on the subcontractor's Daily First-Aid Log.

16.2 Medical Treatment:

16.2.1 The Subcontractor is responsible to ensure an injured worker requiring medical treatment is provided with transportation to and from the medical facility. The Subcontractor may use a medical provider of their choice unless VAWT Construction Manager determines otherwise.

16.3 Incident Investigation Review and Report-Out

16.3.1 Incidents will be investigated and reviewed by VAWT and the Subcontractor.

16.3.2 At minimum, the chronology of events, contributing factors, root cause, and corrective action plan will be outlined and reported.

16.3.3 A final report will be submitted to VAWT within 24 hours of the incident. If information is lacking, a preliminary report will be filed.

16.4 Injury Management

16.4.1 The Subcontractor shall assist VAWT in all areas of injury management, with the greatest emphasis placed on incident prevention.

16.4.2 A proactive approach and total acceptance of the Injury Free Workplace philosophy and process is the key focus.

17 Personal Protective Equipment

17.1 Requirements

17.1.1 VAWT personal protection equipment (PPE) requirements apply to the subcontractor and all its employees, lower tier contractors, vendors, suppliers, and visitors.

Note: The Subcontractor is solely responsible for providing all its employees and representatives with the appropriate site required personal protective equipment.

17.1.2 Vestas will not provide PPE to the Subcontractor's employees, representatives or visitors.

17.1.3 Subcontractor shall document all PPE used during work activities on form DMS 0049-0612, The Subcontractor Management: Personal Protection Equipment Verification.

17.2 Clothing

17.2.1 Full length, non-cuffed pants will be worn. No shirts with sleeve length less than "T" shirt length will be worn at any time. Vestas requires non-melting clothing for both the inner and outer layers. Exceptions are small amount of synthetic materials, as required for elastic bands and such. Any non-flame resistant synthetic material outerwear shall be removed upon entering the turbine base.

17.3 Footwear

17.3.1 Over the ankle, sturdy, work boots made of leather and/or other substantial synthetic materials, will be worn at all times. Should steel toes and/or other special safety features be required, VAWT will notify the Subcontractor.

17.4 Eye Protection

17.4.1 Eye protection (safety glasses) will be worn at all times. Safety glasses must meet ANSI Z-87.1 requirements. Prescription lenses and frames must meet the same requirements. Job

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specific hazards may require additional protection to include, but not limited to, use of goggles when handling hazardous chemicals.

17.4.2 Eye glass frames shall be non-metallic and non-conductive.

17.5 Hearing Protection

17.5.1 Hearing protection (ear plugs or ear muffs) will be worn by employees when working in high-noise areas and/or when operating high-noise emitting tools or equipment. On VAWT sites, high noise is defined as that which measures over 80-decibels.

17.6 Head Protection

17.6.1 All employees are required to wear head protection at all times except in designated “safe areas”. This includes contractors, lower tier contractors, vendors, suppliers, and visitors. Head protection must meet ANSI Z89.1 Class “B” head protection guidelines.

17.7 Fall Protection

17.7.1 VAWT’s Fall Protection Plan focuses on the elimination of the fall hazard as its first priority. The use of personal protective equipment (PPE) fall protection systems will be authorized only as a last resort. PPE will be utilized only after a thorough analysis of the fall hazard has been made and it is determined no other method to eliminate the hazard is feasible and/or possible.

17.7.2 The Subcontractor will provide 100% fall protection to its workers when they are exposed to a potential fall of over 6-feet. There are no exceptions to this requirement.

17.7.3 The Subcontractor fall protection plan will first take into consideration preventive measures such as standard guarding, boom scissor lifts, scaffolding, and other methods of protection before resorting to PPE systems.

17.7.4 When all other protection systems have been considered and found unfeasible, the exposed workers must wear PPE.

17.7.4.1 Whether in a restraint or fall arrest mode, an approved full body harness will be worn. ***Safety belts are not approved for use on VAWT sites.***

17.7.4.2 **Fall “restraint”** is the preferred method of fall protection when a harness is worn; the **fall arrest** method is the last resort in all fall protection plans.

17.7.4.3 An approved lanyard will be secured to a rigged restraint line and/or anchor point.

17.7.4.4 Lanyard hooks must be the double-lock type.

18 Housekeeping

18.1 Daily Requirement

18.1.1 Good housekeeping is essential to the success of VAWT’s Injury Free Workplace policy.

18.1.2 A neat and clean job-site prevents incidents that result in injury. The Subcontractor, in partnership with VAWT, is responsible for maintaining the work site in a clean/safe condition.

18.1.3 The Subcontractor will perform housekeeping on a continual basis and will ensure its work areas are kept free from construction debris in accordance with the site housekeeping requirements.

19 Additional Program Requirements

19.1 Work Activities

19.1.1 At least two competent persons must be present when performing work in a turbine.

19.2 Overhead Work

19.2.1 Controlled access zones will be established and physically marked where overhead work is underway to ensure workers are not exposed to falling equipment or material.

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19.2.2 Substantial barricades will be installed and signs posted to prevent workers or others from inadvertently entering these controlled access zones.

19.2.3 Only qualified individuals shall be utilized for signaling and rigging operations.

19.3 Electrical Safety and Control of Hazardous Energy

19.3.1 Temporary GFCI systems shall be utilized to eliminate electrical shock hazards.

19.3.2 A test for continuous circuitry shall be performed on all cord sets, receptacles not part of the permanent wiring of the facility or structure, and plug-connected equipment required to be grounded.

19.3.3 Electrical equipment shall be visually inspected daily for external defects. Equipment found to be in need of repair shall be removed from service until repaired and tested.

19.3.4 Subcontractor employees shall be provided minimum three (3) non-conductive locks and the employees are required to lock before work and test before touch. Vestas operates under the premise that everyone locks out.

19.3.5 Each employee shall have lock out tags with their name, photo and contact information.

19.3.6 If the employee is not provided with locks and tags the site will provide loaner locks.

19.4 Hazardous Chemicals and Materials

19.4.1 The Subcontractor (with the exception of labor augmentation) is responsible for the procurement, transport, storage, handling, use, and disposal of all hazardous chemicals and/or materials required to perform its scope of work.

19.4.2 When possible, Subcontractor shall substitute and utilize a less hazardous chemical and/or material to minimize potential exposure to employees and environment.

19.4.3 Additionally, the Subcontractor shall comply with the following guidelines.

19.4.3.1 Notify VAWT prior to bringing a hazardous chemical and/or material on site.

19.4.3.2 Provide VAWT with a corresponding and current Safety Data Sheet (SDS).

19.4.3.3 Identify the contents of all containers and label accordingly.

19.4.3.4 Develop a spill containment and cleanup procedure. Train affected employees.

19.4.3.5 Store flammable liquids (quantities over 5-gallons) in a designated storage area.

19.5 Hazardous and Non-Hazardous Waste Control

19.5.1 The Subcontractor shall ensure proper handling and disposal of all hazardous and non-hazardous waste.

19.5.2 Recycling of non-hazardous waste is encouraged and where possible separation of metal, wood, cardboard, and other recyclable material will be performed.

19.5.3 Additionally, the Subcontractor shall comply with the following guidelines:

19.5.3.1 Remove all non-hazardous waste from the work area daily and dispose in designated containers;

19.5.3.2 Store and dispose of hazardous waste in accordance with State and DEQ and OSHA regulations; and

19.5.3.3 Collect and remove all hazardous and non-hazardous waste, and/or unused chemicals and materials, form the site prior to completion of work and departure from the site.

19.6 Fire Prevention and Protection

19.6.1 The Subcontractor shall provide adequate fire prevention and protection procedures and equipment to protect workers and property. Fire prevention methods, such as good housekeeping, will be the first line of defense against fire.

19.6.1.1 The Subcontractor will notify the VAWT Construction Coordinator of any fire in its area of operation immediately, even if it has been contained and extinguished.

19.6.1.2 Fire extinguishers must be of the appropriate size and fire retardant to provide effective protection for the combustible or flammable fire hazard present.

19.6.1.3 In addition to fire protection equipment, the Subcontractor will provide a designated fire-watch for all related hot-work activities.

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Subcontractor Training Verification

Subcontractor:

Site/Location:

Scope of Work:

This form is to be used as a cover page to attach necessary training certificates/documentation listed below:

Name	Telephone Number	Job Title	Training Courses Taken [please provide certificates/documentation]	Experience in Task (Years/Month)

Supervisor/HSE Rep (Please Print) **Signature** **Date:**

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Subcontractor Certificate to Start Work

Contractor Information	**Company Name:**	
	Address:	
	Telephone:	**Fax:**
	North America Industry Classification Identification Number (NACIS):	
	General Liability Insurance Company Used:	**Policy Dates:**
	Insurance Company in case of fatal accident or permanent incapacity (if applicable):	**Policy Dates:**
Background on Scope of Work	**Site (Name and Location) :**	
	Scope of Work to be Completed:	
	Work Commencement Date:	**Estimated Completion Date [Documented Validity Not to exceed 1 year]:**
	Contractual Relationship (Directly contracted by):	**Vestas** ☐ **Client** ☐ **Other** ☐
	Supervisor/Representative Responsible for Employees onsite (Emergency Contact):	

Documentation/ Verification (Prior to Commencement)	**Verify that documentation is completed and obtained onsite (Check each)**	**Work Instructions/Procedures received/obtained for Scope of Work [Include DMS Numbers] - Please List**
	Personal Protection Equipment Verification ☐	
	Health and Safety Training ☐	
	Site Vehicle Identification ☐	
	Emergency Contact Information ☐	
	Subcontractor has received Vestas Sustainability Manual **YES** ☐ **NO** ☐ **Revision Date:**	

Release to Work

I declare that the above information has been received by its respected site. I also declare that the above information has been completed in an accurate manner.

Subcontractor Rep/HSE Supervisor (Print)	**Signature**	**Date**
Site Manager/Supervisor (Please Print)	**Signature**	**Date**

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Subcontractor
Site Vehicle Identification

Subcontractor:

Site/Location:

Scope of Work:

*Vehicles to include in this documents; Company Vehicles, Company Transport Vehicles and any first, second or third tier subcontractors performing work at this location.

Name of Driver	Vehicle Number (If applicable)	Type of Vehicle (Make, Model)	License Plate Number	Validity Period of Insurance

Supervisor/HSE Rep (Please Print) **Signature:** **Date:**

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Subcontractor PPE Verification

Name:

Site /Location:

Scope Of Work:

Date:

Check those that apply to task☑	Equipment *Equipment shall meet legal requirements for the country,state,province or territory which it is used.*		Usable Condition [YES/NO]
	*Fall Arrest Harness (CSA)		
	*Cable Grab/Slider w/ Carabiner		
	*Lanyard – double elastic leg and large mouth snap hooks (CSA)		
	Lanyard – 2', for positioning or ladder work		
	Gear Bag		
	Gloves, Leather		
	Gloves, Mechanic		
	Gloves, Latex or Nitrile		
	Glove Set, High Voltage, HRC 4, with leather outers (within 6 months calibration date)		
	Glove Set, Class 0, 1000 V with leather outers (within 6 months of previous calibration date)		
	Hard Hat (CSA)		
	Hard Hat/Chin Strap		
	Hard Hat Liner		
	Climb Helmet		
	LOTO – Lock, Tags, Hasp set		
	Respirator, Half Face		
	Respirator Cartridge – Organic Vapor		
	Respirator Cartridge – Particulate		
	Safety Glasses		
	Safety Goggles (clear)		
	Face Shield (Clear)		
	High Visibility Vest		
	First Aid Kit – personal size		
	Safety Footwear		

VERIFICATION:

I verify that I have indicated the status of each PPE item required for the task at this location. I hereby verify the PPE items are clean, in good repair, and suitable for use.

Employee (Print Name) Signature

Supervisor (Print Name) Signature

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Construction Daily Sign-In Sheet

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MEETING TYPE: ☐ Daily Safety ☐ Post Incident **CONDUCTED BY:** _____

SITE/PROJECT: _____ **CITY/STATE:** _____

DATE: _____ **WEEK #:** _____ **TIME (FROM/TO):** _____

Today	**Today: ; Temps - Day: F (C), Overnight: F (C); Winds gust m/s**
Tomorrow	**Tomorrow: ; Temps - Day: F (C), Overnight: F (C); Winds , gust m/s**

PLANNED TASKS FOR THE DAY:

CREW SAFETY CONCERN(S) or SUGGESTIONS:

PARTICIPANTS:

	NAME (PRINTED)	Time In	I have arrived at work injury free (Initial)	Time Out	I have worked injury free this shift (sign only if you have received no work related injuries this shift)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					

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Foreign Object Debris (FOD) Prevention Program				Document ID: 0049-2055 INS SUS-SAF-OPC (AME US/CAN) FOD Program
Owner(s): MIGLO	Author(s): RIREG	Valid from: 2015.06.11		Version: 01

Version history

Version No.	Date	Description of Changes
00	2015.06.11	Converted T09 Document 0046-0821 to T03
01	2015.06.11	Uploaded correct document

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1 Purpose

This Foreign Object Debris (FOD) prevention program targets tools, parts or debris entering FOD Critical Areas that could potentially cause damage to wind turbine components or systems. FOD also includes systems degradation which may occurs when a tool or other debris causes a system to malfunction without causing direct damage, as when a tool gets tangled in control cables and jams components.

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2 Responsibility

2.1 Senior Management

2.1.1 Ensure effective program development and implementation;

2.1.2 Provide Site/Construction Management/Authorized Supervisor with adequate resources and support to carry out program responsibilities and obligations;

2.1.3 Require adherence to all policies, procedures, practices and rules related to foreign object control; and

2.1.4 Oversee and evaluate site supervisor performance.

2.1.5 Recognize Site/Construction Management/Authorized Supervisors and Personnel for performance improvement.

2.2 Site/Construction/Authorized Supervisor

2.2.1 Ensure all personnel under Vestas supervision adhere to all policies, procedures and rules related to FOD;

2.2.2 Ensure the appropriate FOD requirements, controls and inspections are included in work packages and procedures.

2.2.3 Ensure contractors are made aware of FOD Critical Areas as part of the site hazard assessment;

2.2.4 Ensure all personnel under Vestas supervision have received training and have adequate knowledge concerning the FOD prevention program;

2.2.5 Report deficiencies in the FOD prevention program to QSE Department;

2.2.6 Conduct scheduled and random inspections of work requiring FOD implementation;

2.2.7 Implement additional site-specific or project-specific requirements upon request by the customer.

2.2.8 Insure all Technicians Contractors and visitors entering FOD sensitive areas are trained or escorted by FOD trained personnel.

2.3 Personnel

2.3.1 Must comply with the FOD when working in the following FOD Critical Areas: hub, transformer room and any electrical cabinet;

2.3.2 Conduct work in a manner that provides for prevention, detection and removal of FOs;

2.3.3 Properly use a FOD Tool Control Form (DMS 0046-2065) to maintain control of all tools, components and debris going in and out of FOD Critical Areas;

2.3.4 Report any conditions that might compromise the FOD prevention program to supervision;

2.3.5 Provide feedback in a timely manner to Site/Construction Management about the effectiveness of FOD.

2.4 QSE Representatives

2.4.1 Evaluate the FOD processes during periodic audits and determine effectiveness.

2.4.2 Update the FOD Prevention processes and procedures as needed.

2.4.3 Ensure all FOD incidents are documented appropriately and corrective actions are records and completed.

2.4.4 Provide a list of FOD Critical areas

3 References

Document No.	Title
NAS 412	National Aerospace FOD Prevention

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4 Scope

This program applies to sites where the customer requirement mandate additional controls for entering established FOD Critical Areas.

FOD prevention and contamination control requirements apply to any wind turbine where foreign objects can cause catastrophic failure, degrade end item performance or other environmental controls.

5 Terms and Abbreviations

Term or Abbreviation	Definition
Foreign Object Debris (FOD)	A substance, debris or article alien to a turbine or system which would potentially cause damage. Foreign Object Debris causes Foreign Object Damage (also referred to as FOD). FOD prevention systems work by detecting the actual debris. The term “FOD” should be used to refer to the debris itself and the term “FOD Damage” should be used to refer to the resulting damage from FOD
Foreign Object Damage (FOD)	Any damage attributed to a foreign object that can be expressed in physical or economic terms which may or may not degrade the product’s required safety and/or performance characteristics.
Potential FOD	The condition where foreign object debris may cause equipment damage, and/or failure should the turbine be put into service.
FOD Critical Area	Wind turbine hub, transformer room or electrical panel where exposure to foreign objects would potentially cause a system or product failure due to deterioration, malfunction or damage.
Tote Tray	A device for storing/carrying/transporting tools or equipment in a secure manner to prevent inadvertent dropping: i.e., a tool holder, pelican case or tool rolls.
Clean As You Go	Clean the immediate area when: • Work cannot continue; • When work debris has the potential to migrate to an out of sight or inaccessible area and cause damage and/or give the appearance of poor workmanship. • Work is completed and prior to inspection. • If you drop something or hear something drop - pick it up
Consumables	Supplies provided to workers that are expendable. i.e. glue, tape, rivets, washers, fasteners and other hardware
Shadowbox	A tool box with specific, marked locations for each tool so that a missing tool will be readily noticeable.
Tether	A lanyard of sufficient strength (wire, rope, cable, etc.) attached to the tool/equipment and to the user or fixed secure object.

6 Forms

Document No.	Title
0049-2048	Tool Control Sheet
0049-2049	FOD Critical Area Evaluation

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7 Training

The primary objective of a FOD prevention training program is to increase employee awareness to the causes and effects of FOD, promote active involvement through specific techniques, and stress good work habits through disciplines.

7.1 Documentation

7.1.1 FOD training will be accomplished upon hire utilizing the Vestas e-learning system for all technicians and supervisory personnel involved in maintenance and repairs.

7.2 Topics

7.2.1 Insure the following topics are included in Technician maintenance training:

7.2.1.1 Proper storage and handling of materials, components, and equipment;

7.2.1.2 Techniques to control debris;

7.2.1.3 Housekeeping;

7.2.1.4 Cleaning and inspection of components and assemblies;

7.2.1.5 Accountability/control of tools and hardware;

7.2.1.6 Control of personal items, equipment and consumables;

7.2.1.7 Care and protection of end items;

7.2.1.8 Quality Workmanship (“Clean-As-You-Go,” inspection); and

7.2.1.9 How to report FOD incidents or potential incidents.

8 Control Techniques

A well-established plan for tool accountability, tool usage, parts, material handling, cleanliness, and task sequencing can eliminate many potential FOD hazards.

8.1 Tool Accountability

8.1.1 The primary objective of a positive tool control program is to eliminate accidents/incidents and loss of life or equipment due to tool FOD.

8.1.2 Methods to facilitate accountability:

8.1.2.1 Use of shadow boards, shadowboxing;

8.1.2.2 Special canvas layouts with tool pockets, or consolidated tool kits;

8.1.2.3 Unique control methods should be implemented for special tools used in checkout, test and operational environments;

8.1.2.4 A specialized tool kit with a preprinted inventory shall be created for selected tasks;

8.1.2.5 Proper use of Tool Control Form, DMS #0046-2065 to document tools entering and leaving FOD Critical Areas;

8.2 Tool control

8.2.1 Tools/equipment shall be tethered* or suitably restrained to the user in areas around structural work stands or any other locations where a dropped article could result in damage to the turbine hardware, injury to personnel, or where difficulty in retrieval would result if the tool were dropped.

NOTE: A tether device, if not regularly examined, may itself become the cause of the FOD. Fraying of the tether material and the hardware (rings, snaps, etc.) can all become FOD.

8.2.1.1 All loose tools should be carried and stored in a tote tray, soft tool bag or other suitable spill proof container and not be placed in a manner that would cause damage to turbine hardware or injury to personnel.

8.2.2 Inspect production tooling (jigs, fixtures, handling equipment, or other maintenance tools) to assure it is clean, undamaged and free of foreign material prior to use. Exercise this same care for scaffolding, work stands, ladders, special test equipment, or like equipment, which shall be placed on, in, or around critical hardware to accomplish specific tasks.

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8.3 Parts and Material Handling

8.3.1 Kit all hardware by task whenever possible

8.3.2 Static sensitive devices shall be properly protected to avoid damage. Materials that are used to protect sensitive electronic components should be kept clean, covered, and stored away from ordinary non-static safe materials.

8.3.3 Parts and assemblies shall be packaged in a manner that will preclude any chance of falling during normal handling operations.

8.3.4 Protective devices (edge protectors, caps, plugs, covers, filters, rub strips) shall be clean and MUST BE secured to prevent accidental damage.

8.4 Housekeeping

8.4.1 Ensure that all turbines, maintenance and test areas meet “good housekeeping” standards that enhance foreign object elimination. This includes vacuuming work areas as well as a regular wipe down of component and areas.

8.4.2 Clean as you go:

8.4.2.1 Clean the immediate area when work cannot continue;

8.4.2.2 Clean the immediate area when work debris has the potential to migrate to an out of sight or inaccessible area and cause damage and/or give the appearance of poor workmanship;

8.4.2.3 Clean the immediate area after work is completed and prior to inspection;

8.4.2.4 Clean at the end of each shift;

8.4.2.5 If you drop something or hear something drop - pick it up!

8.5 Task Sequence

8.5.1 Understanding and dissecting Work Instructions, Tech Info Sheets, and Service Inspection Instructions will assist in limiting the amount tools and parts up tower and the nesting of LOTO procedures.

8.6 Physical Entry into FOD Critical Areas

8.6.1 When physical entry is required into turbine hardware, such as the hub, transformer room or electrical panels, personnel should remove all loose objects, badges, jewelry, etc., from clothing.

8.6.2 Covered or zippered pocket pants or coveralls should be worn to preclude foreign objects dropping from pockets into a FOD critical area.

8.7 Potential FO

8.7.1 Examples:

8.7.1.1 Metal or wire clippings, solder balls and debris lying in the vicinity of electrical terminals, circuitry, connectors, components, etc.;

8.7.1.2 Tools, hardware, or debris left in the vicinity;

8.7.1.3 Debris lying on equipment or walkways;

8.7.1.4 Inclement weather;

8.7.1.5 Animals, birds, rodents or insects;

8.7.1.6 Electro-Static Discharge (ESD);

8.7.1.7 Construction debris; or

8.7.1.8 Unsecured PPE

9 Tool Control Form

The Tool Control form is intended to provide Technicians with a detailed procedure for tool control in critical areas, to ensure that no tools or parts are left behind when work is complete.

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T03 0052-2029 Ver 01 - Approved - Exported from DMS: 2016-08-29 by RIREG

9.1 Purpose

9.1.1 Tool Control form will be used to build a database for task a Technician may encounter in an FOD Critical Area.

9.1.1.1 Forms must include required tools and parts to accomplish the task. Additional lines shall be left blank to add any new items introduced to the task.

9.2 Form Completion

9.2.1 Column 1 list of tools/parts,

9.2.2 Column 2 is the numeric value indicating quantity of that tool or part

9.2.3 Column 3 will be signed by the Tech introducing the items to the area (job pre-count)

9.2.3.1 Any time during the task if additional tools or parts are required the Tech shall stop and add the items to the form before proceeding.

9.2.4 Upon completion of the task the same Tech will vacate the area and perform a post job count to verify all items have been removed.

9.2.5 The second Tech on the crew will perform a visual inspection on the area and verified the area is clear and perform a second count of all items on the form to complete the task.

9.2.6 There must be one form per task performed in an FOD Critical Area.

9.2.7 Forms shall be edited as additional tools or parts are identified.

9.2.8 Pre and post counts must be completed by two separate technicians. In the event there is a third Tech up tower involved in the task that person shall be included in the post count.

10 Reporting FOD Incident

Any time an item is lost during an assembly or maintenance task in a FOD Critical Area, cease activity in the affected area and initiate a search for the item.

10.1 Initial Search

10.1.1 Continue this search until the item is found or adequate assurances are made that the item is not contained in the turbine or assembly.

10.1.2 Searching for such items may require de-paneling or nondestructive inspections, including borescope.

10.1.3 If an item cannot be located after a search has been completed, annotate the Tool Control Form with a description of the item and search procedure followed.

10.1.4 A Hazard Observation shall be submitted in the Vestas Incident Management System.

11 Inspections and Reviews

11.1.1 Site/Construction/Authorized Supervisor or designee shall conduct and record at least one FOD Critical Area assessments once per quarter evaluating site specific FOD Tool Control forms and FOD Incidents.

11.1.1.1 Develop appropriate corrective action plans for deficiencies identified in the assessment or incident investigation.

11.1.2 Lead Tech or designee shall review completed work packages and verify any changes made to the Tool Control form.

12 APPENDIX: version history

Version No.	Date	Description of Changes

VESTAS PROPRIETARY NOTICE

T03 0052-2020 Ver 01 - Approved - Exported from DMS: 2016-08-29 by RIREG

RESTRICTED

Foreign Object Debris Critical Area Evaluation

Evaluator Name:	Date:
Site /Location:	FOD Area:
Person being Evaluated:	
Description of task:	

Requirements (Inside FOD Critical Areas)	**Condition Acceptable Yes/No or N/A**	**Comments/Deficiencies**
Tool Accountability		
Use of shadow boards or boxes		
Use of special layout with tool pockets		
Specialized tool kit with a preprinted inventory		
Tool Control form properly completed		
Tool Control		
Tools and equipment properly tethered		
Tether device in tact and good shape		
Production tooling (jig/fixtures) are clean, undamaged and free of foreign materials		
Only tools required are brought into the area		
Parts and Materials		
Hardware is kitted by task		
Static sensitive devices and parts are adequately protected		
Parts and assemblies are packaged in a manner that will preclude any chance of falling during normal handling operations		
Protective devices (caps, plugs, covers) are clean and secured to prevent accidental damage.		
Housekeeping		
Use of clean as you go techniques evident		
Immediate area cleaned when work cannot continue		
Area clean immediately after work is completed and prior to inspection		
Any items dropped are picked up		
Physical Entry		
All loose objects, badges, jewelry, etc., are removed from clothing		
Covered/zippered pockets or bags are utilized		

Person evaluated (Print Name) _____ Signature _____

Evaluator (Print Name) _____ Signature _____

T03 0049-2049 Ver 00 - Approved - Exported from DMS: 2016-06-15 by RIREG

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Owner: BPO.DEL.SUS
Valid from: 2015.06.11
Version: 00

Foreign Object Debris (FOD)

Document ID: 0049-2048
INS SUS-SAF-OPC (AME US/CAN)
FOD Tool Control Log

V100 TOOL/PARTS CONTROL INSPECTION

Date	Turbine	Scope of Work	Tech	Tech	

Item Description	In	Pre-job count	Post job count	Post job count	Out

Post count "MUST" include a visual inspection of area.

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V90 TOOL/PARTS CONTROL INSPECTION

Date	Turbine	Scope of Work	Tech	Tech	

Item Description	In	Pre-job count	Post job count	Post job count	Out

Post count "MUST" include a visual inspection of area.

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Foreign Object Debris (FOD)

V82 TOOL/PARTS CONTROL INSPECTION

Date	Turbine	Scope of Work	Tech	Tech	

Item Description	In	Pre-job count	Post job count	Post job count	Out

Post count "MUST" include a visual inspection of area.

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T03 0049-2029 Ver 00 - Approved - Exported from DMS: 2016-06-05 by RIREG

Short Service Employee (SSE) Vestas System Instruction				Document ID: 0051-1137 INS SUS-SAF-OPC (AME US) Short Service Employees
Owner(s): BPO.Del.SUS	Author(s): RIREG	Valid from: 2015.06.12		Version: 00

Version history

Version No.	Date	Description of Changes
00	2015.03.27	New Document

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1 Purpose

Ensure that employees with less than six months experience are identified, adequately supervised, trained and managed so as to prevent injury to themselves or others, property damage, or environmental harm.

2 Responsibilities

2.1 Senior Management

2.1.1 Ensure effective program development and implementation.

2.1.2 Provide Site/Construction Management/Authorized Supervisor with adequate resources and support to carry out program responsibilities and obligations.

2.1.3 Require adherence to all policies, procedures, practices and rules related to the use of Subcontractors.

2.1.4 Oversee and evaluate site supervisor performance

2.2 Site/Construction Manager/Authorized Supervisor

2.2.1 Complete the appropriate Shell Forms and submit it to the location supervisor prior to the SSE's arrival on location.

2.2.2 Ensure no SSE is assigned lone work.

2.2.3 Ensure crews with 2-4 persons have only one SSE.

2.2.4 Ensure of 5 or more do not exceed 20% SSE.

2.3 Personnel

2.3.1 Attend a Shell location-specific HSE orientation prior to beginning work on location.

2.3.2 Act as a mentor to closely supervise the assigned SSE and prevent him/her from performing tasks for which they are not properly trained.

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2.3.3 Must wear location specific SSE Identification (Orange hard hat or visible sticker).

2.3.4 Exhibit safe behavior for 6 months and have a general awareness and working knowledge of Shell HSE policies.

3 References

Document No.	Title
	Shell Short Service Policy

4 Forms

Document No.	Title
HSE0021-TO01	Contractor SSE Form
HSE0021-TO02	Contractor Crew SSE Statistics Worksheet
	EPW Contractor SSE Variance Form
	Superintendent concurrence. Documentation

5 Scope

This program applies to sites where the customer requirements mandate additional controls for personnel with less than 6 months service.

6 Terms and Abbreviations

Term or Abbreviation	Definition
Crew	Those employees working at a single location and employed by the same Vestas or an approved subcontractor
SSE	Short Service Employee

7 Program

7.1 Requirements

7.1.1 Any personnel with less than 6 months service in the same job/position with his/her present employer will be considered a Short Service Employee (SSE).

7.1.2 Non-SSE employees who are new to a location should be considered by the Site/Construction Manager/Authorized Supervisor for inclusion in the SSE program based on the specifics of their assignment. Factors to consider include significant differences in:

7.1.2.1 Job responsibilities/duties from previous assignments,

7.1.2.2 Work processes/practices from previous assignments,

7.1.2.3 Equipment/tools from previous assignments, and

7.1.2.4 Skill level, familiarity with co-workers.

7.1.3 All SSE personnel must attend a location-specific Shell HSE orientation prior to beginning work on location. Applicable contractor and Shell HSE Policies shall be discussed during orientation.

7.1.4 SSE personnel will be identified in one of two ways:

7.1.4.1 SSE personnel shall wear high-visibility orange hardhats, or

7.1.4.2 A visible sticker that includes the letters “SSE” shall be placed on SSE personnel hardhats. The sticker should be of contrasting color to the hard hat and be at least 2" x 3" in size.

7.1.5 To be removed from SSE status, an employee must:

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7.1.5.1 Exhibit safe behavior for 6 months (e.g. incident free performance, proactive participation in HSE programs such as incident reporting including near misses, BBS, JSA development, safety meetings, etc.) and have a general awareness and working knowledge of HSE policies.

7.1.6 SSE reduction of requirements:

7.1.6.1 The Site/Construction Manager/Authorized Supervisor may recommend a reduction of the 6 month requirement based on the employee's performance and relevant industry experience.

7.1.6.2 Reduction must be approved by the location supervisor and include a Superintendent concurrence.

7.1.6.3 Documentation (Attachment I) should be maintained for a period of 1 year after a contractor employee has been removed from SSE status.

7.1.7 Employees who do not qualify for release from SSE status after 6 months may continue work at the location only with the documented approval of the Facility Manager

7.2 SSE Ratios

7.2.1 Single person "crew" cannot be a SSE.

7.2.2 2-4 person crews can have only 1 SSE per crew.

7.2.3 Exceptions to these "small crew" requirements require Operation Manager variance approval using contractor SSE Variance Form.

7.2.4 Crews with 5 persons or more:

7.2.4.1 Crew complements should not exceed 20% SSE.

7.2.4.2 Crew complements that are greater than 20%, but less than 30%, shall only be permitted with documented approval of the supervisor AND Superintendent concurrence.

7.2.4.3 Crew complements that exceed 30% shall only be permitted with written variance approval by the Operation Manager.

8 APPENDIX: version history

Version No.	Date	Description of Changes
00	2011.06.09	New document
01	2012.08.10	Removed Appendix A and B, minor grammatical changes, embedded applicable DMS numbers in document.

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CONFIDENTIAL

Health Safety Environment Incident Report External Notification

Document ID: 0051-8455
INS SUS-SAF-TCP (AME)

Owner(s): BPO.Del.SUS	Author(s):RIREG	Valid from: 2015.07.13		Version: 01

Incident Report Status: (indicate one)
☐ Initial Report ☐ Follow-up Report ☐ Closure Report

Incident Date/Time:

Site: Customer:

WTG Pad/#: Incident Location:

Manager/Supervisor:

Injury Classification (Recordability):

Select Incident and Dept. Categories: (check as applicable)
☐ Health/Personal Injury
☐ WTG/Equipment/Vehicle Damage
☐ Environmental Event
☐ Near Miss or Concern
☐ Service
☐ Projects
☐ Resource Group/CIM

Hazards/Risks Involved in Incident: (check as many as applicable)
☐ Lifting/Strain/Rigging
☐ Weather (Hot/Cold/Wet)
☐ Stored Energy - Elect/Hyd
☐ Cut/amputation
☐ Other:
☐ Chemical Exposure
☐ Vehicles/Struck by
☐ Crushing
☐ Slips/Trip/Fall
☐ Electrical (Shock/Arc Flash)
☐ Asphyxiation
☐ Falling/Dropped Object
☐ Fire

☐ PPE in Use? List:

High Level Summary:

Provided Medical Treatment:

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Associated Actions/Events

Prior to Incident:

Incident:

After Incident:

Site Findings:

Primary Cause(s):

Contributing Factor(s):

Corrective/Preventive Action Plan:

Additional Comments:

Report Prepared by:	Date:
Report Reviewed by:	Date:
Report Approved by:	Date:

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UPWIND SOLUTIONS
A HIGHER STANDARD OF SERVICE

AXIOM MEDICAL CONSULTING, LLC
281-419-7063

Vestas®
Owner: BPO.DEL.SUS
Valid From: 2016.03.23

Date Form Completed:	Site/Facility	Person in Charge (PIC):

Job/Location/Description	SR#:

Emergency Response Contacts	Contact Number	Describe Muster Point
Office Contact		
Law Enforcement Medical Responders Fire Department		
Hazardous Spills Response		

Work Permits Required attach (cc)

- ☐ **No Permit Required**
- ☐ Energy Isolation (LOTO) (cc)
- ☐ Confined Space Permit (cc)
- ☐ Hot Work Permit (cc)
- ☐ Heavy Equipment/Heavy Lift Plan (cc)
- ☐ Spill Containment plan (cc)
- ☐ Waste Disposal Permit (cc)
- ☐ Other_____

I CAN STOP WORK AT ANY TIME

As an Upwind Solutions Employee I have the right to STOP WORK at any time for; any reason that causes me to feel uncomfortable about my safety or my partner's safety, Unsafe Conditions, Unsafe Actions, Unclear Policies or Procedures or Inadequate Equipment or Tooling.

ZHA CONVERSATION POINTS

Check all those that apply and give details in the Job Sequence / Potential Hazards / Preventative Measures Section

Work Area Hazards
- ☐ Housekeeping
- ☐ Moving equipment or vehicles
- ☐ Hazardous weather conditions
- ☐ Possible slips, trips, falls, poor footing
- ☐ Ignition sources/heat/static/Grounding
- ☐ Burns from materials

Task Hazards
- ☐ Prolonged bending/repetitive motions
- ☐ Parts of body in the line of fire
- ☐ Pinch points identified and avoided
- ☐ Limited access/tight clearance
- ☐ Contact with sharp objects/edges
- ☐ Manual lifting (too heavy or awkward to lift)
- ☐ Over reaching/working above your head
- ☐ Hand tool inspection
- ☐ Fire hazards possible
- ☐ Designated Smoking Areas Identified
- ☐ Others working in area/above or below
- ☐ Job isolated
- ☐ Potential for fogging of eye protection
- ☐ Other_____

Personal Protection Equipment
- ☐ Hard Hat, Safety Glasses, Steel Toe Boots
- ☐ FRC required
- ☐ Hearing Protection required, Double
- ☐ Gloves (cryogenic/rubber/leather/cotton)
- ☐ Respiratory Protection (SCBA or APR)
- ☐ Eyewash Station location identified_____
- ☐ Jewelry hazards addressed
- ☐ Other_____

Environmental Issues ☐ N/A
- ☐ MSDS reviewed for chemicals used or present
- ☐ Airborne Contaminated dust/fibers/fumes/gas
- ☐ Waste material generated
- ☐ Chance of a pressure release (gas/liquid)
- ☐ Other_____

Energy Isolation-LOTO ☐ N/A
- ☐ Has everyone received formal LOTO training
- ☐ Walkthrough & discussion of LOTO
- ☐ LOTO Checklist used (attached copy)
- ☐ Any risk of trapped energy
- ☐ All energies released/contained

Driving Vehicle/Motorized Equipment ☐ N/A
- ☐ Discuss seat belts and cell phone usage
- ☐ Condition of road or route
- ☐ Livestock or wildlife in the area
- ☐ Parking location/back in/pull through
- ☐ Spotter/safety watch required
- ☐ Access unobstructed
- ☐ Monthly Vehicle Inspection completed
- ☐ All loads secured
- ☐ Secondary containment labels applied

Site Isolation ☐ N/A
- ☐ Barricades/cones required
- ☐ Safety signs and/or color coding

Working at Heights ☐ N/A
- ☐ ARK/SRK provided/up-tower and each Tech trained
- ☐ Man lift inspection completed
- ☐ Fall Protection Plan (harness/lanyard/lifeline)
- ☐ Proper tie-off points identified
- ☐ Ladder Safety

Electrical Safety ☐ N/A
- ☐ Potential for induced voltage
- ☐ Grounding or Bonding required
- ☐ GFCI for electric power tools
- ☐ Ensure safe distance is maintained while performing energized inspections
- ☐ Proper PPE for Voltage levels and ARC hazard

Emergency and Communications
- ☐ Alarms, beacons, horns
- ☐ Wind direction and speed observed
- ☐ Safety equipment locations_____
- ☐ Communication established

Personnel Concerns
- ☐ New Employee/In-experienced workers
- ☐ Are all workers fit for duty (medications, sleep, physical limitations, distractions, etc.)
- ☐ Language barriers

SAFESTART®

Sequence of Job Tasks (Steps to Job) Combine Related	Potential Sources of Danger (Hazards and Errors)	Preventative Measures (Controls/Engineered Barriers, Specific PPE & CERT's)
1.) _____ _____ _____	1) **Hazardous Energy:** ☐ Electrical ☐ Mechanical (Hydraulic, Gravity, Etc. ☐ Thermal (Hot or Cold) ☐ Pressure ☐ Radiation ☐ Biological ☐ Other_____	**Barriers:** a) _____ b) _____ c) _____
Human Factors (States that Lead to Errors) **Check Your States:** ☐ Rushing ☐ Frustration ☐ Fatigue ☐ Complacency	2) **Critical Errors:** ☐ Eyes not on Task ☐ Mind not on Task ☐ Line-of-Fire ☐ Balance /Traction/Grip	**Critical Error Reduction Techniques:** **CERT:** ☐ Self-trigger ☐ Analyze close calls ☐ Look at others ☐ Work on habits

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2.) _____ _____ _____ **Human Factors** (States that Lead to Errors) **Check Your States:** ☐ Rushing ☐ Frustration ☐ Fatigue ☐ Complacency	1) **Hazardous Energy:** ☐ Electrical ☐ Mechanical (Hydraulic, Gravity, Etc. ☐ Thermal (Hot or Cold) ☐ Pressure ☐ Radiation ☐ Biological ☐ Other_____ 2) **Critical Errors:** ☐ Eyes not on Task ☐ Mind not on Task ☐ Line-of-Fire ☐ Balance /Traction/Grip	**Barriers:** a) _____ b) _____ c) _____ **Critical Error Reduction Techniques:** **CERT:** ☐ Self-trigger ☐ Analyze close calls ☐ Look at others ☐ Work on habits
3.) _____ _____ _____ **Human Factors** (States that Lead to Errors) **Check Your States:** ☐ Rushing ☐ Frustration ☐ Fatigue ☐ Complacency	1) **Hazardous Energy:** ☐ Electrical ☐ Mechanical (Hydraulic, Gravity, Etc. ☐ Thermal (Hot or Cold) ☐ Pressure ☐ Radiation ☐ Biological ☐ Other_____ 2) **Critical Errors:** ☐ Eyes not on Task ☐ Mind not on Task ☐ Line-of-Fire ☐ Balance /Traction/Grip	**Barriers:** a) _____ b) _____ c) _____ **Critical Error Reduction Techniques:** **CERT:** ☐ Self-trigger ☐ Analyze close calls ☐ Look at others ☐ Work on habits
4.) _____ _____ _____ **Human Factors** (States that Lead to Errors) **Check Your States:** ☐ Rushing ☐ Frustration ☐ Fatigue ☐ Complacency	1) **Hazardous Energy:** ☐ Electrical ☐ Mechanical (Hydraulic, Gravity, Etc. ☐ Thermal (Hot or Cold) ☐ Pressure ☐ Radiation ☐ Biological ☐ Other_____ 2) **Critical Errors:** ☐ Eyes not on Task ☐ Mind not on Task ☐ Line-of-Fire ☐ Balance /Traction/Grip	**Barriers:** a) _____ b) _____ c) _____ **Critical Error Reduction Techniques:** **CERT:** ☐ Self-trigger ☐ Analyze close calls ☐ Look at others ☐ Work on habits
5.) **Changing Environmental and Turbine Conditions:** Sometimes conditions related to the environment or the turbines can change, increasing risk for personnel and equipment. For instance drought can lead to increased buildup of sand in turbines, or components reaching end of life, such as a high speed coupling, can fail catastrophically. List any changing conditions related to the environment or turbine components that could generate increased risk related to personnel, the environment or the turbines and other equipment. Ensure the team discusses and understands these conditions before work is started.	**Turbine** a) _____ b) _____ c) _____ d) _____ e) _____ f) _____	**Environment:** a) _____ b) _____ c) _____ d) _____ e) _____ f) _____

ZHA Authority (PIC)	Individual Name / Company Name	Signature	Contact Number
Others involved in Job Tasks All workers and visitors on the job location must review, understand, and sign that they agree to the ZHA and that they will have **their SRK with them Up-tower at all times**	**Required** Individual Name	**Required** Signature	Contact Number
	1)		
	2)		
	3)		
	4)		
	5)		

Job/Task Completed

PIC Signature_____Date_____

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Paulding Wind Farm IV LLC
Case No. 18-91-EL-BGN

Exhibit X

Emergency Action Plan

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Attorneys for Paulding Wind Farm IV LLC

Date Filed: July 2, 2018

Document Type:	Plan	Document Code:	H&S

Site Emergency Action Plan

Timber Road Wind Farm

Version Control			
Version #	Date	Content	Justification
1.1	2011-06-01	Initial Version	N/A
1.2	2013-04-11	Site Specific	Update Information
1.3	October 7, 2014	Site Specific	Update Information
1.4	December 19, 2016	Site Specific	Update Information
1.5	March 6, 2017	Site Specific	Update Information
1.6	May 16, 2017	Site Specific	Update Information
1.7	September 19, 2017	Site Specific	Update Information
1.8	March 14, 2018	Site Specific	Update Information

Prepared by:	Reviewed by:	Approved by:
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Title: Site Technician Dpt.: Operations	Title: Operations Manager Dpt.: Operations	Title: Regional Operations Manager Dpt.: Operations
Date: March 14, 2018	Date:	Date:

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1 Introduction

The purpose of an Emergency Action Plan is to protect the employees from serious injury, property loss, or loss of life in the event of an actual or potential major disaster. A major disaster may include, but is not limited to, any of the following: fire, tornado, earthquake, bomb threat, or hazardous chemical spill. In the event of a major disaster, this Emergency Action Plan describes the initial responsibilities and actions which shall occur in order to protect the safety of all employees, contractors, and visitors until the appropriate local/county responders take over.

2 Scope of application

For the protection of employees, an Emergency Action plan is a requirement by OSHA 1910.38. It is also necessary and prudent for the protection of visitors. It is a requirement that the employer review with each employee upon initial assignment or when the plan changes, those parts of the plan that the employee must know to protect themselves in the event of an emergency. In addition, the written plan shall be made available for all employees, contractors, and visitors to review and plan for their evacuation.

3 Legislative & Regulatory

The Occupational Safety and Health Administration established a requirement for employers to provide an Emergency Action Plan (29 CFR 1910.38).

4 Definitions & Acronyms

Emergency Assembly Area: Predetermined area where employees, contractors, and visitors should meet after an emergency evacuation of the building.

EAP: Emergency Action Plan

SSC: Site Safety Coordinator

5 Overview

5.1 Objective

It is impossible to provide specific information for all situations and there is no guarantee implied by this plan that a perfect response to disaster emergency incidents will be practical or possible. Therefore, this plan is meant to only be a guide for employees and a document to help them to familiarize themselves with basic emergency planning, response and evaluation.

5.2 Areas Involved

- Office personnel
- Contractors
- Visitors

5.3 Inputs

- Emergency Assembly Map
- Telephone Bomb Threat Checklist
- Employee List (separate from this document)

5.4 Outputs

- Notification to fire department
- 911 call for medical emergencies
- Notification to supervisor

6 Design

6.1 Pre Planning

Preparation will increase the margin of safety in an emergency. To evacuate successfully:

- Train employees in ways of assisting others
- Inform employees about how/who to communicate in an emergency
- Assign specific tasks
- Identify employees with specific needs
- Provide a site/building specific plan
- Evacuation route maps are posted in the building. Employees should know at least two evacuation routes. The following information should be marked on the maps. (See Attachment 9.2)
  - o Emergency and accessible exits
  - o Evacuation routes
  - o Location of fire extinguishers
  - o Inclement severe weather (Tornado) shelter

6.2 Notification of Emergency Warning

In the event of a disaster, the warning may come from any of the following sources: commercial radio or television, NOAA radio, web/internet, building smoke detection, emergency siren or local authorities. It is recommended that several sources be monitored to assist in determining when emergency situations exist since no one system can cover all circumstances. A person receiving notification of a possible disaster, or a building emergency should immediately notify employees/contractors/visitors and immediate supervisor who will initiate evacuation of the building and/ or project area.

6.3 EAP Team Assignments and Responsibilities

- Review plan annually, revise as necessary, and make copies available to building employees and Corporate Health and Safety Department
- Plan training exercises to test evacuation plan
- Instruct personnel on their duties.
- Direct all initial emergency actions including the following:
  - o Assign tasks to personnel to carry out specific actions
  - o Order evacuation, if deemed necessary
- Assess nature and extent of all emergencies
- Assume initial control of all emergency action until local emergency personnel arrive

6.4 Evacuation Routes & Meeting Places

- A map of evacuation routes will be displayed throughout the building. Each map will show the way to an exit, depending on where persons are located. It will be the responsibility of **Managers/ Chaperones** to inform employees/visitors of these evacuation routes. The **Operations Manager** shall verify that signs are in place and up to date during self-site inspections.
- Meeting places will be established to account for individuals.
  a. Primary meeting place: Parking Lot Northwest Corner

b. Secondary meeting place: Shop Building- Southwest Corner

- Establish a procedure to account for employees and coordinate with contractors to receive a confirmed headcount
- Establish a procedure for reporting to emergency personnel any missing, trapped or injured occupants

6.5 Tower Rescue

This section is intended to inform all personnel of techniques involved during elevated work so they can perform their work safely. All equipment used for fall protection shall comply with ANSI Z359.1 and Subpart M (Fall Protection Standard). All employees performing elevated tower work must have formal "Tower Safety and Rescue training" as specified by company policy. When ascending a tower, there must be a minimum of two climbers that have had formal training in Tower Safety and Rescue Training. Proof of certification for each climbing employee must be on site at all times. Local emergency response authorities will be given turbine locations in the event of an injury; the injured person will be lowered to the base of the turbine and met by local emergency response authorities.

6.6 Disabilities

Each person has different skills and abilities. This calls for specific provisions for individuals with disabilities in the event of an emergency. The employee with a disability is responsible for informing his/her immediate supervisor that he/she will require assistance during an evacuation. It is important not to assume that persons with obvious disabilities need assistance, or to assume what type of assistance they may need.

6.7 Fire Procedures

- Verbally warn employees in the immediate area upon discovery of smoke or fire. All employees are required to evacuate the building.
- Dial 9-1-1 to report the fire to the authorities.
- Give your name, address with closest major intersection and type of emergency.
- Stay on the line with dispatcher until all necessary information has been given.
- CLOSE THE DOORS AS YOU LEAVE.
- Use stairways. When out, move away from building to the **PRIMARY MEETING PLACE (secondary if primary is compromised)** for a head count. You should be as far out from the building as it is high. Leave walks and drives open for fire and emergency responders.
- If necessary for a safe, orderly evacuation, activate fire extinguishers. At the discretion of the individual, use extinguisher if trained and assigned to do so.
- Notify:
  1. Firefighters if you suspect someone may be trapped inside the building.
  2. Immediate supervisor, police and other emergency services if needed.

6.7.1 Grass, Brush Fires

- In the event of grass and brush fires, employees shall contact EDPR Operations with the exact location and size of the fire.
- Operations shall contact 911 or local emergency response and coordinate with the notifying employee to lead firefighting equipment to the fire.
- Employees will be notified by radio or cell phone of the plant entrance at which to rendezvous with the fire department, if needed.

- Operations will contact any home owners in the area with the location and size of the fire. Employees may be directed by Operations to visit any dwellings that may be in the anticipated path of fire.
- Employees shall at no time attempt to extinguish or "fight" a large brush or grass fire. The employee role is to notify Operations and lead firefighting equipment to the scene.

6.7.2 Turbine Fire

- Turbine fires which occur when the turbine is not occupied will be handled the same as a grass/brush fire.
- If fire occurs in the bottom control cabinet while employees are working in the nacelle, employees shall immediately open all nacelle hatches, then following all fall safe procedures, remain in smoke free air until directed by firefighting personnel to climb down.
- If fire should occur in the nacelle while employees are present, employees shall abandon all tool and equipment and immediately descend the tower ladder or evacuate via an emergency descent device.

6.7.3 Electrical Facilities Fire

- In the event of a fire inside a substation enclosure, employees shall notify Operations with the location and source of the fire.
- Operations shall contact 911 or local emergency contacts and coordinate with the reporting employees to lead firefighting equipment to the location of the substation.
- Transformers and capacitors contain flammable, combustible material and all personnel must remain in safe areas away from these explosive sources.

6.8 Environmental Emergencies

6.8.1 Tornado or Severe Thunderstorm Procedure

- **Prevention and practice before the storm:** Turn on local TV, radio or NOAA Weather Radio and stay alert for warnings.
  - o Tornado or Thunderstorm Watch: Weather conditions are favorable for the possible development of tornadoes or severe thunderstorms. Continue normal activities but have someone monitor the situation and notify others if conditions deteriorate.
  - o Tornado or Thunderstorm Warning: A tornado or thunderstorm is occurring or sighted in the area. In addition to dark clouds and/or hail the emergency siren may sound.
  - o Primary Tornado Shelter: Site Restroom (Men)
  - o Secondary Tornado Shelter: Site Restroom (Women)

- **Know the warning signs of a tornado:** Weather forecasting science is not perfect and some tornadoes do occur without a tornado warning. There is no substitute for staying alert to the sky. Besides an obviously visible tornado, here are some things to look and listen for:
  - o Strong, persistent rotation in the cloud base.
  - o Whirling debris on the ground under a cloud base -- tornadoes sometimes do not have a funnel!
  - o Hail or heavy rain followed by either dead calm or a fast, intense wind shift. Many tornadoes are wrapped in heavy precipitation and can't be seen.

o Day or night - Loud, continuous roar or rumble,
o Night - Small, bright, blue-green to white flashes at ground level near a thunderstorm (as opposed to silvery lightning up in the clouds). These mean power lines are being snapped by very strong wind, maybe a tornado.
o Night - *Persistent* lowering from the cloud base, illuminated or silhouetted by lightning -- especially if it is on the ground or there is a blue-green-white power flash underneath.

- **Turbines:** Employees working in turbine nacelles, upon issuance of a tornado watch or warning in the immediate vicinity, (30 mile radius) shall descend and exit the turbine **immediately** or seek shelter in the base of the tower as appropriate. If any of the tornado warning signs are observed, employees shall take cover in low lying areas and not attempt to drive to a building.

After a tornado has passed through the area and an all clear has been given by EDPR NA Management, Employees will regroup at the Primary Shelter Location.

- **Inside a building:** Go to the basement, lowest floor, small center room (like a bathroom or closet), under a stairwell, or in an interior hallway or room with no windows. Go to the center of the room. Stay away from corners because they tend to attract debris.
  o Get under sturdy protection (heavy table or work bench), or cover yourself with a mattress or sleeping bag.
  o Know where very heavy objects rest on the floor above and do not go under them. They may fall down through a weakened floor and crush you.

- **If you are in a vehicle:** Park the car as quickly and safely as possible -- out of the traffic lanes. Get out and seek shelter in a sturdy building. If in the open country, run to low ground away from any cars (which may roll over on you). Lie flat and face-down, protecting the back of your head with your arms. Avoid seeking shelter under bridges, which can create deadly traffic hazards while offering little protection against flying debris.

- **In the open outdoors:** If possible, seek shelter in a sturdy building. If not, lie flat and face-down on low ground, protecting the back of your head with your arms. Get as far away from trees and cars as you can; they may be blown onto you in a tornado.

- **AFTER A TORNADO:** Wait for emergency personnel to arrive. Carefully render aid to those who are injured. Stay away from power lines and puddles with wires in them as they may still be conducting electricity. Watch your step to avoid broken glass, nails, and other sharp objects. Stay out of any heavily damaged houses or buildings as they could collapse at any time. Do not use matches or lighters, in case of leaking natural gas pipes or fuel tanks nearby. Remain calm and alert, and listen for information and instructions from emergency crews or local officials.

6.8.2 Blizzard

- **If indoors:**
  o Stay Indoors.

- o Stay calm and await instructions from National Weather Service.
- o If there is no heat:
  - Close off unneeded room or areas.
  - Stuff towels or rags in cracks under doors.
  - Cover windows at night.
- o Eat and drink. Food provides the body with energy and heat. Fluids prevent dehydration.
- o Wear layers of loose-fitting, lightweight, warm clothing, if available

- **If outdoors:**
  - o Find a dry shelter. Cover all exposed parts of the body.
  - o If stranded in a vehicle:
    - Stay in car or truck.
    - Run motor to turn heater on about every 10 minutes every hour and make sure to open the window a little for fresh air.
    - Check the tailpipe before turning on engine – a blocked tailpipe can send carbon monoxide into the vehicle and cause death.
    - Make yourself visible to rescuers (hazard lights or honk horn).
    - Stay hydrated – if no water is available melt snow and drink.
    - Exercise to keep blood circulating and to keep warm.

6.8.3 Icing Conditions

- **Evaluating Icing on Blades/External Equipment:**
  - o Weather forecasts must be consulted at the beginning of each day and discussed during the pre-work meetings. Weather should be monitored throughout the day in order to plan for any inclement weather.
  - o In conditions in which the weather is favorable for ice shedding, an initial inspection from a safe location should be performed before any work begins on the WTG or PMT. Conditions that can indicate icing or ice shedding could occur include:
    - Below normal production for current wind speed/ irregular patterns in production.
    - Visible ice or snow on the turbine
    - Signs of fallen ice around the turbine or in the surrounding area
    - Temperature around the freezing point
    - Freezing rain within the last 24 hours
    - Gusty or strong winds
    - Strong or direct sunlight
  - o If shedding of ice is observed in the area, personnel should not attempt to enter the WTG. Personnel should remain in a safe location and contact site management immediately.

- **Approaching Wind Turbine:**
  - o The turbine should be stopped remotely and nacelle shall be yawed to the desired location via SCADA. If possible, the blades should be aligned down wind and opposite the entry door.
  - o Once all WTG motion has stopped, personnel should wait at least 5 minutes to ensure no ice is shedding before approaching the turbine.

- At least one crewmember must be designated at the WTG where work is being performed and any neighboring turbine that is running to watch for shedding ice. Constant communication with the rest of the team should be maintained. Binoculars or a spotting scope should be used to help identify ice on blades, nacelle or hub. If ice is observed, personnel should notify site management immediately before proceeding.
- Approach the WTG with extreme caution and park the service vehicle 60 feet away from the turbine. When parking vehicle attempt to reduce the need for personnel to walk through deep snow or ice. To avoid walking and handling materials through deep snow/ice, the vehicle may need to be parked closer than the normal distance from the WTG.
- Approach the WTG from behind the hub to decrease the risk of being hit if ice falls from the hub.
- No work shall be performed on top of the WTG, including any transitions to the hub, wind vane or FAA lights if there is ice present on the walking surfaces.
- All WTG work in or on the towers must be delayed until the ice has shed and/or there is no danger of ice shedding.
- If personnel are inside of a WTG when ice shedding begins, exiting from the tower is forbidden until it has ceased.

- **Approach to PMT Switching During an Icing Event to be Followed in Addition other Safety Standards:**
  - Timber Road II turbine transformers are located in the Nacelle.

6.8.4 Earthquake

An earthquake usually occurs without any type of warning. Due to the suddenness, all personnel should attempt to get under a table or desk. After the earthquake has stopped, initiate the following procedure.

- **Indoor Safety:**
  - If an earthquake strikes, you may be able to take cover under a heavy desk or table. It can provide you with air space if the building collapses. If you get under a table and it moves, try to move with it.
  - Inner walls or door frames are the least likely to collapse and may also shield against falling objects. If other cover is not available, go to an inner corner or doorway, away from windows or glass panels.
  - Stay away from glass, hanging objects, cabinets with doors that could swing open, bookcases, or other large furniture that could fall.
  - Grab something to shield your head and face from falling debris and broken glass.
  - If the lights go out, use a battery-operated flashlight. Don't use candles, matches, or lighters during or after the earthquake. If there is a gas leak, an explosion could result.
  - If you are in the kitchen, quickly turn off appliances and take cover at the first sign of shaking.

- **Performing work in a wind turbine:**

- Stay inside the turbine, but avoid standing below openings from above where objects could fall. Distance yourself from electrical panels.
- Quickly take a look around the work area for heavy equipment, construction or maintenance in process, as materials may fall, tip over, or collapse in the area. Stay clear.
- If outside in the wind plant during an earthquake and closely adjacent to overhead objects such as turbines or met towers, immediately move farther away if possible and be cognizant of the need to avoid falling objects.

- **Automobiles:**
  - If you are in a moving automobile, stop as quickly and safely as possible and move over to the shoulder or curb, away from utility poles, overhead wires, and under- or overpasses.
  - Stay in the vehicle, set the parking brake, and turn on the radio for emergency broadcast information.
  - A car may jiggle violently on its springs, but it is a good place to stay until the shaking stops.

- **After The Earthquake:**
  - Once the initial shock is over, calmly walk out of the area to the wind plant's Emergency Assembly Area (EAA).
  - Be prepared for additional earth movements called "aftershocks." Although most of these are smaller than the main earthquake, some may be large enough to cause additional damage or bring down weakened structures.

- **Checking Utilities:**
  - An earthquake may break gas, electrical, and water lines. If you smell gas:
    - Open windows
    - Shut off the main gas valve
    - Do not turn any electrical appliances or lights on or off
    - Go outside
    - Report the leak to authorities
    - Do not reenter the building until a utility official says it is safe to do so.

- **Other Precautions:**
  - Check to see if sewage lines are intact before using bathrooms or plumbing.
  - Do not touch downed power lines or objects in contact with downed lines. Report electrical hazards to the authorities.
  - Immediately clean up spilled medicines, drugs, flammable liquids, and other potentially hazardous materials.
  - Stay off all telephones except to report an emergency. Replace telephone receivers that may have been knocked off by the earthquake.
  - Cooperate fully with public safety officials. Respond to requests for volunteer assistance from police, fire fighters, emergency management officials, and relief organizations, but do not go into damaged areas unless assistance has been requested.

6.8.5 Flooding

Flooding can occur as a result of either long-term, sustained precipitation or short-term intense weather events. Monitoring of emergency broadcasts is important to ensure proper preparation for such events.

- **If ordered to evacuate:**
  - Time permitting, turn off the gas, electricity, and water and move vital materials and equipment to higher ground.
  - Disconnect appliances to prevent electrical shock when power is restored,
  - DO NOT attempt to drive or walk across creeks or flooded roads.

- **Driving Flood Facts**:
  - Six inches of water will reach the bottom of most passenger cars causing loss of control and possible stalling.
  - A foot of water will float many vehicles.
  - Two feet of rushing water can carry away most vehicles including sport utility vehicles (SUV's) and pick-ups.

- **After a Flood:**

  Listen for news reports to learn whether the community's water supply is safe to drink.
  - Avoid floodwaters; water may be contaminated by oil, gasoline, or raw sewage. Water may also be electrically charged from underground or downed power lines.
  - Avoid moving water.
  - Be aware of areas where floodwaters have receded. Roads may have weakened and could collapse under the weight of a car.
  - Stay away from downed power lines, and report them to the power company.
  - Return home only when authorities indicate it is safe.
  - Stay out of any building if it is surrounded by floodwaters.
  - Use extreme caution when entering buildings; there may be hidden damage, particularly in foundations.
  - Service damaged septic tanks, cesspools, pits, and leaching systems as soon as possible. Damaged sewage systems are serious health hazards.
  - Clean and disinfect everything that got wet. Mud left from floodwater can contain sewage and chemicals.

6.8.6 Lightning

- No personnel are permitted in or near a turbine during, as well as, at least one hour after an electrical storm has passed due to the risk of static electricity on the blades.
- A warning will be issued to the site by the Site Operations Manager of his designee when the lightning is detected within 30 miles of the site. Crews will be notified that lightning has been detected within 30 miles and the tower evacuation may be required.
- Each crew must acknowledge the warning by radio or cell phone. Also crews should monitor the area themselves upon notification because many lightning strikes go undetected by the monitoring services.

- A stand down notification will be issued when lightning is detected within eight (8) miles of the site. Upon notification crews will stop work, acknowledge the notification by radio or cell phone, evacuate the wind turbine generator (WTG), and return to the O&M Building.
- The stand down will remain in effect until the site has received an "ALL CLEAR". An "ALL CLEAR" will be issued when the lightning has been outside of the 30 mile radius for five (5) minutes.
- All site personnel must notify the Site Operations Manager or his designee and Owners of any lightning in the area.

6.9 Criminal Activity/Hostile Intruder

- If you observe a crime in progress, behavior which you suspect is criminal or hostile behavior call **911 or appropriate number from emergency contact list.** Report as much information as possible including:
  - o Activity
  - o Person's description
    - i. Height, Weight, Sex, Clothing, Weapons
  - o Location
  - o Direction of Travel
  - o Vehicle Description
    - i. Color, Year, Make, Model, License plate information, Additional distinctive features
- DO NOT APPROACH OR ATTEMPT TO APPREHEND THE PERSON(S) INVLOVED.
- Stay on the phone with the police dispatcher and provide additional information as changes in the situation occur until the first law enforcement officer arrives at your location.

6.10 Medical Emergencies

6.10.1 Injury Illness Ground

Emergency Medical Services (EMS) personnel or those individuals who are trained by a certified First Aid trainer will provide first aid. Until rescue personnel arrive, administer first aid in the building, or in the event of a complete evacuation, at the designated Emergency Assembly Area (EAA) outside.

- **Call 911 immediately if the injury is life threatening**. Provide the following information to the emergency dispatcher.
  - o Nature of medical emergency
  - o Location of emergency (road #, turbine #, substation)
  - o Your name and phone number which you are calling from.
  - o Provide additional information which may be useful.
  - o Do not move victim unless absolutely necessary.
- Call the following personnel trained in CPR and First Aid to provide the required assistance prior to the arrival of the professional medical help:
  - o Benjamin Werkowski Phone: 765-509-0300
  - o Alex West Phone: 419-605-3201
  - o John McConville Phone: 419-263-0137

- The First Aid Kit(s) location: EDPR Conference Room/ Vestas Shop Area/ Gamesa Office/ Gamesa Shop Area/ Site Vehicles/ Substation Control Rooms
- In case of rendering assistance to personnel exposed to hazardous materials. Consult the MSDS and wear the appropriate personal protective equipment. Attempt first aid ONLY if trained and qualified. Call 911 and refer to Hazardous Substance Spill Section of this document.

6.10.2 Injury / Illness Up-Tower

- In the event of an injury/illness requiring medical treatment to employees working in a nacelle or tower, Operations shall be contacted immediately.
- Operations shall contact 911 and coordinate rendezvous points with ambulance service and site personnel. Rendezvous points shall generally be at the site of the injury. However, if Emergency Responders are unable to locate the site, the O&M building will serve as a rendezvous point. (Note: multiple site personnel may be required to lead both EMT first responders and then follow-on emergency vehicles to the injured location.)
- In the event an injured or ill employee is not capable of climbing down the tower, attending employees shall assess the situation, and respond according the appropriate action before lowering injured employees.

6.11 Biological, Radiological, Explosive, Chemical (BREC) Threat

The threat that a bomb/BREC has been planted is usually made via telephone. In the majority of cases, these threats have been proved to be false and no device or material was located. However, the potential for loss of human life and property is so great that each situation must be pursued and evaluated. A calm response to the bomb threat caller could result in obtaining additional information.

- **Telephone threat:**
  - Remain Calm
  - Attempt to keep the caller on the lines as long as possible by asking the caller to repeat the message. Record words spoken (as many words as possible) by the person and use the telephone threat check list (see checklist below).
    - Ask for the exact location where threat has been or going to be planted.
    - Get as much information as possible about the caller (*i.e. vocal characteristics, sex, group affiliation, reason*)
    - Clues from background noises, which might indicate caller's location or area which call was placed.
  - Immediately after the caller hangs up, report the threat to **911** and report it to your supervisor.
  - Remain available, as law enforcement personnel will want to interview you.
  - Wait for further direction from your supervisor.
  - Do not spread rumors.

- **Written Threat:**
  - Remain calm.

- Avoid unnecessary handling in order to preserve possible fingerprint(s), handwriting or typewriting, paper, and postal marks. These will prove essential in tracing the threat and identifying the writer.
- While written messages are usually associated with generalized threats and extortion attempts, a written warning of a specific device my occasionally be received; it should never be ignored.
- Immediately contact local authorities and report to immediate supervisor.
- Wait for further instructions.
- Do not spread rumors.

- **Suspicious Package:**
  - If a suspicious package or device is found, **immediately** notify the appropriate law enforcement authorities.
  - Do not shake or empty the contents of any suspicious package or envelope.
  - Put the package or envelope down on a stable surface; do not sniff, touch, taste, or look closely at it or at any contents that may have spilled.
  - Alert others in the area but **DO NOT use the fire alarm.**
  - Leave the area. Close any doors and assemble outside the room's entrance.
  - Do not allow anyone to reenter the area.
  - Wash hands with soap and water to prevent spreading potentially infectious material to face or skin.
  - If possible, create a list of persons who were in the room or area when the suspicious letter or package was recognized and a list of persons who also may have handled it.
- **Hazardous Substance:**

The following are locations of:

Spill Containment Equipment: EDPR, Vestas, and Gamesa Shop/ Site Vehicles/ Substations
Safety Data Sheets: EDPR Office/ Vestas Shop Area/MSDS Online
SPCC Plan: EDPR Office

A separate Spill Prevention, Control and Countermeasures plan (SPCC) has been developed to address spills in detail. Please refer to that plan for more detailed instructions regarding spill prevention and response.

In the event of a hazardous spill or potentially hazardous substance:

- Type of oil or hazardous substance involved
- Estimated quantity of spillage
- Fire Risk
- MSDS recommendations and considerations
- Inform Supervisor
- If safe, contain spill

Should the spill be too extensive to be resolved using the available spill kit, then the spill should be contained as far as is practicable and the site's environmental contractor should be contacted to resolve the situation.

The spill should be reported to the National Response Center (NRC) and The State:
NRC: 1-800-424-8802
State: See SPCC Plan for reporting requirements.

The following information will be required when reporting the incident:
- o Clearly identify the location of the spill
- o What substance is involved
- o Approximate quantity spilled
- o Approximate concentration of the spilled material, if appropriate
- o Identify the source of the spill
- o Identify who is cleaning the spill
- o Identify any resources damaged, if applicable
- o Provide contact information
- o Did the spill leave site/reach water

7 Training Requirements

- Assigned personnel shall be trained on how to assist others in the proper evacuation of the building.
- Employees shall be informed on the Site Specific Emergency Action Plan.

8 References

- 29 CFR 1910.38

9 Attachments

- **9.1 Telephone Bomb Threat Checklist**
- **9.2 Map of Evacuation Routes/ Life Safety Plan [Operations Building]**
- **9.3 Map of Evacuation Routes/ Life Safety Plan [Storage Building]**
- **9.4 Map of Emergency Assembly Areas**
- **9.5 Emergency Contact List**
- **9.6 Active Contingency Watch Contact List**
- **9.7 Accident Investigation and Reporting**
- **9.8 Accident Investigation and Reporting (Witness/ Employee Report)**
- **9.9 Site Description/ Map Timber Road II**
- **9.10 Site Description/ Map Timber Road III**

(Attachment 9.1_Telephone Bomb Threat Checklist)

YOUR NAME:		**TIME:**		**DATE:**
CALLER'S IDENTITY SEX:	**Male** ☐	**Female** ☐	**Adult** ☐	**Juvenile** ☐
APPROXIMATE AGE:				
ORIGIN OF CALL:	**Local** ☐	**Long Distance** ☐	**Telephone Booth** ☐	
CALLERS ATTITUDE & LANGUATE				
☐ **Well Spoken** ☐ **Taped Message**	☐ **Incoherent** ☐ **Message Being Read**	☐ **Profane/Foul** ☐ **Irrational**	☐ **Angry** ☐ **Calm**	
VOICE CHARACTERISTICS				
☐ **Loud/High Pitch** **Raspy** ☐ **Deep Breaths**	☐ **Nasal** **Excited** ☐ **Crying**	☐ **Lisp** **Rapid** ☐ **Whisper**	☐ **Disguised** **Deep** ☐ **Stutter**	☐ **Slow** **Normal** ☐ **Accent**
BACKGROUND NOISES				
☐ **Street Noises** **Static** ☐ **Radio/TV** ☐ **Cell Phone**	☐ **Long Distance** **Restaurant** ☐ **Wildlife** ☐ **Music**	☐ **Factory Machines** ☐ **Local** **PA System** ☐ **Office Sounds**	☐ **Weather** ☐ **Other Voices** ☐ **Motor** ☐ **Other**	☐ **Trains** ☐ **Airplanes** ☐ **Party** ☐ **None**

Pretend Difficulty Hearing - Keep Caller Talking - If Caller Seems Agreeable To Further Conversation, Ask Questions Like:

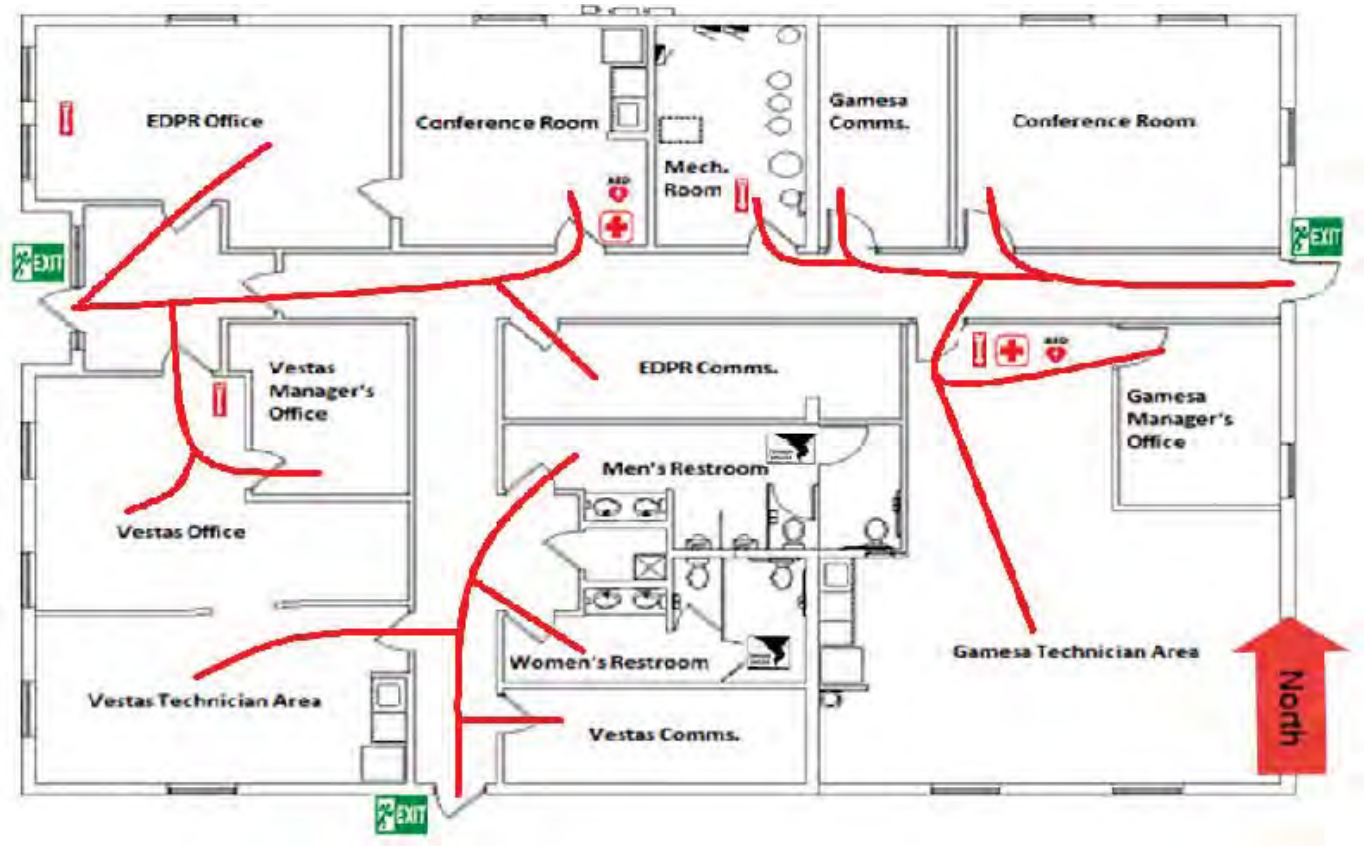
When will it go off?	**Certain hour time remaining?**
Where is it located?	**Which Area of Building?**
What kind of bomb?	**What kind of package?**

If building is occupied, inform caller that detonation could cause injury or death.

Call the Emergency Response Coordinator at 419-263-0137 or Police Department at 911, and relay information about call.

Did the caller appear familiar with building (by his/her description of the bomb location)? Write out the message in its entirety and any other comments on a separate sheet of paper and attach to this checklist. Notify your supervisor immediately.

(Attachment 9.2_Map of Evacuation Routes/ Life Safety Plan [Operations Building])



Tornado Shelter (Primary: Men's Restroom, Secondary: Women's Restroom)

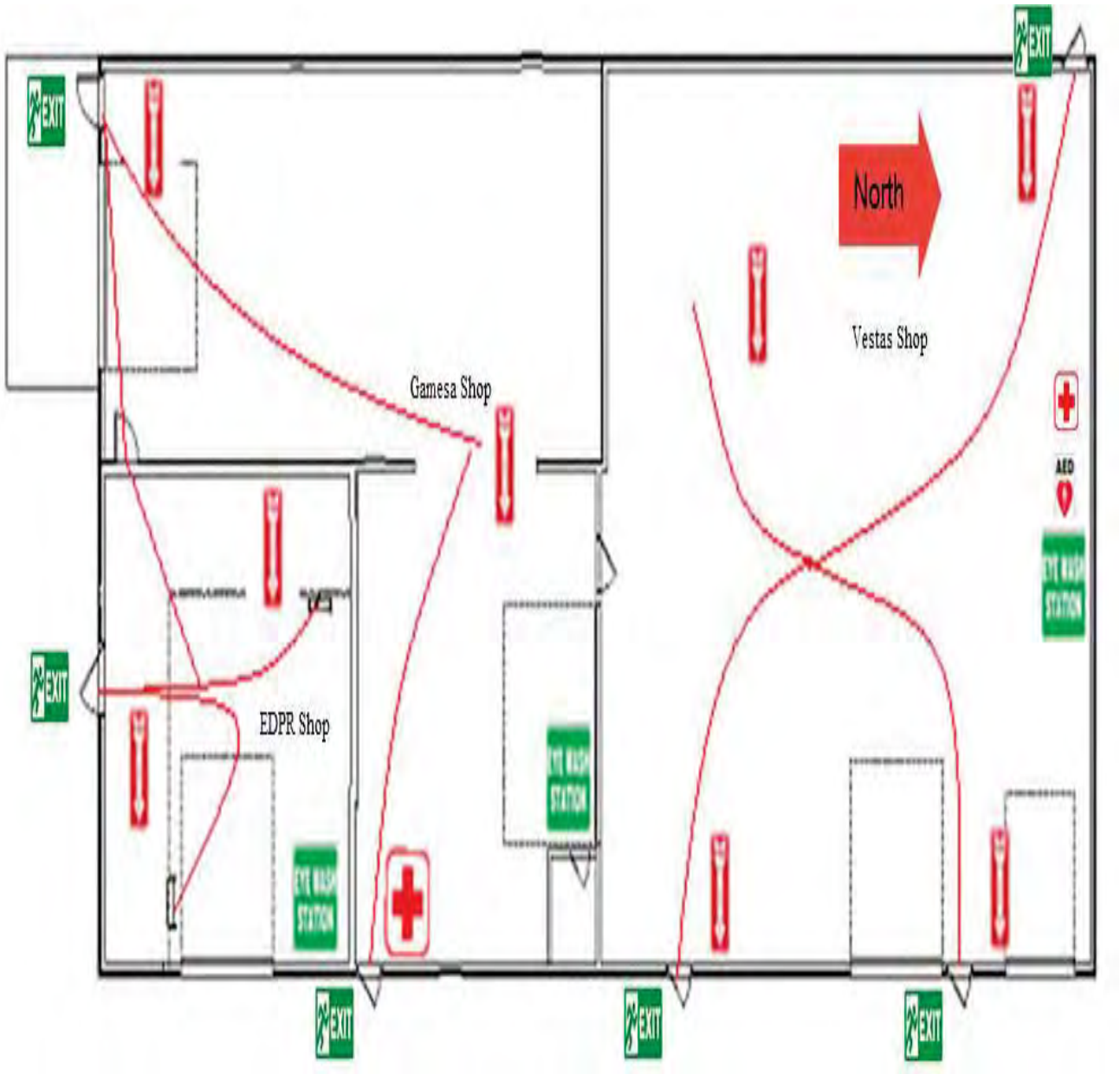
Fire Extinguishers (EDPR, Gamesa, and Vestas office areas)

AED (EDPR and Gamesa office areas)

First Aid Kit (EDPR and Gamesa office areas)

Exit (West, East, and South sides of office)

(Attachment 9.3_Map of Evacuation Routes/ Life Safety Plan [Shop Areas])



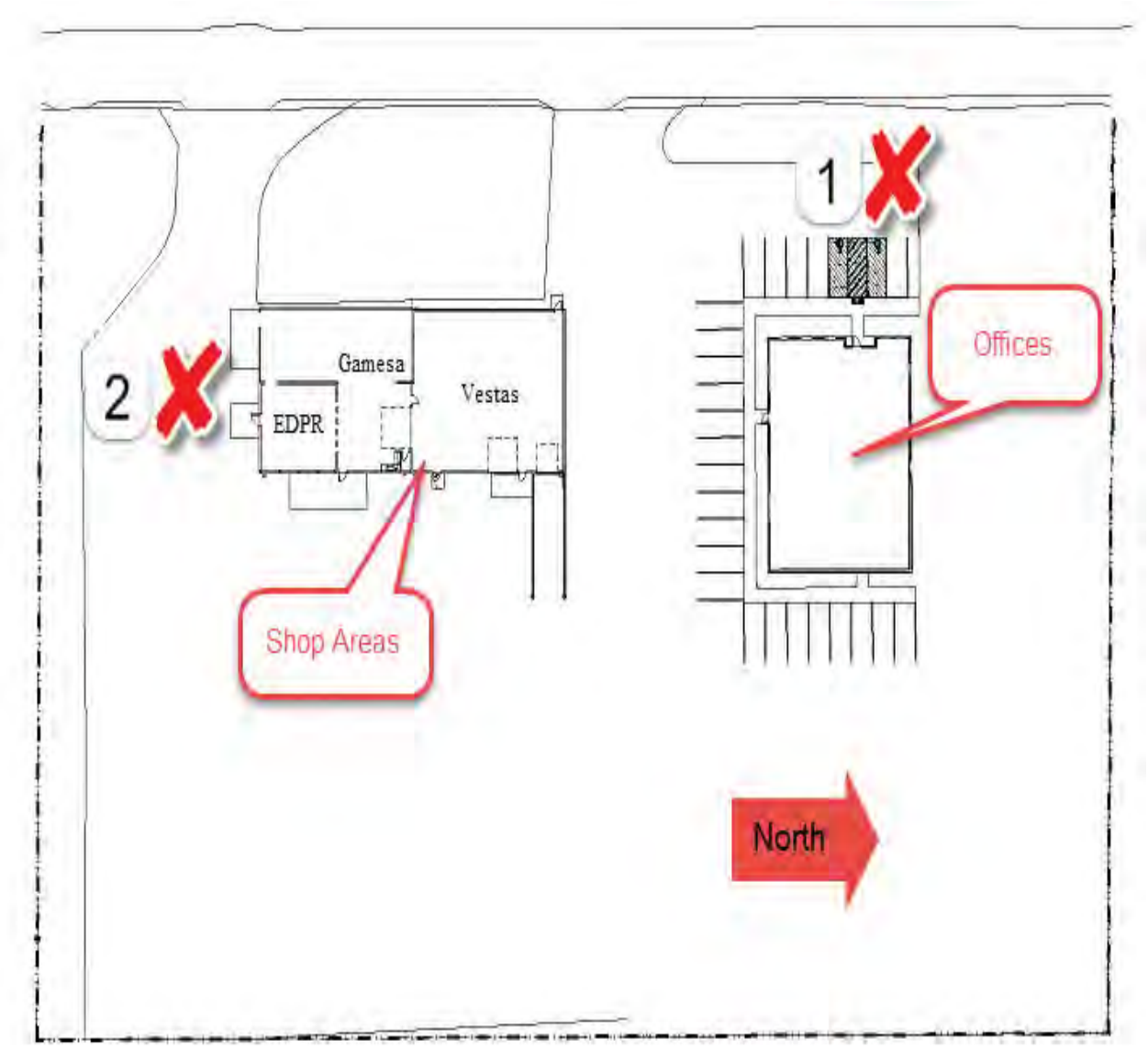
Fire Extinguishers (EDPR, Gamesa, and Vestas shop areas)

AED (Vestas shop area)

First Aid Kit (Gamesa and Vestas shop areas)

Eyewash station (EDPR, Gamesa, and Vestas shop areas)

(Attachment 9.4_Map of Emergency Assembly Areas)



1 **Primary emergency assembly area is the Northwest corner of the parking lot.**

2 **Secondary emergency assembly area is the Southwest corner of the shop areas.**

(Attachment 9.5_Emergency Contact List)

Timber Road Contact List

Life Threatening Emergency Call 9-1-1

Emergency Contacts			
EDPR Operations	Timber Road Office		(419) 263-0137
EDPR Operations Manager	Benjamin Werkowski		(765) 509-0300
EDPR Operations Site Technician	Alex West		(419) 605-3201
EDPR Operations Administrator	Dawn McCrory		(419) 771-2794
Vestas Americas	Timber Road Office		(503) 327-7883
Vestas Americas Site Manager	Michael Herman		(661) 229-0787
Gamesa Site Manager	Justin Butler		(215) 444-5730
Fire Department			
Payne Volunteer Fire Department	402 North Laura Street, Payne, OH 45880		(419) 263-2823
Van Wert Fire Department	515 East Main Street, Van Wert, OH 45891		(419) 238-4918
Emergency Hospital			
Paulding County Hospital	1035 West Wayne Street, Paulding, OH		(419) 399-4080
Parkview Hospital	10501 Corporate Drive, Fort Wayne, IN		(260) 373-7092
Law Enforcement			
Paulding County Sheriff	500 East Perry Street, Paulding, Ohio		(419) 399-3791
Ohio State Patrol (Van Wert)	10234 County Highway 434, Van Wert, OH		(419) 238-3055
Federal Bureau of Investigation (FBI)	Cleveland Field Office		(216) 522-1400

Important Contacts

Focus Area	Organization	Contact Name	Phone Number
Operations (ALL)	EDPR Eastern Region, ROM	Tod Nash	(315) 874-4200
Turbine Reliability	EDPR Eastern Region, TRE	Stan Kraeger	(315) 286-6225
Turbine Operations	ROCC Primary Control Contact		(713) 356-2573
High Voltage	EDPR Eastern Region, HVRE	Bryan Peyres	(309) 660-4268
Health and Safety	EDPR Corporate Safety	Gary Lee	(713) 356-2475
Health and Safety	Occupational Safety and Health		(419) 259-7542
Poison Control	National Capital Poison Center		(800) 222-1222
Environmental Reporting	Ohio Environmental Protection Agency		(800) 282-9738
Environmental Reporting	Ohio State Emergency Response		(614) 644-2260
Environmental Response	Safety-Kleen	Joe Kahn	(260) 740-6088
Environmental Reporting	National Response Center (NRC)		(800) 424-8802
Excavation/ Digging	Ohio Utilities Protection Services		(800) 362-2764
Radios/ Communication	2-Way Mobile	Greg Whistler	(419) 367-6337
Mowing and Snow Removal	Solid Ground, LLC	Brian Shuherk	(419) 769-0927
Civil Services/ Road Maintenance	Dan Gordon Enterprises	Dan Gordon	(260) 750-0091
High Voltage/ Interconnect	AEP Dispatch		(614) 413-4353
Turbine Mowing	Dan Gordon Enterprises	Dan Gordon	(260) 750-0091

(Attachment 9.6_Acting Project Watch Contingency Information)

Timber Road Project Watch Contingency Information

FOCUS	NAME	ORGANIZATION	PHONE	EMAIL
ALL (if available)	Benjamin Werkowksi	EDP RENEWABLES NA, LLC	765-509-0300	Benjamin.werkowski@edpr.com
ALL	Tod Nash (NE ROM)	EDP RENEWABLES NA, LLC	315-874-4200	Tod.Nash@edpr.com
ALL	Jeremy Chenoweth	EDP RENEWABLES NA, LLC	219-207-0857	Jeremy.Chenoweth@edpr.com
Turbine Operations (VESTAS)	Michael Herman	Vestas Americas	661-229-0787	mihmn@vestas.com
Electrical Systems Outage	ROCC Primary Contact (1st)	EDP RENEWABLES NA, LLC	713-356-2573	
Electrical Systems Outage	ROCC Secondary (2nd)	EDP RENEWABLES NA, LLC	713-356-2544	
Electrical Systems Outage	ROCC Emergency (3rd)	EDP RENEWABLES NA, LLC	713-828-1550	
Electrical Systems Outage	Brian Peyres (NE HVRE)	EDP RENEWABLES NA, LLC	309-660-4268	brian.peyres@edpr.com
Electrical Systems Outage	AEP Dispatch	American Electric Power	614-413-4353	
Electrical Systems Outage	Tim Maine	Maine Technical Services, Inc	315-272-7959	tmaine@mainetechnicalservices.com
Electrical Systems Regulatory	Regional Generation Dispatch	PJM		
Electrical Regulatory (NERC)	Mary L Ideus	EDP RENEWABLES NA, LLC	713-356-2460	Marylou.ideus@edpr.com
Environmental Response	Joe Kahn	Safety Kleen	260-484-8034	Joseph.kahn@safetykleen.com
Environmental Reporting		National Response Center(NRC)	800-424-8802	
Civil (Locating)		Ohio Utilities Protection Service	800-362-2764	
Ops Building Maintenance	Jeff Dawson	Morton Buildings	419-399-4549	Jeffrey.Dawson@mortonbuildings.com
Site Safety (Corp. Level)	Gary Lee	EDP RENEWABLES NA, LLC	713-356-2475	Gary.Lee@edpr.com
Law Enforcement (Local)	Dispatch	Paulding County Sherriff	419-399-3791	
Fire Response	Dispatch	Payne Vol. Fire	419-263-2823	
Fire Response (Alt)	Dispatch	Van Wert Fire	419-238-4918	
Law Enforcement (Federal)	Cleveland Field Office	FBI	216-522-1400	
Solid Waste (recycling)	Rob Gerken	Erie Recycling & Services	419-258-2345	erierecycling@frontier.com
Solid Waste (refuse)	Dispatch	Werlor Inc.	419-784-4285	
Communication (EDPR IT)	Helpdesk	EDP RENEWABLES NA, LLC	713-265-0345	support@edpr.com
Communication (Radios)	Greg Whistler	Two-Way Communication		
Water (Ops Building)	Rick Swagger	Culligan Water Systems	260-750-7948	

(Attachment 9.7_Accident Investigation and Reporting)

EDPR NA Wind Energy Accident Investigation Report

☐ INJURY ☐ EQUIPMENT or PROPERTY DAMAGE

Date and hour of accident: ___/___/___ _____ _____AM ☐ PM ☐		Time employee began work: _____ AM ☐ PM ☐
Date and hour accident was reported to EDPR NA: ___/___/___ _____AM ☐ PM ☐		
Address, city, state, & zip of accident: _____		
EDPR NA Employee(s) involved: ____		
Non-EDPR NA workers involved: ☐ N/A or __ (names and companies)		
Witnesses: ☐ N/A or _		
Treated at and ER: ☐ Y / ☐ N	Overnight hospitalization: ☐ Y / ☐ N	Hospital/clinic: _____
Type of injury: ☐ N/A	☐ Strain/sprain ☐ Bruising ☐ Amputation ☐ Foreign body ☐ Fracture ☐ Scratch/abrasion ☐ Burn/scald ☐ Internal ☐ Laceration/cut ☐ Chemical reaction ☐ Dislocation ☐ Other _____	
Injured body part:	☐ Head; ☐ Back; ☐ Groin; ☐ Leg; ☐ Arm; ☐ Hand; ☐ Finger; ☐ Other __	
Weather conditions:	_____	

Were the appropriate tools and materials available? Were they being used?	☐ Yes ☐ No ☐ N/A
Should personal protective equipment (PPE) have been used?	☐ Yes ☐ No ☐ N/A
Was the PPE used?	☐ Yes ☐ No ☐ N/A
Was it too hot or too cold?	☐ Yes ☐ No ☐ N/A
Was there adequate light?	☐ Yes ☐ No ☐ N/A
Were toxic or hazardous gases, dusts, or fumes present?	☐ Yes ☐ No ☐ N/A
Were workers experienced in the work being done?	☐ Yes ☐ No ☐ N/A
Had they been adequately trained? Training documented?	☐ Yes ☐ No ☐ N/A
Were safety rules communicated to and understood by all employees?	☐ Yes ☐ No ☐ N/A
Were written procedures available? Were they being enforced?	☐ Yes ☐ No ☐ N/A
Had hazards been previously identified?	☐ Yes ☐ No ☐ N/A

Describe what happened and what caused the accident: _____

_____

_____

_____

_____

Describe what action has or will be taken to prevent a recurrence:

_____

_____

_____

_____ _____

Signature of supervisor or lead investigator Date

(Attachment 9.8_Employee/ Witness Report)

EDPR NA Wind Energy Employee/Witness Report

You are: EDPR NA Employee ☐ other Witness ☐	Name:
Date of accident: ____/___/____	Hour of accident:____AM ☐ PM ☐
Address, city, state, & zip of accident:	
Describe what happened and what caused the accident: _____ _____ _____ _____ _____ _____ _____	
Describe what action can be taken to prevent a recurrence: _____ _____ _____ _____ _____	

_____ _____

Signature of employee or witness Date

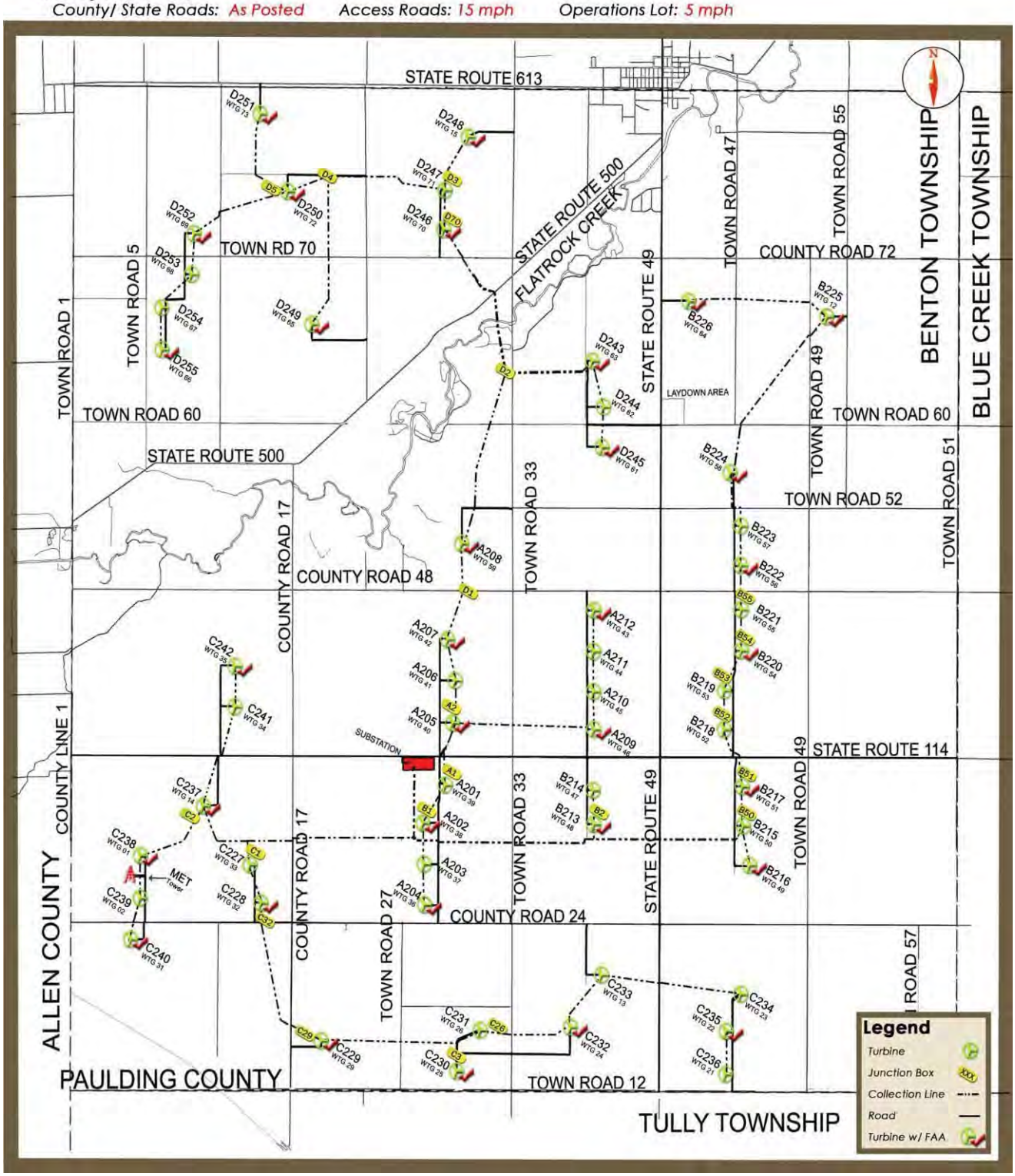
Send completed report to your Supervisor/Manager

(Attachment 9.9_Site Description/ Map)

Timber Road II Site Map

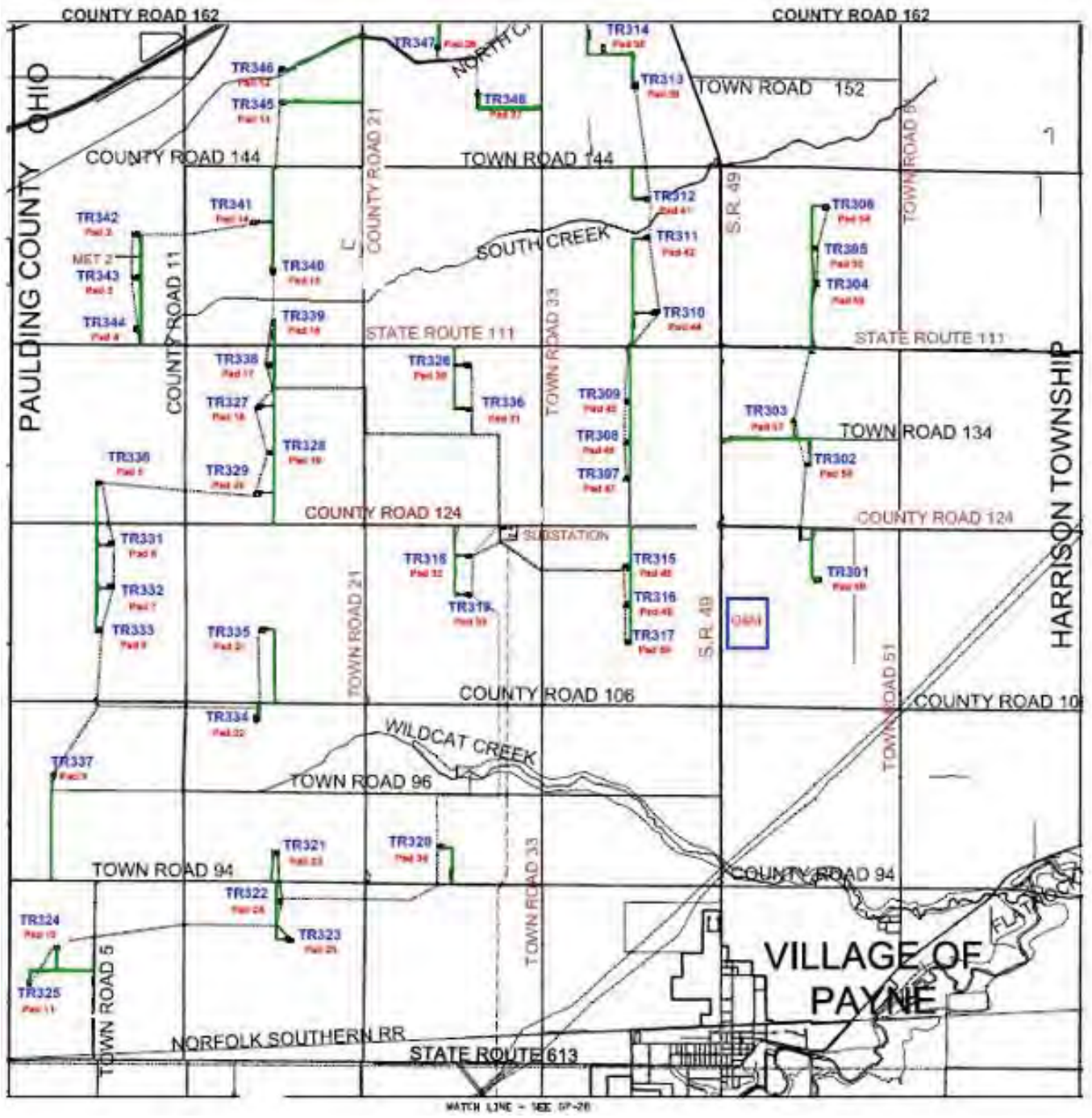
Site Speed Limits

County/ State Roads: As Posted Access Roads: 15 mph Operations Lot: 5 mph



Attachment 9.10_Site Description/ Map)

Timber Road III Site Map



Timber Road III					Timber Road II				
			Coordinates					Coordinates	
Construction Pad	Operational Turbine #	Turbine #	Lat	Long	Construction Pad	Operational Turbine #	Turbine #	Lat	Long
Pad 59	1-301	301	41.117084	-84.71619	Pad 39	A201	201	41.016205	-84.75467
Pad 58	1-302	302	41.126474	-84.71788	Pad 38	A202	202	41.012926	-84.757255
Pad 57	1-303	303	41.130125	-84.71924	Pad 37	A203	203	41.009286	-84.757268
Pad 56	1-304	304	41.140942	-84.71691	Pad 36	A204	204	41.005703	-84.757259
Pad 55	1-305	305	41.144095	-84.7168	Pad 40	A205	205	41.021715	-84.753362
Pad 54	1-306	306	41.147373	-84.71558	Pad 41	A206	206	41.025411	-84.753341
Pad 47	1-307	307	41.125225	-84.73734	Pad 42	A207	207	41.029075	-84.754563
Pad 46	1-308	308	41.128184	-84.73737	Pad 59	A208	208	41.037513	-84.752539
Pad 45	1-309	309	41.131531	-84.7374	Pad 46	A209	209	41.021206	-84.735323
Pad 44	1-310	310	41.138834	-84.73382	Pad 45	A210	210	41.024473	-84.735448
Pad 42	1-311	311	41.144889	-84.73497	Pad 44	A211	211	41.028025	-84.735448
Pad 41	1-312	312	41.147981	-84.73485	Pad 43	A212	212	41.031626	-84.735467
Pad 39	1-313	313	41.157073	-84.73642	Pad 48	B213	213	41.012897	-84.735301
Pad 38	1-314	314	41.160475	-84.73997	Pad 47	B214	214	41.015874	-84.735424
Pad 48	2-315	315	41.118081	-84.7375	Pad 50	B215	215	41.01283	-84.716085
Pad 49	2-316	316	41.115015	-84.73723	Pad 49	B216	216	41.009303	-84.714924
Pad 50	2-317	317	41.112009	-84.73719	Pad 51	B217	217	41.016277	-84.716095
Pad 32	2-318	318	41.11878	-84.75383	Pad 52	B218	218	41.021273	-84.718209
Pad 33	2-319	319	41.11563	-84.75386	Pad 53	B219	219	41.024691	-84.718237
Pad 34	2-320	320	41.095179	-84.75729	Pad 54	B220	220	41.02816	-84.716235
Pad 23	2-321	321	41.094536	-84.77464	Pad 55	B221	221	41.031761	-84.716276
Pad 24	2-322	322	41.090694	-84.77419	Pad 56	B222	222	41.035597	-84.716344
Pad 25	2-323	323	41.087411	-84.77308	Pad 57	B223	223	41.039129	-84.716401
Pad 10	2-324	324	41.087122	-84.79839	Pad 58	B224	224	41.043713	-84.717351
Pad 11	2-325	325	41.083584	-84.80129	Pad 12	B225	225	41.057498	-84.705192
Pad 30	3-326	326	41.134267	-84.75404	Pad 64	B226	226	41.058817	-84.723224
Pad 18	3-327	327	41.130796	-84.77718	Pad 33	C227	227	41.00919	-84.779961
Pad 19	3-328	328	41.127222	-84.77589	Pad 32	C228	228	41.00585	-84.778524
Pad 20	3-329	329	41.123745	-84.77729	Pad 29	C229	229	40.993782	-84.77054
Pad 05	3-330	330	41.124578	-84.79372	Pad 25	C230	230	40.991067	-84.752305
Pad 06	3-331	331	41.119682	-84.79246	Pad 26	C231	231	40.994789	-84.7499
Pad 07	3-332	332	41.116152	-84.79247	Pad 24	C232	232	40.995105	-84.73817
Pad 08	3-333	333	41.112673	-84.79369	Pad 13	C233	233	40.999689	-84.734149
Pad 22	3-334	334	41.10527	-84.77701	Pad 23	C234	234	40.997991	-84.715964
Pad 21	3-335	335	41.112628	-84.77667	Pad 22	C235	235	40.994698	-84.717651
Pad 31	3-336	336	41.130718	-84.75391	Pad 21	C236	236	40.991073	-84.71766
Pad 09	3-337	337	41.101005	-84.79866	Pad 14	C237	237	41.014342	-84.785896
Pad 17	4-338	338	41.134344	-84.77603	Pad 01	C238	238	41.009807	-84.794093
Pad 16	4-339	339	41.138004	-84.77538	Pad 02	C239	239	41.006206	-84.794048
Pad 15	4-340	340	41.141741	-84.77536	Pad 31	C240	240	41.002552	-84.795514
Pad 14	4-341	341	41.145835	-84.77778	Pad 34	C241	241	41.023036	-84.781995
Pad 02	4-342	342	41.144884	-84.79053	Pad 35	C242	242	41.026624	-84.782015
Pad 03	4-343	343	41.141352	-84.79054	Pad 63	D243	243	41.053071	-84.735682
Pad 04	4-344	344	41.137387	-84.79006	Pad 62	D244	244	41.049476	-84.734309
Pad 13	4-345	345	41.155643	-84.77475	Pad 61	D245	245	41.04598	-84.734415
Pad 12	4-346	346	41.158448	-84.77488	Pad 70	D246	246	41.064956	-84.755134
Pad 26	4-347	347	41.160034	-84.75781	Pad 71	D247	247	41.068335	-84.755065
Pad 27	4-348	348	41.156659	-84.7535	Pad 15	D248	248	41.072835	-84.752483
					Pad 65	D249	249	41.056612	-84.772223
					Pad 72	D250	250	41.068249	-84.775464
					Pad 73	D251	251	41.074933	-84.779087
					Pad 69	D252	252	41.064469	-84.787627
					Pad 68	D253	253	41.060876	-84.787979
					Pad 67	D254	254	41.057967	-84.79177
					Pad 66	D255	255	41.054294	-84.791745

Substations		
	Lat	Long
TRII	41° 1'5.55"N	84°45'29.85"W
TRIII	41° 7'15.16"N	84°45'1.59"W

Paulding Wind Farm IV LLC
Case No. 18-91-EL-BGN

Exhibit Y

Ice Throw Analysis

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Date Filed: July 2, 2018

ICE THROW ANALYSIS

Timber Road IV Wind Farm

Crane, Harrison, Paulding, Benton, and
Blue Creek Townships

Paulding County, Ohio

July 2018

EDR Project No. 17031

Prepared for:

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1.0 PROJECT OVERVIEW

Paulding Wind Farm IV, LLC (the Applicant) is proposing to construct a 125.1-megawatt (MW) wind energy generation facility, permitting of 54 turbines and the necessary associated project infrastructure. The project site, located within Paulding County, Ohio, sits in the northwestern corner of the state, roughly 8 kilometers (km) east of the border with Indiana and 70 km south of the border with Michigan. Multiple turbine models are under consideration for the project. Given the nature of this analysis, the largest turbine was selected for consideration here. The Vestas 150 – 4.2 MW turbine has a hub height of 105 meters (m) and a 150 m rotor diameter.

The Applicant is requesting a Certificate of Environmental Compatibility and Public Need from the Ohio Power Siting Board (OPSB).

2.0 INTRODUCTION

Ice throw refers to the release of an ice fragment from a rotating turbine blade. Its occurrence is the product of ice accretion on the blades and the appropriate conditions to allow release from the blade. Ice accumulation from atmospheric icing on a turbine blade occurs in two primary ways, precipitation icing and in-cloud icing. Precipitation icing forms as liquid precipitation comes into contact with a turbine blade. During a narrow temperature range precipitation icing may result from wet snow, though this generally occurs on structures at a standstill. In contrast, freezing rain can affect rotating blades with a high rate of adhesion, and results in ice with a high density. In-cloud icing forms as supercooled water droplets deposit onto the blade surface. A wider range of accretion and density result from this meteorological occurrence, influenced by the thermodynamics at the surface (Battisti 2015). These occurrences dominate in different regions. For instance, freezing rain is the primary mechanism by which ice accumulates on turbine blades in Southern Ontario, while in-cloud icing is more common in mountainous regions, including British Columbia and mountain ranges in Europe (Biswas et. al. 2012, Tammelin 1998).

When ice fragments are released from the blade their trajectory is influenced by the wind strength and direction, along with the mass and size of the fragments, amongst other factors (Battisti 2015). Limited data on the impact of these individual factors exist, however a limited number of observational studies have been undertaken to quantify ice throw behavior. In a 2-year study in the Swiss Alps, researchers collected 121 fragments, in the area surrounding 40-m rotor diameter turbine, with a maximum weight of 1.8 kilograms (kg) and a maximum throwing distance of 92 m. 40% of the ice found was recovered within 20 m of the turbine base and over 95% of the fragments were less than 500 grams (g) (Cattin et. al. 2007). A Swedish study conducted between 2014 to 2016 collected 421 ice fragments, of which 336 have a recorded mass. 50% of these 336 fragments were less than 500 g and 85% less than 1 kg. A maximum throwing distance of 142 m was recorded for a 0.10 kg ice fragment at a wind speed of 8.4 m/s (Poyry 2017).

Potential impacts resulting from ice throw are frequently modeled using a simplified ballistic model (Biswas et. al. 2012). This model calculates the average trajectories associated with given wind speed profiles for relatively compact ice fragments. For site and turbine specific analyses, this model is considered valid when used to derive impact statistics on the variation in ice throw impacts with distance and direction, and it has been used in multiple ice throw studies (Bredesen et. al. 2017, LeBlanc 2007, Renstrom 2015).

3.0 METHODS

The OPSB requires applicants to evaluate and describe the site-specific potential for ice throw. Specifically, the applicable regulations set forth at 4906-4-09 of the Ohio Administrative Code (OAC) require an ice throw analysis to:

- Include the probability of ice throw impact at the nearest property boundary and public road.
- Satisfy safety considerations by demonstrating that the probability of 1 kg of ice landing beyond the statutory property line setback for each turbine location is less than 1% per year.

The methodology, as detailed in the following sections, included identifying conditions under which ice throw could occur, analyzing trends in local wind conditions, and modeling the trajectory of released ice fragments. Further, the probabilities of impact across a grid surrounding each turbine are calculated. A localized regression model is applied to the results to approximate probability contours around each turbine.

3.1 LOCATION AND CLIMATE

The project includes a wind turbine generation facility in Paulding County, Ohio, consisting of 54 turbines. Within the project site, land use is dominated by agriculture interspersed with single family residences. Ohio, in general, experiences a humid continental climate with hot humid summers and cold winters. While ice forms on turbine blades in two primary ways, as previously discussed in Section 2, there are minimal studies on the accretion of ice on turbine blades, and to the author's knowledge none in Ohio. However, beyond Ohio there are records of the occurrence of ice accretion on turbine blades due to freezing rain. This method is thought to be the most common method of ice accretion in nearby Southern Ontario and is more likely to impact low-lying lands such as those of the project site (Biswas et. al. 2012, Tammelin 1998). Chagnon & Karl considered historic trends in freezing rain between 1948 and 2000 for the continental U.S. (2003). Shown in Figure 1, this analysis found an average of five freezing rain days a year in Northwestern Ohio. This is taken as a proxy for the frequency of ice event occurrence on an annual basis at the project site, where each day is considered one icing event. Five days per year is considered a moderate level of icing event occurrence within the existing body of ice throw literature (Morgan 1998). This value is used to describe icing event frequency in ice throw studies undertaken in New York, Ontario, the United Kingdom, and multiple Nordic countries (Taylor et. al. 2017, Tammelin 1998, Bredesen 2017). Chagnon & Karl also found that freezing rain occurs in the area between November and April (2003). This six-month range is taken as the time frame during which ice throw could occur.

In addition to the accretion of ice on the turbine blades, conditions must exist for ice fragments to release from the blades. To the author's knowledge no standard methodology exists to determine the number of releases based on physical parameters and meteorological conditions. Instead, a simplified method has been developed in the literature from observations of ice accretion and ice throw at existing turbines (Battisti 2015). This ratio of daily ice accretion to the average mass of fragments found around the turbine results in roughly 200 throws per event for an ice fragment of 0.36 kg. For a 1 kg ice fragment, assuming the same average daily ice accretion, this would result in 75 throws. Given the uncertainty in this calculation, for the purposes of this study, this value was rounded up to 100 throws per event. Together with the events per year, this would result in roughly 500 throws per year of 1 kg ice fragments.

3.2 PROJECT SITE WIND PROFILE

The client operates a Sonic Detection and Ranging (SODAR) unit which measures wind speed and direction up to 200 m above ground. For this analysis, the direct measured wind speed and direction at 100 m is used to approximate wind speed and direction at the turbine hub height of 105 m. No additional adjustment was made to the 100 m wind data, as any difference in wind speed over the 5 m difference at this height is considered negligible.

From the SODAR unit, wind speed and direction between November and April over a 2-year period between 2009 and 2011 were analyzed for trends. Wind speeds were binned in 2.5 m/s intervals ranging from 2.5 to 22.5 m/s. This range was selected to reflect the cut-in and cut-out speeds for the turbine considered in this analysis, 3 and 22.5 m/s. The lower limit was adjusted to 2.5 m/s to maintain consistent bin sizes throughout the range. Wind directions grouped into 16 equal-sized 22.5° bins from 0° to 360°. Trends in wind speed and direction for the site are shown in Figure 2. Between November and April, winds dominate from the west-southwest, primarily at 5 to 7.5 m/s.

3.3 BALLISTICS MODEL

A ballistic model described in Biswas et. al., is used to model the three-dimensional trajectory of ice fragments released from turbine blades (2012). The turbine considered for the study was selected from a list of potential turbine models under

consideration for the site, for its long blade length and height. The Vestas 150 – 4.2 MW turbine has a hub height of 105 m and a blade diameter of 150 m.

Roughness length, a function of ground cover, is estimated from the site wind data and confirmed as reasonable for the known land use. The frontal area is assumed as 0.02 m^2, which for an ice density expected from ice accretion resulting from freezing rain, 900 kg m^{-3}, could take the dimensions of 0.14 m by 0.14 m by 0.056 m. Model inputs are summarized in Table 1.

The model is run for a 1 kg ice fragment released at 360 positions of blade angle, 74 positions of release along the blade length, and 8 wind speeds, the midpoints of each wind speed bin. This results in over 200,000 points of impact around a turbine.

For the purposes of this study, the 1 kg ice fragment is assumed compact, and thus the influence of lift is negligible and is not included in this analysis. Ice shed, or ice falling from the blades while the turbine is not in motion, is not considered here, nor is the influence of localized topography on the wind profile or impact distance.

Table 1. Model Input Parameters

Variable Name	Numeric Value
Air density (ρ)	1.225 $\frac{kg}{m^3}$
Drag coefficient (C_D)	1
Von Karman constant (k)	0.4
Gravitational acceleration (g)	-9.8 $\frac{m}{s^2}$
Ice fragment mass (M)	1 kg
Roughness length (z_0)	0.19 m
Turbine hub height (h)	105 m
Ice fragment frontal area (A)	0.02 m^2

3.4 PROBABILITY CALCULATIONS

The total probability of impacts for a given area on an annual basis is the culmination of multiple individual probabilities. The calculation methodology is detailed in Figure 3.

4.0 RESULTS

The results of the study yield an annual probability impact for every 1 m^2 in a 29-hectare grid with a turbine at the center. This can be understood as the probability of a 1 kg ice fragment landing within a given square meter on an annual basis. For ease of interpretation and visualization the results were fit with a local regression model (LOESS) which identifies trends in the probabilities, generating impact probability contours around a turbine. As localized topography was not included, and the model input data is considered consistent across the project site, the impact probability contours are the same for each proposed turbine.

4.1 IMPACT PROBABILITY

Impact probabilities in impacts/m^2/year for a 1 kg ice fragment are shown in Figure 4. The impact probability is skewed around the origin with a higher probability of farther impacts northeast of the turbine. This is consistent with the higher proportion of winds out of the southwest, shown in Figure 2. Northeast of the turbine, the 1% impact contour approaches 60 m as measured diagonally from the turbine base. In contrast, this distance is 49 m to the south, and 56 m to the west.

The statutory property line setbacks for these turbines are 418 m, a distance which greatly exceeds the distance of the 1% impact contour.

4.2 IMPACT PROBABILITY IN SATISFACTION OF OPSB SAFETY CONSIDERATIONS

Annual impact probabilities at the nearest public road and the nearest non-participating parcel boundary are shown in Figures 5 and 6, respectively. The nearest public road to any proposed turbine, Township Road 59, is 180 m east of the alternate-1 proposed location for turbine 49. The annual impact probability for a 1 kg ice fragment 180 m east of the turbine is roughly 0.2% (i.e., less than the OPSB safety consideration of 1% annually). The nearest non-participating parcel boundary is 213 m east of the alternate-2 proposed location for turbine 46. The annual impact probability for a 1 kg ice fragment 213 m east of the turbine is roughly 0.02% (i.e., less than the OPSB safety consideration of 1% annually).

5.0 CONCLUSIONS

In summary, the analysis presented here finds that for a 1 kg fragment of ice an impact probability of 1% does not extend beyond the length of the turbine blade modeled, at 60 m vs. the 75 m blade length. Further, the analysis determines the probabilities at the nearest public road and nearest non-participating property boundary to be 0.2% and 0.02%, respectively. The analysis makes conservative assumptions by using the largest proposed turbine across the site, assuming a high fixed rotational velocity at the rotor, and using meteorological records as the wind input. In addition, the 1 kg ice fragment is assumed compact, and thus the influence of lift is negligible and is not included in the analysis. Further, the model assumes the turbine continues to operate as ice accretes on the blades, however safety measures stipulated in the OPSB regulation should prevent such occurrences, decreasing the impact probabilities. While uncertainty exists in the rate of ice accretion and release during icing events given the limited available data on field observations presented in the literature, reasonable assumptions were made in this analysis which are consistent with the methodologies presented in multiple sources. Using multiple moderate assumptions generates conservative impact probabilities which likely overestimate the probabilities of the modeled impacts.

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Figures

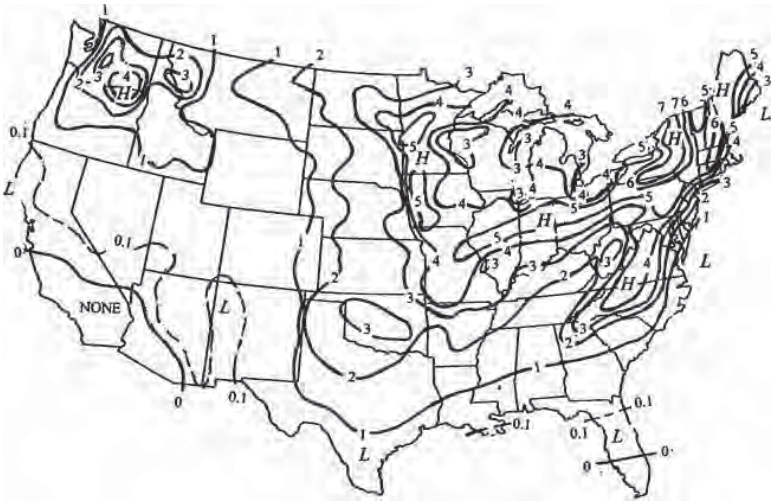


Figure 1. Annual freezing rain days in the U.S. (Chagnon & Karl 2003).

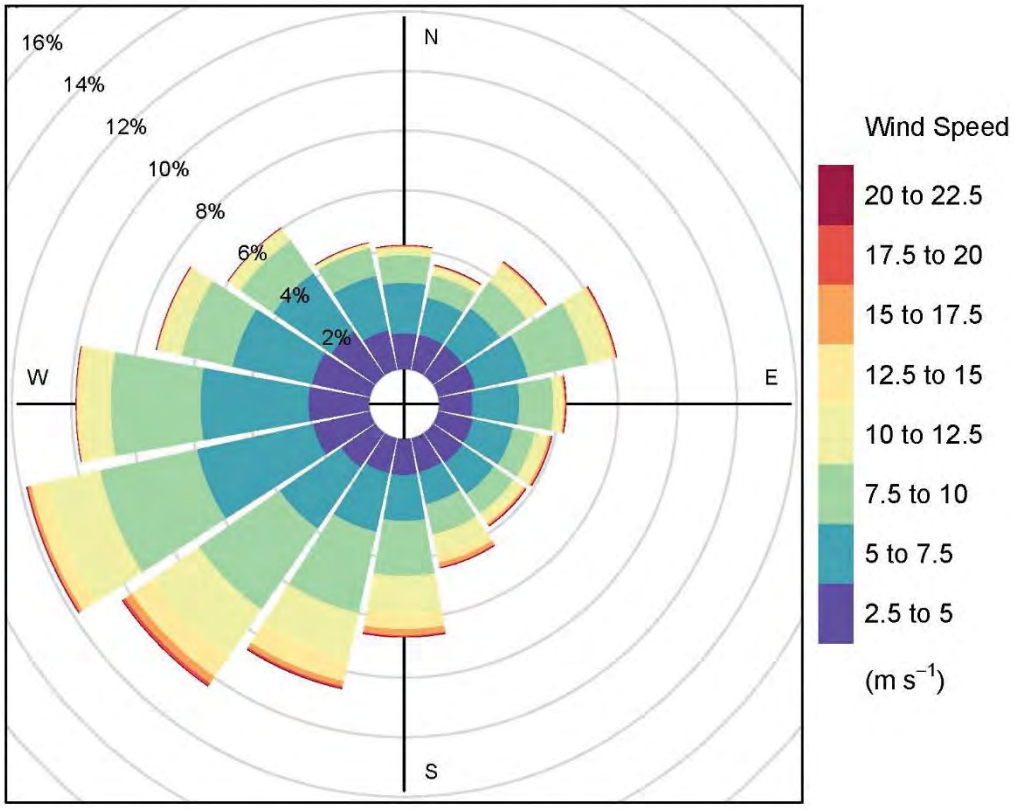


Figure 2. Wind Speed and Direction between November and April at the Project Site

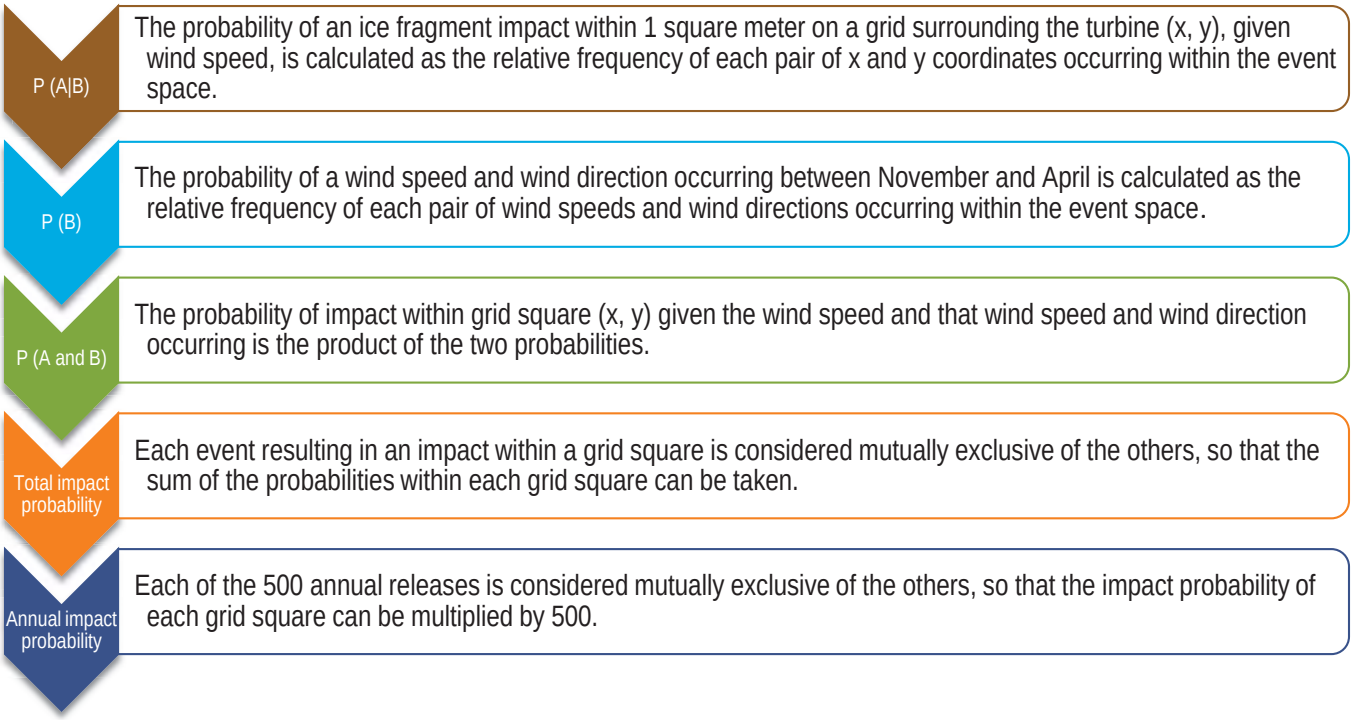


Figure 3. Probability Calculation Schematic



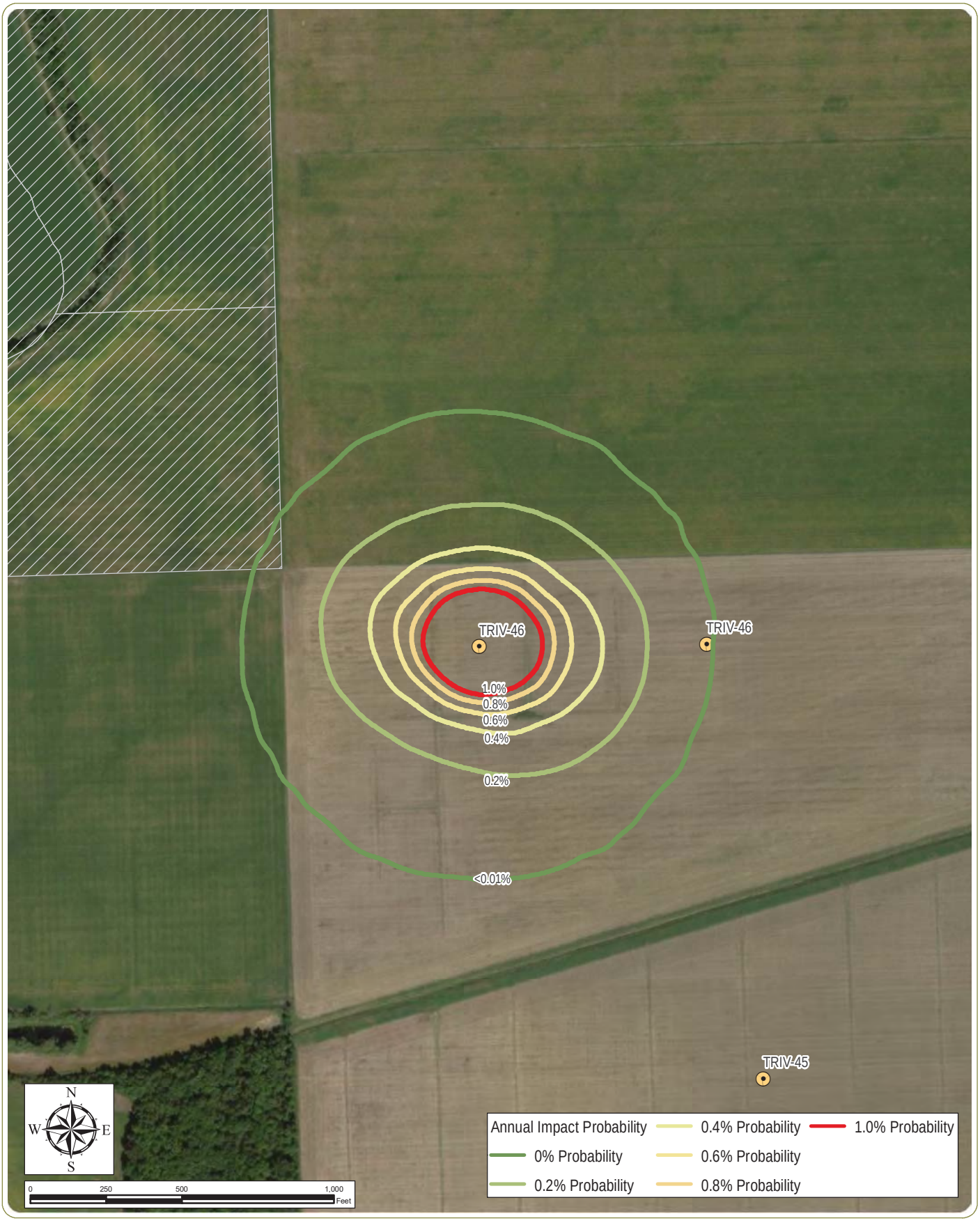
Timber Road IV Wind Farm

Crane, Harrison, Paulding, Benton, and Blue Creek Townships, Paulding County, Ohio

Figure 4. Annual Impact Probability

Wind Turbine

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery" map service. 2. This map was generated in ArcMap on June 25, 2018. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data. 4. Annual impact probability units are impacts/square meter/year. 5. The 0% probability contour represents a probability approaching zero.



Timber Road IV Wind Farm

Crane, Harrison, Paulding, Benton, and Blue Creek Townships, Paulding County, Ohio

Figure 5. Annual Impact Probability at the Nearest Nonparticipating Property

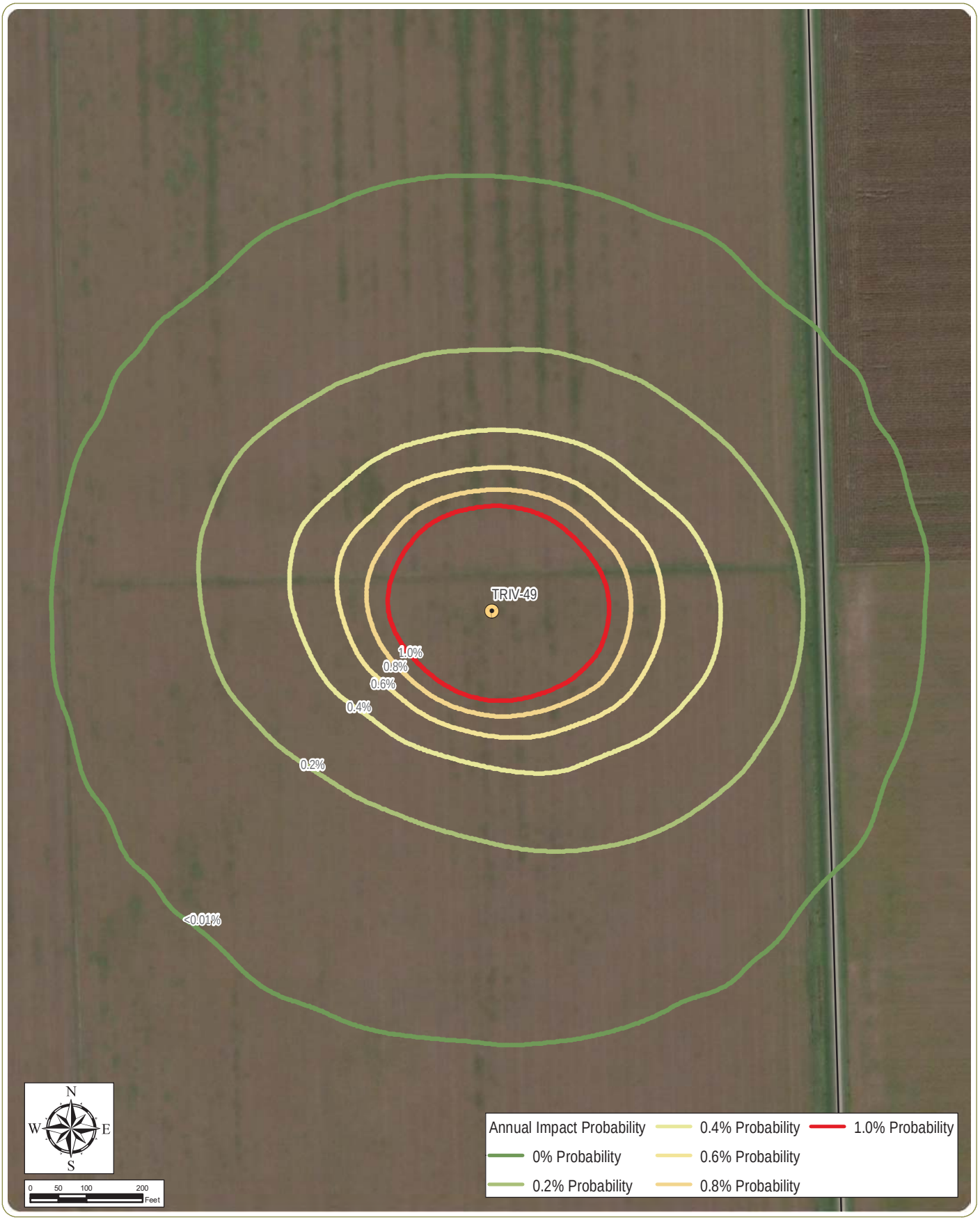
Wind Turbine

Nonparticipating Property

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery" map service. 2. This map was generated in ArcMap on June 26, 2018. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data. 4. Annual impact probability units are impacts/square meter/year. 5. The 0% probability contour represents a probability approaching zero.

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Timber Road IV Wind Farm

Crane, Harrison, Paulding, Benton, and Blue Creek Townships, Paulding County, Ohio

Figure 6. Annual Impact Probability at the Nearest Public Road

Notes: 1. Basemap: ESRI ArcGIS Online "World Imagery" map service. 2. This map was generated in ArcMap on June 25, 2018. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data. 4. Annual impact probability units are impacts/square meter/year. 5. The 0% probability contour represents a probability approaching zero.

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Exhibit Z

Off-Air Television Analysis

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Wind Power GeoPlanner™

Off-Air TV Analysis

Paulding Wind Farm IV LLC



Prepared on Behalf of
EDP Renewables NA
LLC

June 6, 2018

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1. Introduction

Off-air television stations broadcast signals from terrestrially-based facilities directly to television receivers. Comsearch identified those off-air stations whose service could potentially be affected by the proposed Paulding Wind Farm IV project in Paulding County, Ohio. Comsearch then examined the coverage of the stations and the communities in the area that could potentially have degraded television reception due to the location of the proposed wind turbines.

2. Summary of Results

The proposed wind energy project area and local communities are depicted in Figure 1, below.

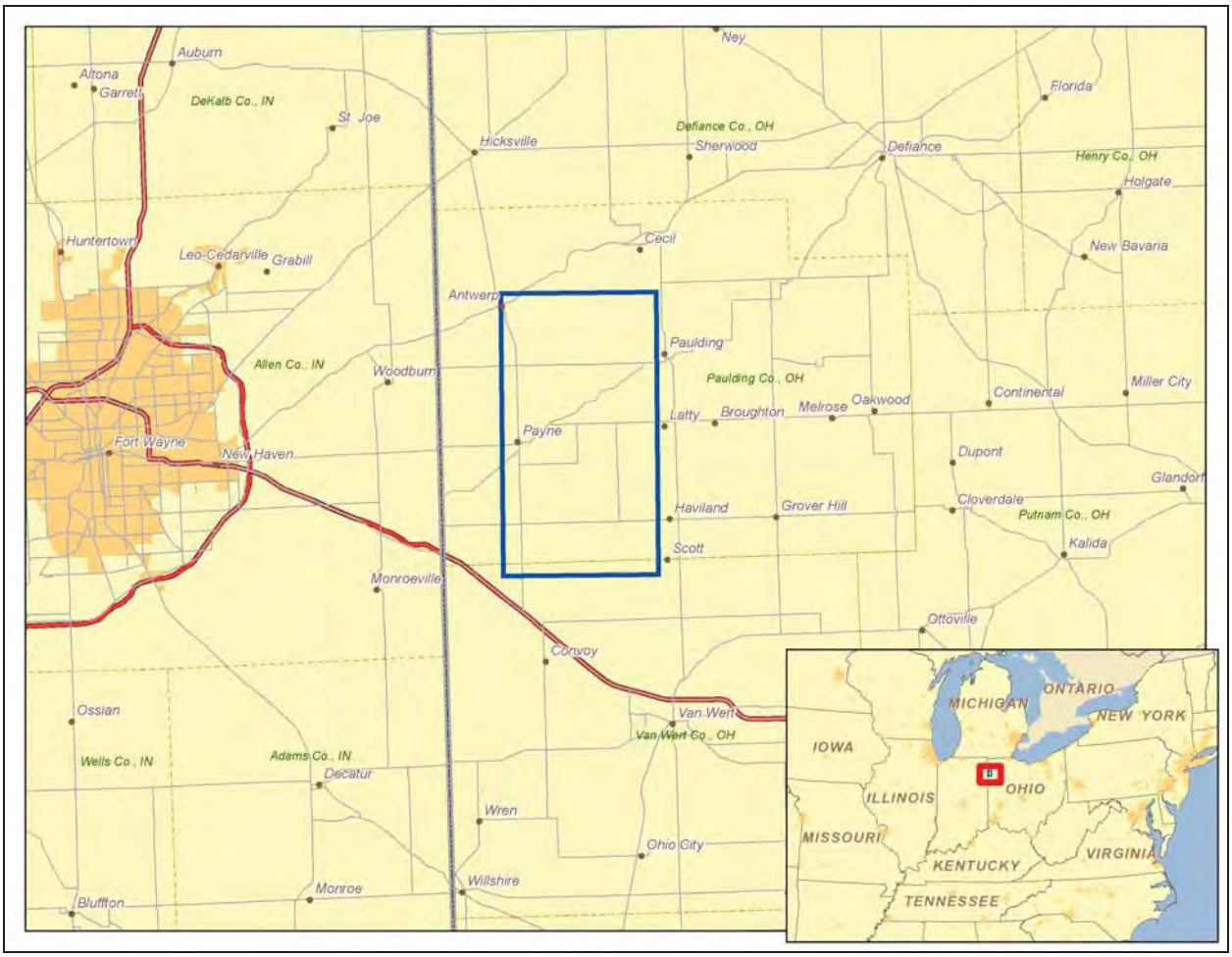


Figure 1: Wind Farm Project Area and Local Communities

To begin the analysis, Comsearch compiled all off-air television stations[1] within 150 kilometers of the center of the project area of interest (AOI). Appendix A contains a tabular summary of these stations. A plot depicting their locations appears in Figure 2, below.

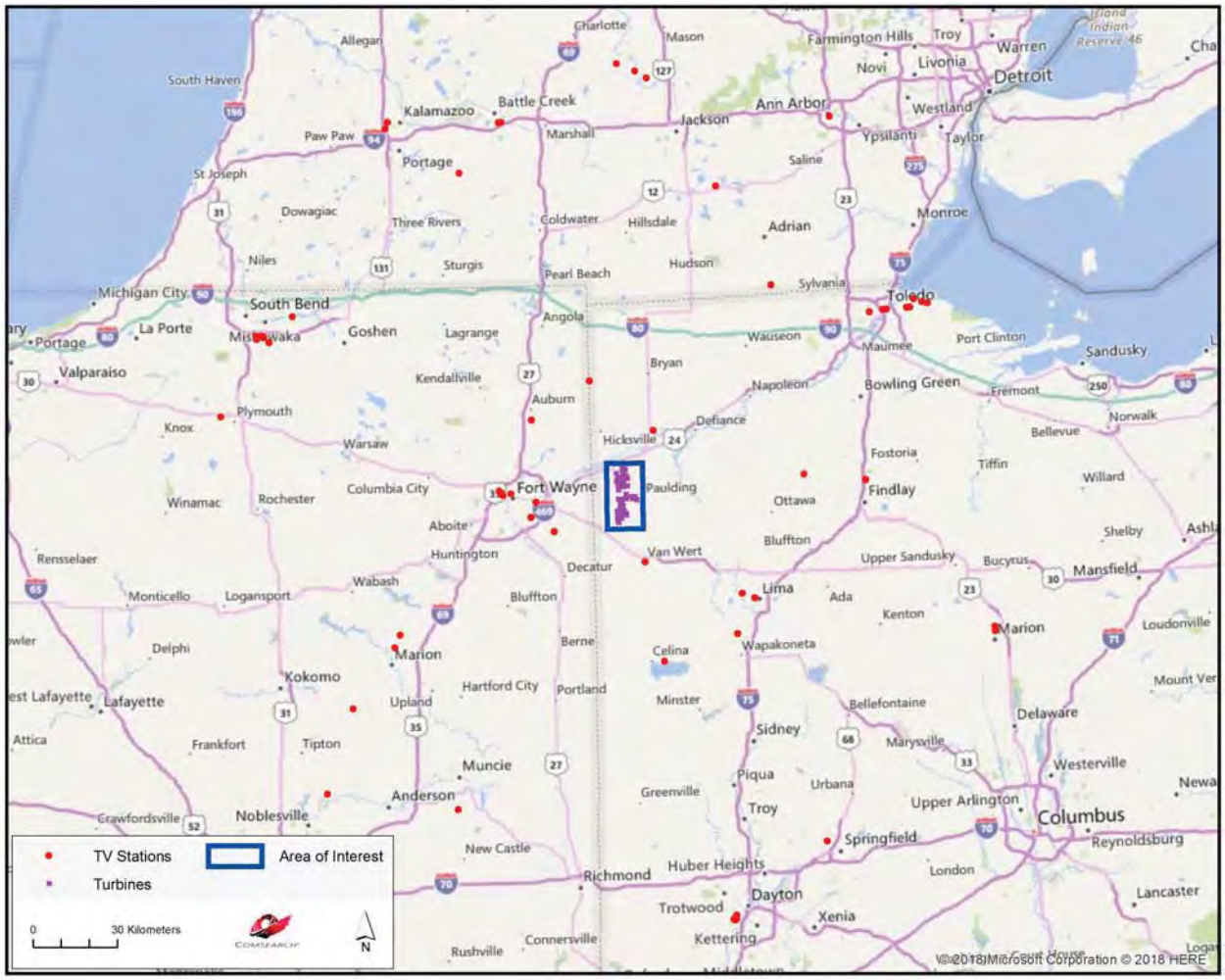


Figure 2: Plot of Off-Air TV Stations within 150 Kilometers of Project Area

TV stations at a distance of 100 kilometers or less are the most likely to provide off-air coverage to the project area and neighboring communities. These stations are listed in Table 1, below, and a plot depicting their locations is provided in Figure 3. There are a total of fifty-seven database records for stations within approximately 100 kilometers of the project. Of these stations, only twenty-seven are currently licensed and operating, fourteen of which are low-power stations or translators. Translator stations are low-power stations that receive signals

[1] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data presented in this report is derived from the TV station's FCC license and governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

from distant broadcasters and retransmit the signal to a local audience. These stations serve local audiences and have limited range, which is a function of their transmit power and the height of their transmit antenna.

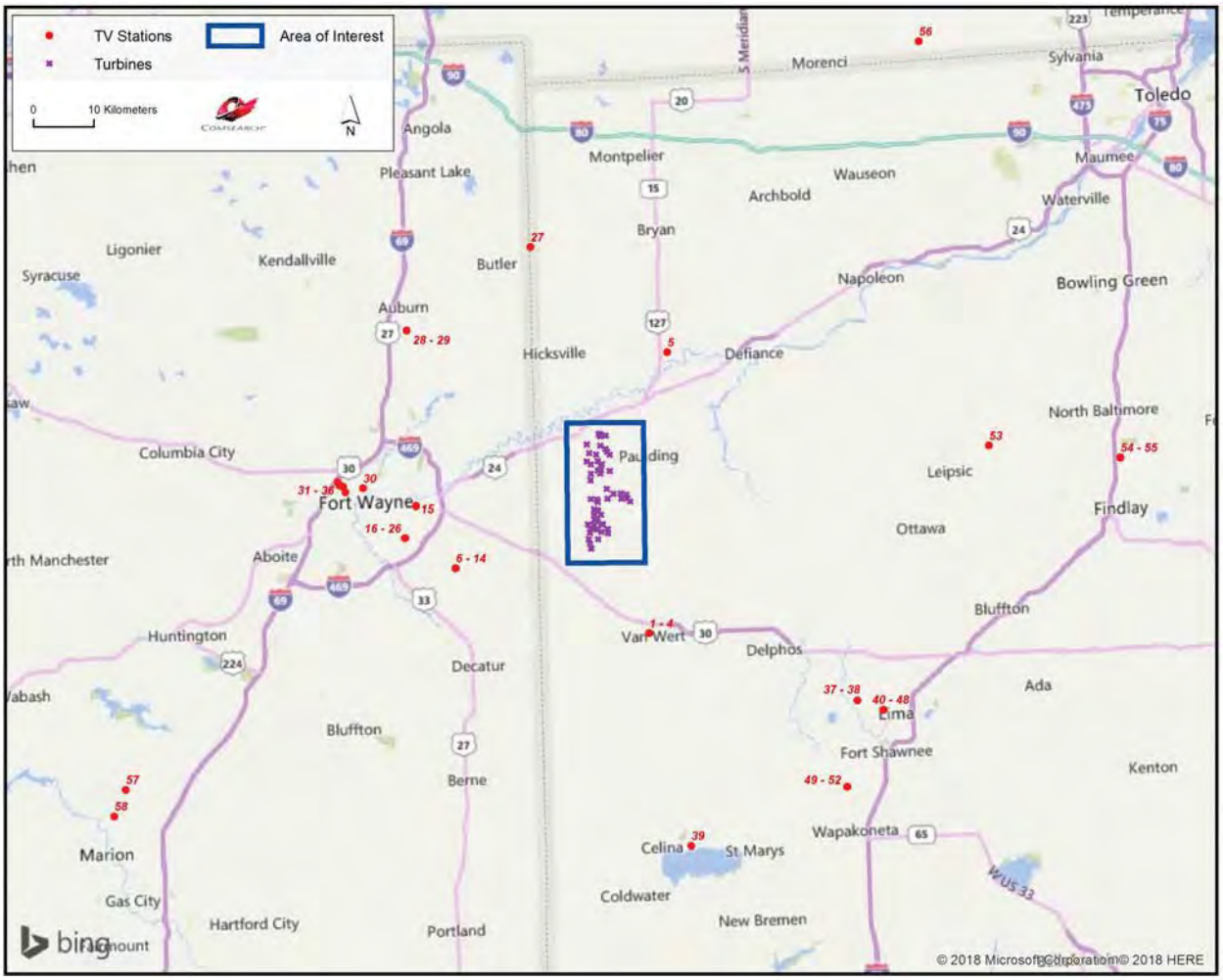


Figure 3: Plot of Off-Air TV Stations within 100 Kilometers of Project Area

ID	Call Sign	Status	Service[2]	Channel	Transmit ERP[3] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to Nearest Turbine (km)
1	W16DM-D	CP	LD	16	0.5	40.872806	-84.588000	16.95
2	W29EL-D	CP	LD	29	0.5	40.872806	-84.588000	16.95
3	W42EP-D	CP	LD	42	0.5	40.872806	-84.588000	16.95
4	W49EM-D	CP	LD	49	0.5	40.872806	-84.588000	16.95
5	WDFM-LP	LIC	TX	26	7.5	41.291389	-84.537500	17.23
6	WCUH-LD	CP MOD	LD	16	5.0	40.977250	-84.966056	22.58
7	WCUH-LD	LIC	LD	16	5.0	40.977250	-84.966056	22.58
8	W41DS-D	CP MOD	LD	41	6.0	40.977250	-84.966056	22.58
9	W41DS-D	LIC	LD	41	6.0	40.977250	-84.966056	22.58
10	W04DU-D	CP	LD	4	3.0	40.977222	-84.966111	22.58
11	W43DI-D	CP MOD	LD	43	10.0	40.977222	-84.966111	22.58
12	W43DI-D	LIC	LD	43	6.0	40.977222	-84.966111	22.58
13	WODP-LD	CP MOD	LD	49	7.0	40.977222	-84.966111	22.58
14	WODP-LD	LIC	LD	49	6.0	40.977222	-84.966111	22.58
15	NEW	CP	LD	35	3.0	41.071222	-85.040972	28.66
16	W14DS-D	CP	LD	14	15.0	41.023944	-85.064111	30.40
17	WCUH-LD	CP	LD	16	15.0	41.023944	-85.064111	30.40
18	W19DT-D	CP	LD	19	15.0	41.023944	-85.064111	30.40
19	WDGM-LD	CP MOD	LD	20	15.0	41.023944	-85.064111	30.40
20	W21DJ-D	CP	LD	21	15.0	41.023944	-85.064111	30.40
21	W33DC-D	CP	LD	33	15.0	41.023944	-85.064111	30.40
22	W41DS-D	CP	LD	41	15.0	41.023944	-85.064111	30.40
23	W43DI-D	CP	LD	43	15.0	41.023944	-85.064111	30.40
24	WODP-LD	CP	LD	49	5.0	41.023944	-85.064111	30.40
25	W51EQ-D	CP	LD	51	12.5	41.023944	-85.064111	30.40
26	WDGM-LD	CP MOD	LD	20	6.0	41.023917	-85.064111	30.40
27	WINM	LIC	DT	12	16.5	41.454167	-84.802778	33.12
28	W07CL	LIC	TX	7	0.032	41.333639	-85.052167	35.41
29	W26DH-D	LIC	LD	26	6.0	41.333611	-85.052222	35.42
30	WFWC-CD	LIC	DC	45	1.62	41.099139	-85.145000	37.33
31	WANE-TV	LIC	DT	31	1000.0	41.093889	-85.180000	40.32
32	WISE-TV	LIC	DT	18	320.0	41.102222	-85.184722	40.63

[2] Definitions of service and status codes:
DT – Digital television broadcast station
LD – Low-power digital television broadcast station
TX – Translator station
DC – Class A digital television broadcast station
DX – Digital auxiliary (backup) facility
LIC – Licensed and operational station
CP – Construction permit granted
CP MOD – Modification of construction permit
APP – Application for construction permit, not yet operational

[3] ERP = Transmit Effective Radiated Power

ID	Call Sign	Status	Service[2]	Channel	Transmit ERP[3] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to Nearest Turbine (km)
33	WPTA	LIC	DT	24	335.0	41.102222	-85.184722	40.63
34	WEIJ-LD	LIC	LD	38	15.0	41.103611	-85.191111	41.15
35	WFWA	LIC	DT	40	152.8	41.103611	-85.191111	41.15
36	WFFT-TV	LIC	DT	36	1000.0	41.109278	-85.195056	41.44
37	WTLW	LIC	DT	44	165.0	40.763056	-84.183056	49.77
38	W32DS-D	LIC	LD	32	6.8	40.552917	-84.517250	52.01
39	WLIO	LIC	DT	8	27.5	40.747556	-84.131750	54.30
40	WLIO	CP	DT	8	16.5	40.747556	-84.131750	54.30
41	WLQP-LP	CP	TX	25	7.5	40.747556	-84.131750	54.30
42	WLQP-LP	CP	TX	25	7.5	40.747556	-84.131750	54.30
43	WOHL-CD	LIC	DC	35	9.0	40.747556	-84.131750	54.30
44	WLMO-LP	CP	TX	38	5.3	40.747556	-84.131750	54.30
45	WLMO-LP	CP	TX	38	5.3	40.747556	-84.131750	54.30
46	WLQP-LP	CP	LD	45	15.0	40.747556	-84.131750	54.30
47	WLMO-LP	CP	LD	47	15.0	40.747556	-84.131750	54.30
48	WLQP-LP	LIC	TX	18	7.7	40.634194	-84.208000	57.85
49	W23DE-D	LIC	LD	23	3.0	40.634194	-84.208000	57.85
50	WLMO-LP	LIC	TX	38	15.0	40.634194	-84.208000	57.85
51	W23DE-D	CP	LD	43	7.85	40.634194	-84.208000	57.85
52	WBGU-TV	LIC	DT	27	153.0	41.136667	-83.906667	60.31
53	WFND-LD	LIC	LD	22	15.0	41.111111	-83.648333	81.69
54	WFND-LD	CP	LD	22	7.5	41.111417	-83.647972	81.73
55	WLMB	LIC	DT	5	10.0	41.744722	-84.018333	83.64
56	WSOT-LD	LIC	LD	27	10.0	40.655028	-85.623028	86.97
57	WIWU-CD	LIC	DC	51	1.45	40.615528	-85.646472	90.75

Table 1: Off-Air TV Stations within 100 Kilometers of Project Area

3. Impact Assessment

Based on a contour analysis of the licensed stations within 100 kilometers of the Paulding Wind Farm IV project, it was determined that the ten full-power digital stations, identified below in Table 2, along with translator station WDFM-LP and low-power digital stations W26DH-D and WEIJ-LD, may have their reception disrupted in and around the project. The areas primarily affected would include TV service locations within 10 kilometers of the wind energy project that have clear line-of-sight (LOS) to a proposed wind turbine but not to the respective station. After the wind turbines are installed, communities and homes in these locations may have degraded reception of these stations. This is due to multipath interference caused by signal scattering as TV signals are reflected by the rotating wind turbine blades and mast.

ID	Call Sign	Status	Service[4]	Channel	Transmit ERP[5] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to Nearest Turbine (km)
5	WDFM-LP	LIC	TX	26	7.5	41.291389	-84.537500	17.23
27	WINM	LIC	DT	12	16.5	41.454167	-84.802778	33.12
29	W26DH-D	LIC	LD	26	6.0	41.333611	-85.052222	35.42
31	WANE-TV	LIC	DT	31	1000.0	41.093889	-85.180000	40.32
32	WISE-TV	LIC	DT	18	320.0	41.102222	-85.184722	40.63
33	WPTA	LIC	DT	24	335.0	41.102222	-85.184722	40.63
34	WEIJ-LD	LIC	LD	38	15.0	41.103611	-85.191111	41.15
35	WFWA	LIC	DT	40	152.8	41.103611	-85.191111	41.15
36	WFFT-TV	LIC	DT	36	1000.0	41.109278	-85.195056	41.44
38	WTLW	LIC	DT	44	165.0	40.763056	-84.183056	49.77
40	WLIO	LIC	DT	8	27.5	40.747556	-84.131750	54.30
53	WBGU-TV	LIC	DT	27	153.0	41.136667	-83.906667	60.31
56	WLMB	LIC	DT	5	10.0	41.744722	-84.018333	83.64

Table 2: Licensed Off-Air TV Stations Subject to Degradation

[4] Definitions of service and status codes:
DT – Digital television broadcast station
LD – Low-power digital television broadcast station
TX – Translator station
LIC – Licensed and operational station

[5] ERP = Transmit Effective Radiated Power

4. Recommendations

While TV signals are reflected by wind turbines, which can cause multipath interference to the TV receiver, modern digital TV receivers have undergone significant improvements to mitigate the effects of signal scattering. When used in combination with a directional antenna, it becomes even less likely that signal scattering from wind farms will cause interference to digital TV reception.

Nevertheless, signal scattering could still impact certain areas currently served by the TV station mentioned above, especially those that would have line-of-sight to at least one wind turbine but not to the station antenna. In the unlikely event that interference is observed in any of the TV service areas, it is recommended that a high-gain directional antenna be used, preferably outdoors, and oriented towards the signal origin in order to mitigate the interference.

Both cable service and direct broadcast satellite service will be unaffected by the presence of the wind turbine facility and may be offered to those residents who can show that their off-air TV reception has been disrupted by the presence of the wind turbines after they are installed.

5. Contact

For questions or information regarding the Off-Air TV Analysis, please contact:

Contact person:	David Meyer
Title:	Senior Manager
Company:	Comsearch
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Telephone:	703-726-5656
Fax:	703-726-5595
Email:	dmeyer@comsearch.com
Web site:	www.comsearch.com

Appendix A

ID	Call Sign	Status	Service[6]	Channel	Transmit ERP[7] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to Nearest Turbine (km)
1	W16DM-D	CP	LD	16	0.5	40.872806	-84.588000	16.95
2	W29EL-D	CP	LD	29	0.5	40.872806	-84.588000	16.95
3	W42EP-D	CP	LD	42	0.5	40.872806	-84.588000	16.95
4	W49EM-D	CP	LD	49	0.5	40.872806	-84.588000	16.95
5	WDFM-LP	LIC	TX	26	7.5	41.291389	-84.537500	17.23
6	WCUH-LD	CP MOD	LD	16	5.0	40.977250	-84.966056	22.58
7	WCUH-LD	LIC	LD	16	5.0	40.977250	-84.966056	22.58
8	W41DS-D	CP MOD	LD	41	6.0	40.977250	-84.966056	22.58
9	W41DS-D	LIC	LD	41	6.0	40.977250	-84.966056	22.58
10	W04DU-D	CP	LD	4	3.0	40.977222	-84.966111	22.58
11	W43DI-D	CP MOD	LD	43	10.0	40.977222	-84.966111	22.58
12	W43DI-D	LIC	LD	43	6.0	40.977222	-84.966111	22.58
13	WODP-LD	CP MOD	LD	49	7.0	40.977222	-84.966111	22.58
14	WODP-LD	LIC	LD	49	6.0	40.977222	-84.966111	22.58
15	NEW	CP	LD	35	3.0	41.071222	-85.040972	28.66
16	W14DS-D	CP	LD	14	15.0	41.023944	-85.064111	30.40
17	WCUH-LD	CP	LD	16	15.0	41.023944	-85.064111	30.40
18	W19DT-D	CP	LD	19	15.0	41.023944	-85.064111	30.40
19	WDGM-LD	CP MOD	LD	20	15.0	41.023944	-85.064111	30.40
20	W21DJ-D	CP	LD	21	15.0	41.023944	-85.064111	30.40
21	W33DC-D	CP	LD	33	15.0	41.023944	-85.064111	30.40
22	W41DS-D	CP	LD	41	15.0	41.023944	-85.064111	30.40
23	W43DI-D	CP	LD	43	15.0	41.023944	-85.064111	30.40
24	WODP-LD	CP	LD	49	5.0	41.023944	-85.064111	30.40
25	W51EQ-D	CP	LD	51	12.5	41.023944	-85.064111	30.40

[6] Definitions of service and status codes:
TV – Analog television broadcast station
DT – Digital television broadcast station
DS – Digital special temporary authority (STA)
LP – Low power analog television broadcast station
LD – Low power digital television broadcast station
CA – Class A analog television broadcast station
DC – Class A digital television broadcast station
DX – Digital auxiliary (backup) facility
TX – Translator station
DD – Distributed digital television system
LIC – Licensed and operational station
CP – Construction permit granted
CP MOD – Modification of construction permit
APP – Application for construction permit, not yet operational
STA – Special transmit authorization, usually granted by FCC for temporary operation

[7] ERP = Transmit Effective Radiated Power

ID	Call Sign	Status	Service[6]	Channel	Transmit ERP[7] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to Nearest Turbine (km)
26	WDGM-LD	CP MOD	LD	20	6.0	41.023917	-85.064111	30.40
27	WINM	LIC	DT	12	16.5	41.454167	-84.802778	33.12
28	W07CL	LIC	TX	7	0.032	41.333639	-85.052167	35.41
29	W26DH-D	LIC	LD	26	6.0	41.333611	-85.052222	35.42
30	WFWC-CD	LIC	DC	45	1.62	41.099139	-85.145000	37.33
31	WANE-TV	LIC	DT	31	1000.0	41.093889	-85.180000	40.32
32	WISE-TV	LIC	DT	18	320.0	41.102222	-85.184722	40.63
33	WPTA	LIC	DT	24	335.0	41.102222	-85.184722	40.63
34	WEIJ-LD	LIC	LD	38	15.0	41.103611	-85.191111	41.15
35	WFWA	LIC	DT	40	152.8	41.103611	-85.191111	41.15
36	WFFT-TV	LIC	DT	36	1000.0	41.109278	-85.195056	41.44
37	WTLW	LIC	DT	44	165.0	40.763056	-84.183056	49.77
38	W32DS-D	LIC	LD	32	6.8	40.552917	-84.517250	52.01
39	WLIO	LIC	DT	8	27.5	40.747556	-84.131750	54.30
40	WLIO	CP	DT	8	16.5	40.747556	-84.131750	54.30
41	WLQP-LP	CP	TX	25	7.5	40.747556	-84.131750	54.30
42	WLQP-LP	CP	TX	25	7.5	40.747556	-84.131750	54.30
43	WOHL-CD	LIC	DC	35	9.0	40.747556	-84.131750	54.30
44	WLMO-LP	CP	TX	38	5.3	40.747556	-84.131750	54.30
45	WLMO-LP	CP	TX	38	5.3	40.747556	-84.131750	54.30
46	WLQP-LP	CP	LD	45	15.0	40.747556	-84.131750	54.30
47	WLMO-LP	CP	LD	47	15.0	40.747556	-84.131750	54.30
48	WLQP-LP	LIC	TX	18	7.7	40.634194	-84.208000	57.85
49	W23DE-D	LIC	LD	23	3.0	40.634194	-84.208000	57.85
50	WLMO-LP	LIC	TX	38	15.0	40.634194	-84.208000	57.85
51	W23DE-D	CP	LD	43	7.85	40.634194	-84.208000	57.85
52	WBGU-TV	LIC	DT	27	153.0	41.136667	-83.906667	60.31
53	WFND-LD	LIC	LD	22	15.0	41.111111	-83.648333	81.69
54	WFND-LD	CP	LD	22	7.5	41.111417	-83.647972	81.73
55	WLMB	LIC	DT	5	10.0	41.744722	-84.018333	83.64
56	WSOT-LD	LIC	LD	27	10.0	40.655028	-85.623028	86.97
57	WIWU-CD	LIC	DC	51	1.45	40.615528	-85.646472	90.75
58	WDMY-LP	CP	LD	23	8.0	41.646861	-83.604917	103.21
59	WDMY-LP	LIC	TX	38	8.2	41.646861	-83.604917	103.21
60	-	CP	LD	26	0.1	42.066944	-84.240833	105.79
61	-	CP	LD	26	0.1	42.066944	-84.240833	105.79
62	WDTJ-LD	LIC	LD	18	4.0	41.653361	-83.547972	107.67
63	WDTJ-LP	LIC	TX	68	6.6	41.653361	-83.547972	107.67
64	WMNT-CD	LIC	DC	48	15.0	41.653639	-83.530194	108.98
65	WCZA-LD	LIC	LD	15	6.0	40.421667	-85.824167	114.85
66	WUPW	LIC	DT	46	110.0	41.656111	-83.444722	115.37
67	WUPW	CP	DT	46	200.0	41.656111	-83.444722	115.37

ID	Call Sign	Status	Service[6]	Channel	Transmit ERP[7] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to Nearest Turbine (km)
68	WGTE-TV	LIC	DT	29	49.5	41.657222	-83.431944	116.37
69	WIPB	LIC	DT	23	250.0	40.093611	-85.392222	116.64
70	WTVG	LIC	DT	13	16.7	41.683333	-83.413611	119.08
71	WJGP-LD	LIC	LD	26	15.0	42.128833	-85.339472	119.80
72	WTOL	LIC	DT	11	16.9	41.672778	-83.379722	121.03
73	WNWO-TV	CP	DT	23	62.5	41.667500	-83.356111	122.52
74	WNWO-TV	LIC	DT	49	105.0	41.667500	-83.356111	122.52
75	WEID-LD	LIC	LD	16	15.0	41.678306	-86.060778	127.60
76	WXMI	LIC	LD	17	15.0	42.288722	-85.153278	130.27
77	WOBC-CD	LIC	DC	14	0.277	42.287972	-85.165083	130.49
78	WHME-TV	LIC	DT	48	300.0	41.595278	-86.160556	131.46
79	WCWW-LD	LIC	LD	25	14.9	41.615250	-86.185167	134.18
80	WBND-LD	LIC	LD	34	15.0	41.615250	-86.185167	134.18
81	WMYS-LD	LIC	LD	39	15.0	41.615250	-86.185167	134.18
82	WNIT	CP	DT	31	78.3	41.613667	-86.188889	134.40
83	WNIT	LIC	DT	35	85.0	41.613667	-86.188889	134.40
84	WSJV	LIC	DX	28	150.0	41.616111	-86.193889	134.89
85	WSJV	LIC	DT	28	311.0	41.616111	-86.193889	134.89
86	WNDU-TV	LIC	DT	42	631.0	41.605333	-86.212500	135.90
87	WNDU-TV	LIC	DT	42	800.0	41.605556	-86.212778	135.93
88	WSBT-TV	LIC	DT	22	266.0	41.616667	-86.216944	136.70
89	WSBT-TV	LIC	DX	22	261.0	41.616667	-86.216944	136.70
90	WCBZ-CD	LIC	DC	28	7.5	40.627556	-83.129889	134.81
91	WXCB-CD	LIC	DC	45	15.0	40.612778	-83.130000	135.42
92	WLWD-LD	LIC	TX	20	8.7	39.962222	-83.863611	135.29
93	WLAJ	LIC	DT	25	483.3	42.420278	-84.523611	139.30
94	WNDY-TV	LIC	DT	32	1000.0	40.148917	-85.935222	141.15
95	WUEA-LD	LIC	LD	23	6.0	41.358333	-86.367778	141.45
96	WILX-TV	LIC	DT	10	30.0	42.442500	-84.572500	141.45
97	WSYM-TV	LIC	DT	38	933.0	42.467500	-84.651667	143.99
98	WFHD-LP	LIC	TX	27	1.5	42.278056	-83.742222	145.10
99	WHIO-TV	LIC	DT	41	1000.0	39.733889	-84.248056	145.76
100	WHIO-TV	LIC	DX	41	1000.0	39.733889	-84.248056	145.76
101	WHIO-TV	LIC	DT	41	1000.0	39.733889	-84.248056	145.76
102	WLWD-LD	LIC	LD	20	5.0	39.724611	-84.254889	146.61
103	WBDT	LIC	DT	26	770.0	39.724611	-84.254889	146.61
104	WRGT-TV	LIC	DT	30	498.0	39.724611	-84.254889	146.61
105	WKEF	APP	DT	18	525.0	39.724444	-84.255000	146.62
106	WRCX-LP	LIC	TX	40	34.0	39.724444	-84.255000	146.62
107	WRCX-LP	CP	LD	40	0.32	39.724444	-84.255000	146.62
108	WRCX-LP	APP	LD	40	15.0	39.724444	-84.255000	146.62
109	W22DE	LIC	TX	22	54.0	39.720556	-84.261111	146.91

ID	Call Sign	Status	Service[6]	Channel	Transmit ERP[7] (kW)	Latitude (NAD 83)	Longitude (NAD 83)	Distance to Nearest Turbine (km)
110	WPTD	LIC	DT	16	163.0	39.721111	-84.250000	147.09
111	WDTN	LIC	DT	50	1000.0	39.718611	-84.256111	147.23
112	WUHO-LP	LIC	TX	36	15.0	42.275472	-85.653028	147.07
113	WOKZ-CD	LIC	DC	50	0.1	42.296667	-85.641389	148.50

Table A: Off-Air TV Stations within 150 Kilometers of Project Area

Exhibit AA

AM/FM Radio Report

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Attorneys for Paulding Wind Farm IV LLC

Date Filed: July 2, 2018

Wind Power GeoPlanner™

AM and FM Radio Report

Paulding Wind Farm IV LLC



Prepared on Behalf of
EDP Renewables NA
LLC

June 6, 2018

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1. Introduction

Comsearch analyzed AM and FM radio broadcast stations whose service could potentially be affected by the proposed Paulding Wind Farm IV project in Paulding County, Ohio.

2. Summary of Results

AM Radio Analysis

Comsearch found five database records[1] for AM stations within approximately 30 kilometers of the project, as shown in Table 1 and Figure 1. These records represent station WERT, which broadcasts from Van Wert, Ohio, to the southeast of the project area of interest (AOI); station WONW, from Defiance, Ohio, to the northeast; and station WJZI, from Decatur, Indiana, to the southwest. Stations WERT and WONW are licensed separately for daytime and nighttime operations, with a higher transmit power permitted during daytime hours.

ID	Call Sign	Status[2]	Frequency (kHz)	Transmit ERP[3] (kW)	Operation Time	Latitude (NAD 27)	Longitude (NAD 27)	Required Separation Distance[4] (km)	Distance to Nearest Turbine (km)
1	WERT	LIC	1220	0.25	Daytime	40.871944	-84.554167	0.25	18.73
2	WERT	LIC	1220	0.029	Nighttime	40.871944	-84.554167	0.25	18.73
3	WONW	LIC	1280	1.0	Daytime	41.278889	-84.397222	2.34	25.45
4	WONW	LIC	1280	0.5	Nighttime	41.278889	-84.397222	2.34	25.45
5	WJZI	LIC	1540	0.25	Daytime	40.820556	-84.920000	0.19	27.38

Table 1: AM Radio Stations within 30 Kilometers of Project Area

[1] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data presented in this report is derived from the AM/FM station's FCC license and governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf. The coordinates provided for AM station KVWC were adjusted slightly based on aerial imagery.

[2] LIC = Licensed and operational station; APP = Application for construction permit; CP=Construction permit granted; CP MOD = Modification of construction permit.

[3] ERP = Transmit Effective Radiated Power.

[4] The required separation distance is based on the lesser of 10 wavelengths or 3 kilometers for directional antennas and 1 wavelength for non-directional antennas.

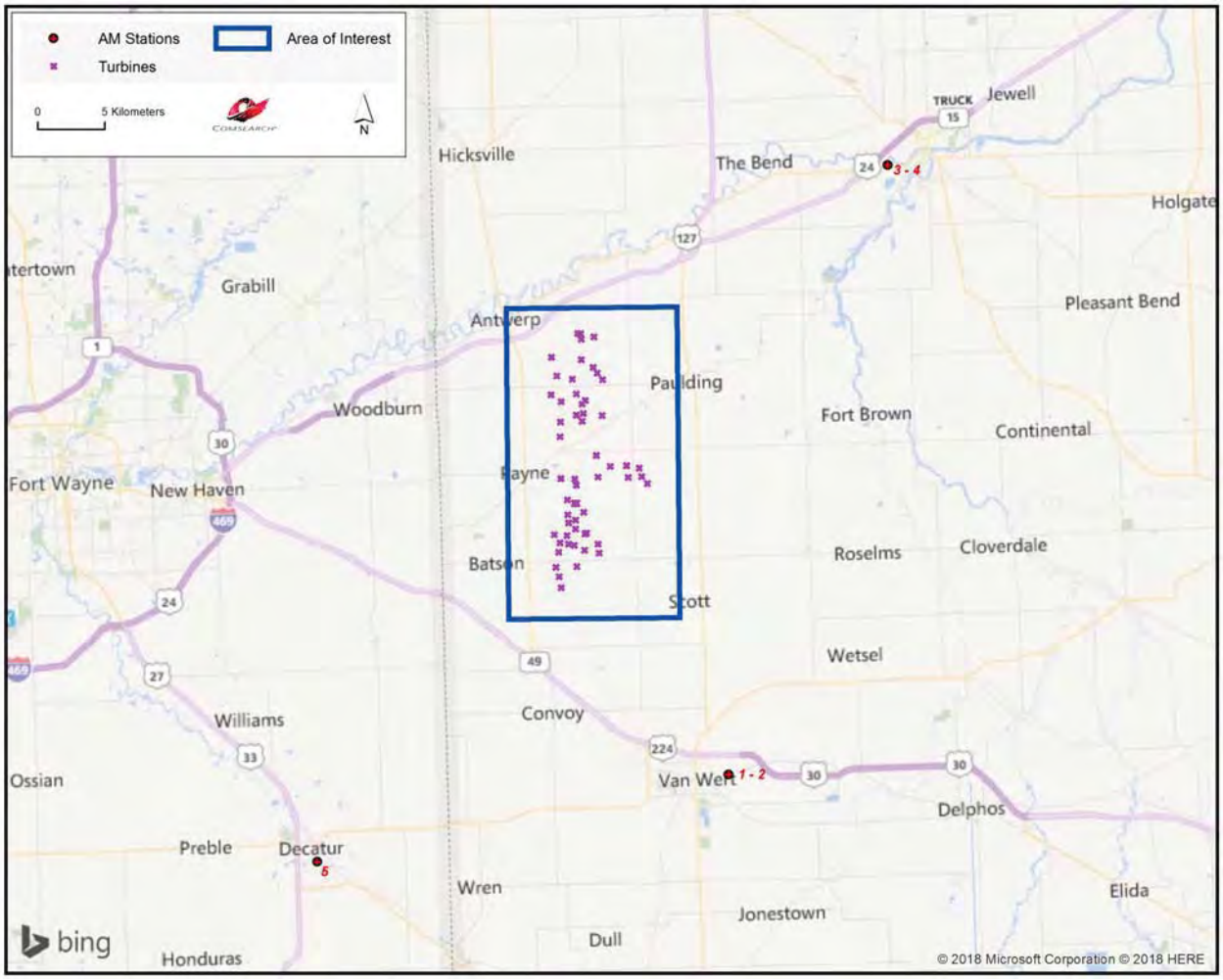


Figure 1: AM Radio Stations within 30 Kilometers of Project Area

FM Radio Analysis

Comsearch determined that there were thirteen database records for FM stations within 30 kilometers of the Paulding Wind Farm IV project, as shown in Table 2 and Figure 2. While all of these stations are currently licensed and operating, seven are low-power or translator stations that broadcast with limited range.

ID	Call Sign	Status[5]	Service[6]	Frequency (MHz)	Transmit ERP[7] (kW)	Latitude (NAD 27)	Longitude (NAD 27)	Distance to Nearest Turbine (km)
1	WKSD	LIC	FM	99.7	3.0	41.058889	-84.591667	2.56
2	WMYW-LP	LIC	FL	102.7	0.008	41.178611	-84.627222	3.23
3	WBYR	LIC	FM	98.9	50.0	40.953889	-84.885278	16.60
4	WDFM	LIC	FM	98.1	50.0	41.291111	-84.538056	17.18
5	W282CF	LIC	FX	104.3	0.25	40.872222	-84.553611	18.74
6	WZOM	LIC	FM	105.7	6.0	41.223056	-84.376667	24.80
7	WDBF-LP	LIC	FL	103.5	0.1	40.836667	-84.912500	25.65
8	WHNH-LP	LIC	FL	101.3	0.1	41.070694	-85.018889	26.82
9	WGDE	LIC	FM	91.9	6.0	41.294722	-84.390000	26.85
10	W209AW	LIC	FX	89.7	0.08	41.072500	-85.038611	28.49
11	WDCM-LP	LIC	FL	92.9	0.1	41.307222	-84.371944	28.87
12	WLDE	LIC	FM	101.7	6.0	41.076389	-85.045278	29.10
13	WOOO-LP	LIC	FL	95.5	0.035	41.311389	-84.365278	29.59

Table 2: FM Radio Stations within 30 Kilometers of Project Area

[5] LIC = Licensed and operational station; APP = Application for construction permit; CP=Construction permit granted; CP MOD = Modification of construction permit.

[6] FM = FM broadcast station; FX = FM translator station; FL = Low-power FM station; FS = FM auxiliary (backup) station; FB = FM booster station.

[7] ERP = Transmit Effective Radiated Power.

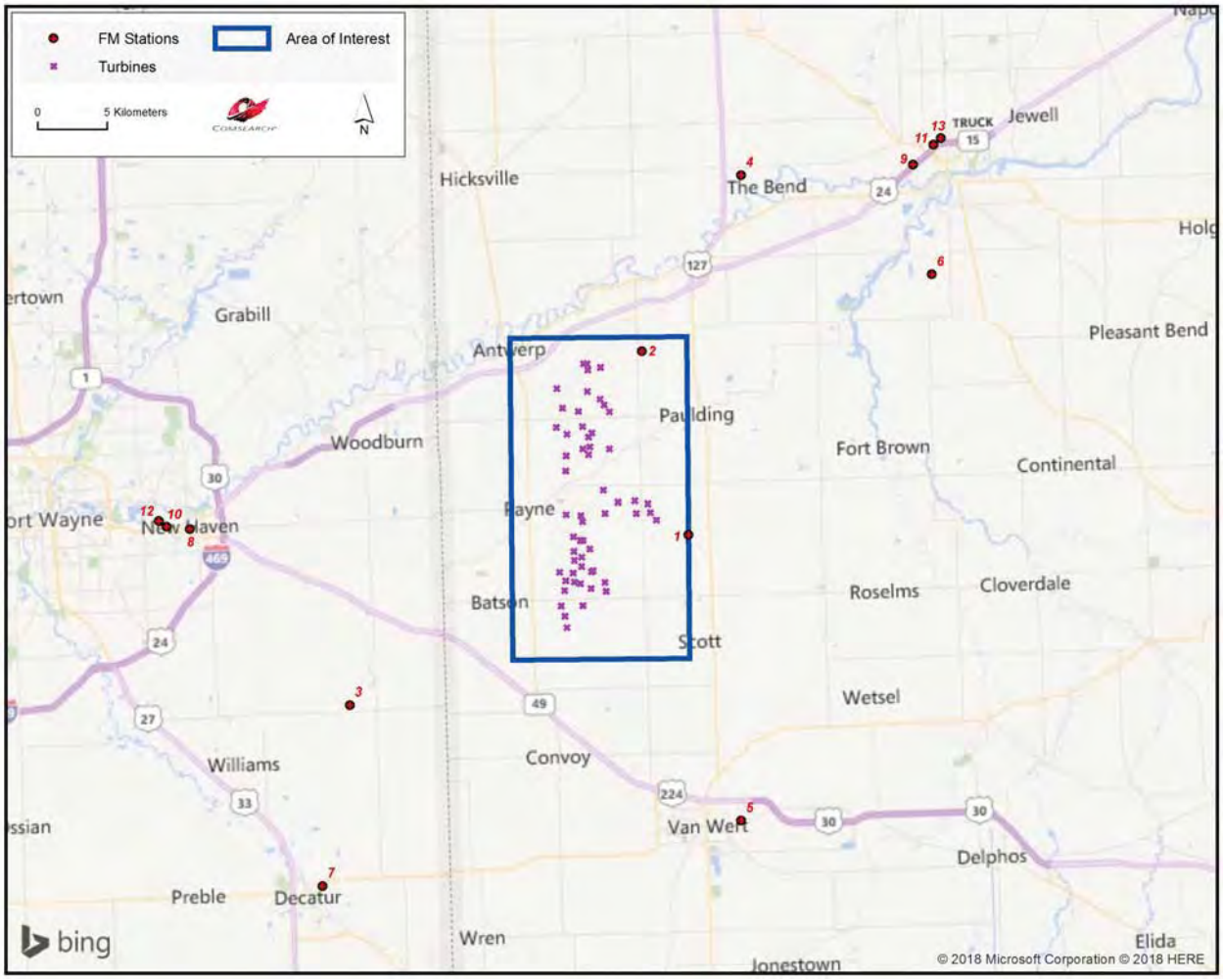


Figure 2: FM Radio Stations within 30 Kilometers of Project Area

3. Impact Assessment

The exclusion distance for AM broadcast stations varies as a function of the antenna type and broadcast frequency. For directional antennas, the exclusion distance is calculated by taking the lesser of 10 wavelengths or 3 kilometers. For non-directional antennas, the exclusion distance is simply equal to 1 wavelength. Potential problems with AM broadcast coverage are only anticipated when AM broadcast stations are located within their respective exclusion distance limit from wind turbine towers. The closest AM station to the Paulding Wind Farm IV project, WERT, is more than 18.7 kilometers from the nearest turbine location. As there were no stations found within 3 kilometers of any of the proposed turbines, which is the maximum possible exclusion distance based on a directional AM antenna broadcasting at 1000 KHz or less, the project should not impact the coverage of local AM stations.

The coverage of FM stations is generally not susceptible to interference caused by wind turbines, especially when large objects, such as wind turbines, are sited in the *far field* region of the radiating FM antenna in order to avoid the risk of distorting the antenna's radiation pattern. The closest FM station to the Paulding Wind Farm IV project, WKSD, is more than 2.5 kilometers from the nearest turbine. At this distance, there should be adequate separation to avoid radiation pattern distortion.

4. Recommendations

Since no impact on the licensed and operational AM or FM broadcast stations' broadcast, retransmission, or reception was identified in our analysis, no recommendations or mitigation techniques are required for this project.

5. Contact

For questions or information regarding the AM and FM Radio Report, please contact:

Contact person: David Meyer
Title: Senior Manager
Company: Comsearch
Address: 19700 Janelia Farm Blvd., Ashburn, VA 20147
Telephone: 703-726-5656
Fax: 703-726-5595
Email: dmeyer@comsearch.com
Web site: www.comsearch.com

Paulding Wind Farm IV LLC
Case No. 18-91-EL-BGN

Exhibit BB

NTIA Correspondence

Christine M.T. Pirik (0029759)
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Attorneys for Paulding Wind Farm IV LLC

Date Filed: July 2, 2018

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230

MAY 29 2018

Mr. Frank O'Brien
COMSEARCH
19700 Janelia Farm Blvd.
Ashburn, VA 20147

Re: Paulding IV Project, Rev. 2: Paulding County, OH

Dear Mr. O'Brien:

In response to your request on March 22, 2018, the National Telecommunications and Information Administration provided to the federal agencies represented in the Interdepartment Radio Advisory Committee (IRAC) the plans for the Paulding IV Wind Farm, Revision 2, located in Paulding County, Ohio.

After a 45 day period of review, no agencies had issues with turbine placement in this area.

While the IRAC agencies did not identify any concerns regarding radio frequency blockage, this does not eliminate the need for the wind energy facilities to meet any other requirements specified by law related to these agencies. For example, this review by the IRAC does not eliminate any need that may exist to coordinate with the Federal Aviation Administration concerning flight obstruction.

Thank you for the opportunity to review these proposals.

Sincerely,

Peter A. Tenhula
Deputy Associate Administrator
Office of Spectrum Management

Paulding Wind Farm IV LLC
Case No. 18-91-EL-BGN

Exhibit CC

Airport Coordination

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wvorys@dickinsonwright.com

Attorneys for Paulding Wind Farm IV LLC

Date Filed: July 2, 2018

edp renewables

TIMBER ROAD
WIND FARM

June 25th 2018

Mr. Barry Steinman
23526 Dawkins Road,
Woodburn, IN 46797

Dear Mr. Steinman

This letter is to notify you that Timber Road IV Wind Farm Boundary is within two (2) miles of your airport. We are planning on building a one hundred and twety five point one (125.1) MW project that includes thirty six (36) turbines at tip heights up to five hundred ninety one (591) ft.

We will be starting construction around early to mid April 2019; after final approval from Ohio Power and Siting Board to gain our state permit.

If you have any questions please contact Sarah Aftergood at: (281) 757.6981.

Sincerly,

Sarah Aftergood

www.edpr.com

EDP Renewables North America LLC
Corporate Headquarters
808 Travis, Suite 700
Houston, TX 77002
T: 713 265 0350 F: 713 265 0365



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TIMBER ROAD
WIND FARM

June 25th 2018

Mr. Charles Buehler
RR 2
Paulding, OH 45879

Dear Mr. Buehler

This letter is to notify you that Timber Road IV Wind Farm Boundary is within two (2) miles of your airport. We are planning on building a one hundred and twety five point one (125.1) MW project that includes thirty six (36) turbines at tip heights up to five hundred ninety one (591) ft.

We will be starting construction around early to mid April 2019; after final approval from Ohio Power and Siting Board to gain our state permit.

If you have any questions please contact Sarah Aftergood at: (281) 757.6981.

Sincerly,

Sarah Aftergood

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edp renewables

TIMBER ROAD
WIND FARM

June 25th 2018

Mrs. Gloria Gerig
606 Brobst Rd.
Woodburn, IN 46797

Dear Mrs. Gerig

This letter is to notify you that Timber Road IV Wind Farm Boundary is within two (2) miles of your airport. We are planning on building a one hundred and twety five point one (125.1) MW project that includes thirty six (36) turbines at tip heights up to five hundred ninety one (591) ft.

We will be starting construction around early to mid April 2019; after final approval from Ohio Power and Siting Board to gain our state permit.

If you have any questions please contact Sarah Aftergood at: (281) 757.6981.

Sincerly,

Sarah Aftergood

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Paulding Wind Farm IV LLC
Case No. 18-91-EL-BGN

Exhibit DD

Licensed Microwave Report

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Attorneys for Paulding Wind Farm IV LLC

Date Filed: July 2, 2018

Wind Power GeoPlanner™

Microwave Study

Paulding Wind Farm IV LLC



Prepared on Behalf of
EDP Renewables NA
LLC

May 31, 2018

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1. Introduction

Microwave bands that may be affected by the installation of wind turbine facilities operate over a wide frequency range (900 MHz – 23 GHz). Comsearch has developed and maintains comprehensive technical databases containing information on licensed microwave networks throughout the United States. These systems are the telecommunication backbone of the country, providing long-distance and local telephone service, backhaul for cellular and personal communication service, data interconnects for mainframe computers and the Internet, network controls for utilities and railroads, and various video services. This report focuses on the potential impact of wind turbines on licensed, proposed and applied non-federal government microwave systems.

2. Project Overview

Project Information

Name: Paulding Wind Farm IV LLC
County: Paulding
State: Ohio

Number of Turbines: 54
Blade Diameter: 126 – 150 meters
Hub Height: 82 – 114 meters

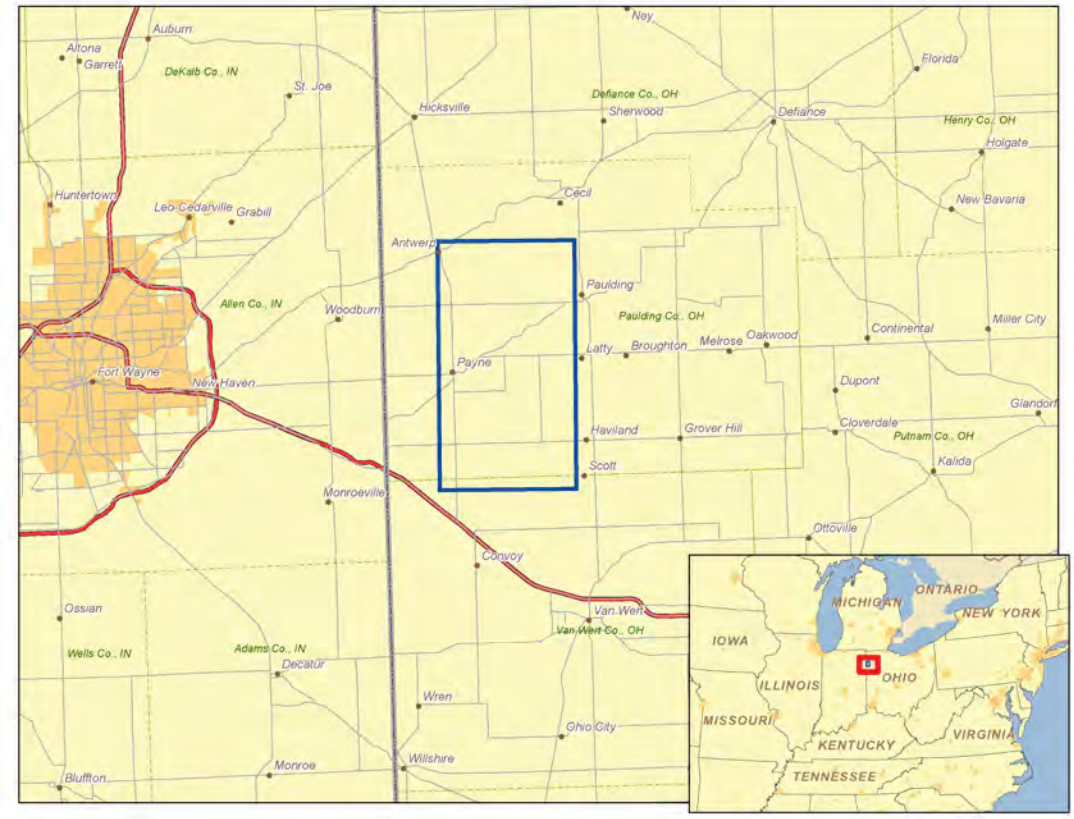


Figure 1: Area of Interest

3. Two-Dimensional Fresnel Zone Analysis

Methodology

Our obstruction analysis was performed using Comsearch's proprietary microwave database, which contains all non-government licensed, proposed and applied paths from 0.9 - 23 GHz[1]. First, we determined all microwave paths that intersect the area of interest[2] and listed them in Table 1. These paths and the area of interest that encompasses the planned turbine locations are shown in Figure 2.

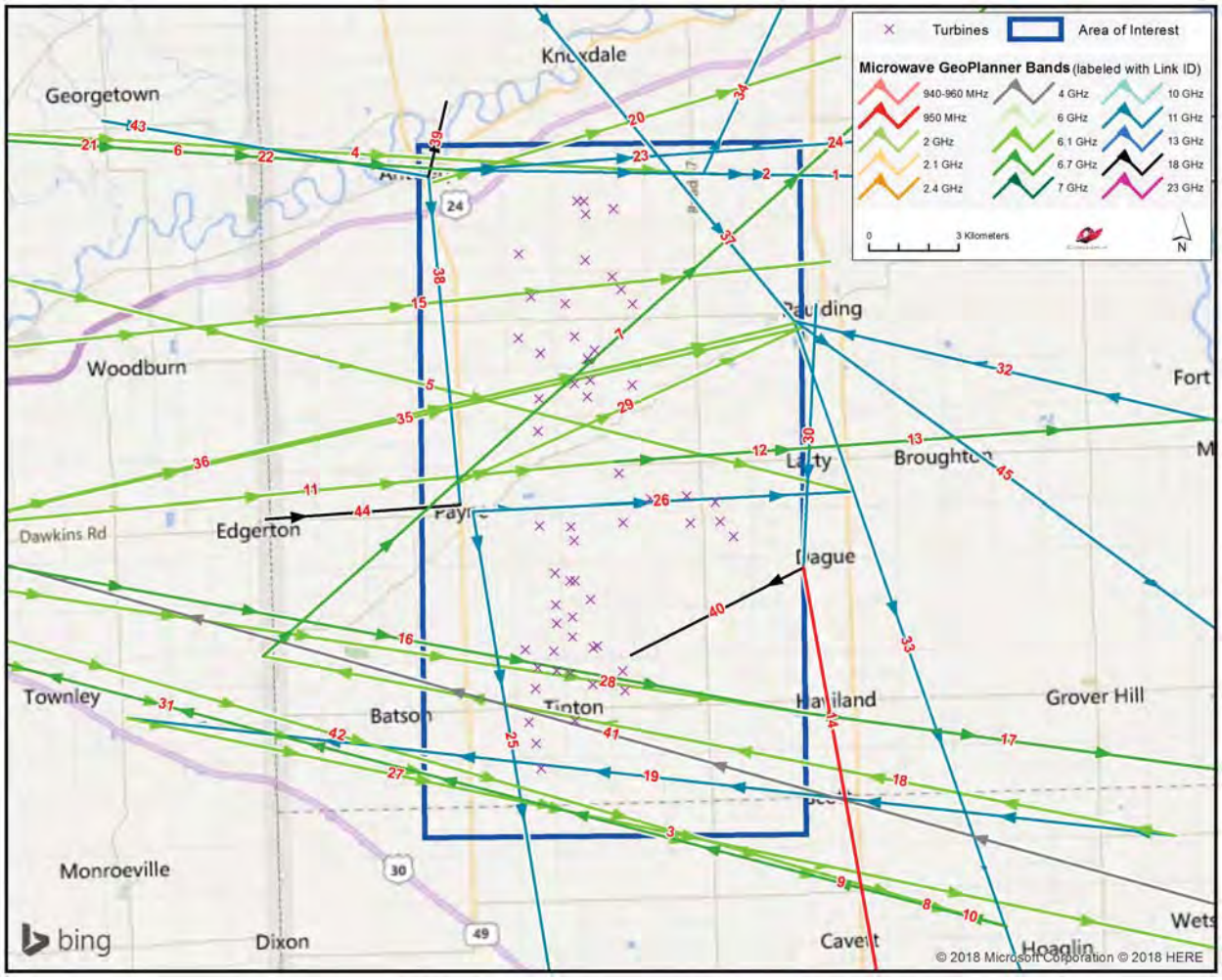


Figure 2: Microwave Paths that Intersect the Area of Interest

[1] Please note that this analysis does not include unlicensed microwave paths or federal government paths that are not registered with the FCC.

[2] We use FCC-licensed coordinates to determine which paths intersect the area of interest. It is possible that as-built coordinates may differ slightly from those on the FCC license.

ID	Status	Callsign 1	Callsign 2	Band	Path Length (km)	Licensee
1	Proposed	ASR12738	ATC51286	11 GHz	32.18	Wireless Internetwork LLC
2	Proposed	ATC27533	ATC51286	11 GHz	23.93	Wireless Internetwork LLC
3	Proposed	CCI87269	ATC50782	Lower 6 GHz	49.37	Fundamental Broadcasting LLC
4	Proposed	GTPIN-52	ATC27533	Lower 6 GHz	48.31	Wireless Internetwork LLC
5	Proposed	GTPIN-52	OH03415-	Lower 6 GHz	54.80	Wireless Internetwork LLC
6	Proposed	GTPIN-52	WQQX660	Lower 6 GHz	40.06	Wireless Internetwork LLC
7	Licensed	KJI65	KYK81	Upper 6 GHz	55.74	Panhandle Eastern Pipe Line Company, L.P
8	Proposed	VANWERT	FORTWAYN	Upper 6 GHz	57.94	ECW Wireless, LLC
9	Licensed	VANWERT	FTWAYNE	Lower 6 GHz	57.94	ECW Wireless, LLC
10	Proposed	VANWERT	WQPF726	Upper 6 GHz	57.94	ECW Wireless, LLC
11	Licensed	WAZ563	WAZ596	Lower 6 GHz	31.42	Norfolk Southern Railway
12	Licensed	WAZ596	WBB735	Lower 6 GHz	38.51	Norfolk Southern Railway
13	Licensed	WAZ596	WBB735	Upper 6 GHz	38.51	Norfolk Southern Railway
14	Licensed	WLD621	RXONLY	950 MHz	21.00	First Family Broadcasting, Inc.
15	Licensed	WQOD566	WQOD564	Lower 6 GHz	51.96	GTT America LLC
16	Licensed	WQON426	WQON427	Upper 6 GHz	51.69	Fort Wayne Communications Group Company
17	Licensed	WQON427	WQON424	Upper 6 GHz	39.37	Fort Wayne Communications Group Company
18	Proposed	WQOV248	EDGERTON	Lower 6 GHz	31.09	ECW Wireless, LLC
19	Licensed	WQOV248	WQOS750	11 GHz	35.35	World Class Wireless, LLC
20	Licensed	WQPS490	WMN405	Lower 6 GHz	14.25	Verizon Wireless (VAW) LLC - Ohio
21	Licensed	WQQX658	WQQX660	Lower 6 GHz	40.06	Wireless Internetwork LLC
22	Proposed	WQQX658	WQQX660	Upper 6 GHz	40.06	Wireless Internetwork LLC
23	Licensed	WQQX660	WQQX868	11 GHz	38.60	Wireless Internetwork LLC
24	Proposed	WQQX660	WQQX868	11 GHz	38.60	Wireless Internetwork LLC
25	Licensed	WQRY696	WQRX772	11 GHz	18.18	Sprintcom, Inc
26	Licensed	WQRY696	WQRY695	11 GHz	12.61	Sprintcom, Inc
27	Licensed	WQSA894	WQSA779	Lower 6 GHz	49.37	Argos Engineering, LLC
28	Licensed	WQSD967	WQSD966	Lower 6 GHz	49.79	Torellco LLC
29	Licensed	WQTF467	WQTF470	Lower 6 GHz	12.85	Verizon Wireless (VAW) LLC - Ohio
30	Licensed	WQTX717	WQWF235	11 GHz	8.85	MetaLINK Technologies, Inc.
31	Licensed	WQUL511	WQUL808	Lower 6 GHz	57.94	Torellco LLC
32	Licensed	WQUT734	WQUU748	11 GHz	30.18	Agile Network Builders LLC
33	Licensed	WQUU748	WQUT739	11 GHz	30.27	Agile Network Builders LLC
34	Licensed	WQVP538	WQNI657	11 GHz	13.41	MetaLINK Technologies, Inc.
35	Licensed	WQVT311	WQVT312	Lower 6 GHz	31.85	Paulding-Putnam Electric Cooperative
36	Licensed	WQVT311	WQYJ953	Lower 6 GHz	31.73	Paulding-Putnam Electric Cooperative
37	Licensed	WQWC960	WQUU748	11 GHz	23.19	Agile Network Builders LLC
38	Licensed	WQWF230	WQWF232	11 GHz	11.03	MetaLINK Technologies, Inc.
39	Licensed	WQWF230	WQYE353	18 GHz	2.57	MetaLINK Technologies, Inc.
40	Applied	WQWF235	GREENTOP	18 GHz	6.44	MetaLINK Technologies, Inc.
41	Licensed	WQWF483	WQWF484	4 GHz	84.41	Waterleaf International LLC
42	Licensed	WQXC632	WQUL808	Lower 6 GHz	59.99	Torellco LLC

ID	Status	Callsign 1	Callsign 2	Band	Path Length (km)	Licensee
43	Licensed	WQXW982	WQWF230	11 GHz	11.07	MetaLINK Technologies, Inc.
44	Licensed	WQYC934	WQWF232	18 GHz	6.52	MetaLINK Technologies, Inc.
45	Licensed	WQYJ953	WQYI235	11 GHz	20.46	Paulding-Putnam Electric Cooperative

Table 1: Summary of Microwave Paths that Intersect the Area of Interest

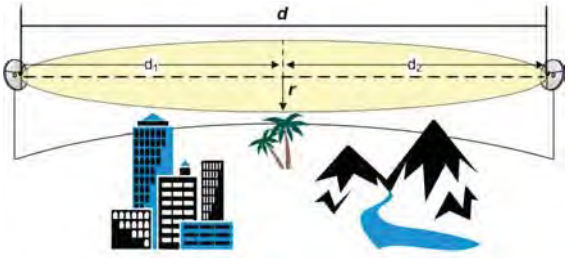
(See enclosed mw_geopl.xlsx for more information and GP_dict_matrix_description.xls for detailed field descriptions)

Verification of Coordinate Accuracy

It is possible that as-built coordinates may differ from those on the FCC license. For this project, 19 paths cross within close proximity of the proposed turbines and the tower locations for these paths will have a critical impact on the result. These 19 paths are highlighted in grey in Table 1. We verified these locations using aerial photography. Some of the towers were found to be slightly off and were moved to their locations based on the aerial photos[3].

Next, we calculated a Fresnel Zone for each path based on the following formula:

$$r \cong 17.3\sqrt{\frac{n}{F_{GHz}}\left(\frac{d_1 d_2}{d_1 + d_2}\right)}$$



Where,

r	=	Fresnel Zone radius at a specific point in the microwave path, meters
n	=	Fresnel Zone number, 1
F_{GHz}	=	Frequency of microwave system, GHz
d_1	=	Distance from antenna 1 to a specific point in the microwave path, kilometers
d_2	=	Distance from antenna 2 to a specific point in the microwave path, kilometers

In general, this is the area where the planned wind turbines should be avoided, if possible. A depiction of the Fresnel Zones for each microwave path listed can be found in Figure 3 through Figure 6, and is also included in the enclosed shapefiles[4,5].

[3] See enclosed mw_geopl.shp and mw_geopl_fcc.shp for details.

[4] The ESRI® shapefiles enclosed are in NAD 83 UTM Zone 16 projected coordinate system.

[5] Comsearch makes no warranty as to the accuracy of the data included in this report beyond the date of the report. The data provided in this report is governed by Comsearch's data license notification and agreement located at http://www.comsearch.com/files/data_license.pdf.

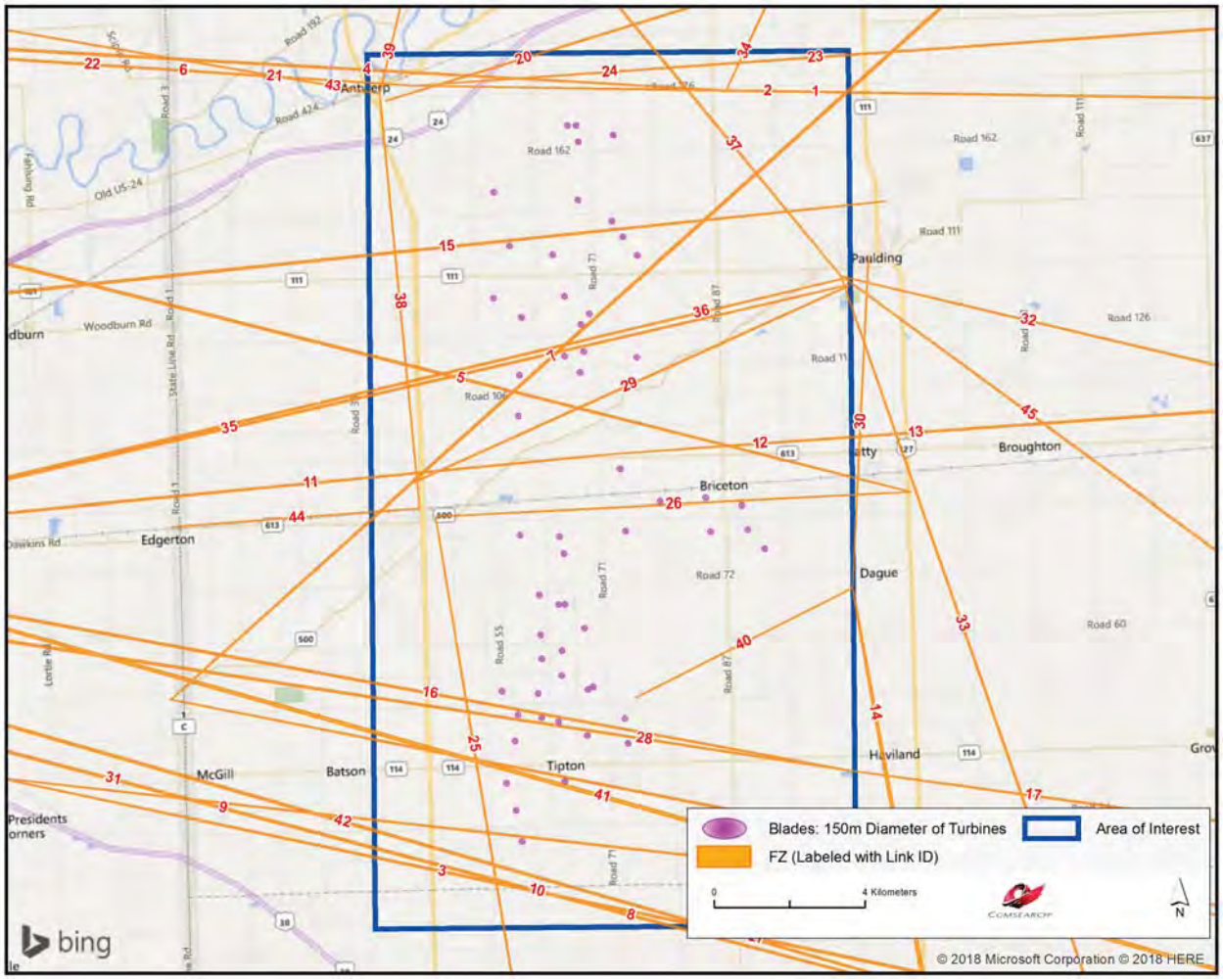


Figure 3: Microwave Paths with Fresnel Zones



Figure 4: Microwave Paths with Fresnel Zones



Figure 5: Microwave Paths with Fresnel Zones



Figure 6: Microwave Paths with Fresnel Zones

4. Conclusion

Total Microwave Paths	Paths with Affected Fresnel Zones	Total Turbines	Turbines intersecting the Fresnel Zones
45	0	54	0

Table 2: Fresnel Zone Analysis Result

Our study identified 45 microwave paths intersecting the Paulding Wind Farm IV area of interest. The Fresnel Zones for these microwave paths were calculated and mapped in order to assess the potential impact from the turbines. A total of 54 turbines were considered in the analysis, each with a blade diameter of 126 - 150 meters and a hub height of 82 - 114 meters. Of those turbines, none were found to have potential obstruction with the microwave systems in the area.

5. Contact

For questions or information regarding the Microwave Study, please contact:

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Web site: www.comsearch.com

Paulding Wind Farm IV LLC
Case No. 18-91-EL-BGN

Exhibit EE

HDD Frac-out Contingency Plan

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Attorneys for Paulding Wind Farm IV LLC

Date Filed: July 2, 2018

PAULDING WIND FARM IV FRAC-OUT CONTINGENCY PLAN (FCP)

1.0 Introduction and Purpose

Directional bore operations have a potential to release drilling fluids into the surface environment through frac-outs. A frac-out is the condition where drilling mud is released through fractured bedrock into the surrounding rock and sand and travels toward the surface. Because drilling muds consist largely of a bentonite clay-water mixture, they are not classified as toxic or hazardous substances. However, if it is released into water bodies, bentonite has the potential to adversely impact fish and invertebrates.

While drilling fluid seepage associated with a frac-out is most likely to occur near the bore entry and exit points where the drill head is shallow, frac-outs can occur in any location along a directional bore. This Frac-Out Contingency Plan (FCP) establishes operational procedures and responsibilities for the prevention, containment, and clean-up of frac-outs associated with the proposed directional drilling. All personnel and subcontractors responsible for the work must adhere to this plan during the directional drilling process.

The specific objectives of this plan are to:

1. Minimize the potential for a frac-out associated with directional drilling activities;
2. Provide for timely detection of frac-outs;
3. Protect environmentally sensitive areas (streams, wetlands, other biological resources, cultural resources);
4. Ensure an organized, timely and “minimum-impact” response in the event of a frac-out and release of drilling bentonite; and,
5. Ensure that all appropriate notifications are made immediately to the customer, management and safety personnel.

2.0 Description of Work

The proposed project consists of:

Drilling operations will be halted by the drill rig operators immediately upon detection of a drop in drilling pressure or other evidence of a frac-out. The clean-up of all spills shall begin immediately. Management and the safety department shall be notified immediately of any spills and shall be consulted regarding clean-up procedures. A spill kit shall be on-site and used if a frac-out occurs. Containment materials, such as straw bales, shall also be on-site prior to and during all operations. In the event of a frac-out, the Site Supervisor/Foreman will conduct an evaluation of the situation and direct recommended mitigation actions, based on the following guidelines.

a. If the frac-out is minor, easily contained, and has not reached the surface and is not threatening sensitive resources, drilling operations may resume after use of a leak stopping compound or redirection of the bore.

b. If the frac-out has reached the surface, any material contaminated with bentonite shall be removed by hand to a depth of 2-feet, contained and properly disposed of, as required by law. The drilling contractor shall be responsible for ensuring that the bentonite is either properly disposed of at an approved disposal facility or properly recycled in an approved manner. The Site Supervisor shall notify and take any necessary follow-up response actions in coordination with agency representatives. The Site Supervisor will coordinate the mobilization of equipment stored at off-site locations (e.g. vacuum equipment) on an as needed basis.

3.0 Site Supervisor/Foreman Responsibilities

The Site Supervisor/Foreman has overall responsibility for implementing this FCP. The Site Supervisor/Foreman will ensure that all employees are trained prior to all drilling. The Site Supervisor/Foreman shall be notified immediately when a frac-out is detected. The Site Supervisor/Foreman will be responsible for ensuring that the safety department is aware of the frac-out, coordinating personnel, response, cleanup, regulatory agency notification and coordination to ensure proper clean-up, disposal of recovered material and timely reporting of the incident. The Site Supervisor/Foreman shall ensure all waste materials are properly containerized, labeled, and removed from the site to an approved disposal facility by personnel experienced in the removal, transport, and disposal of drilling mud.

The Site Supervisor/Foreman shall be familiar with all aspects of the drilling activity, the contents of this FCP and the conditions of approval under which the activity is permitted to take place. The Site Supervisor/Foreman shall have the authority to stop work and commit the resources (personnel and equipment) necessary to implement this plan. The Site Supervisor/Foreman shall assure that a copy of this plan is available (on-site) and accessible to all construction personnel. The Site Supervisor/Foreman shall ensure that all workers are properly trained and familiar with the necessary procedures for response to a frac-out, prior to commencement of drilling operations.

4.0 Equipment

The Site Supervisor shall ensure that:

- All equipment and vehicles are checked and maintained daily to prevent leaks of hazardous materials.
- Spill kits and spill containment materials are available on-site at all times and that the equipment is in good working order.
- Equipment required to contain and clean up a frac-out release will be available at the work site.
- If equipment is required to be operated near a riverbed, absorbent pads and plastic sheeting for placement beneath motorized equipment shall be used to protect the riverbed from engine fluids.

5.0 Training

Prior to the start of construction, the Site Supervisor/Foreman shall ensure that the crew members receive training in the following:

- The provisions of the FCP, equipment maintenance and site specific permit and monitoring requirements;
- Inspection procedures for release prevention and containment equipment and materials;
- Contractor/crew obligation to immediately stop the drilling operation upon first evidence of the occurrence of a frac-out and to immediately report any frac-out releases;
- Contractor/crew member responsibilities in the event of a release;
- Operation of release prevention and control equipment and the location of release control materials, as necessary and appropriate; and,
- Protocols for communication with agency representatives who might be on-site during the clean-up effort.

6.0 Drilling Procedures

The following procedures shall be followed each day; prior to the start of work. The FCP shall be available on-site during all construction. The Site Supervisor/Foreman shall be on-site at any time that drilling is occurring or is planned to occur. The Site Supervisor/Foreman shall ensure that a Job Briefing meeting is held at the start of each day of drilling to review the appropriate procedures to be followed in case of a frac-out. Questions shall be answered and clarification given on any point over which the drilling crew or other project staff has concerns.

Drilling pressures shall be closely monitored so they do not exceed those needed to penetrate the formation. Pressure levels shall be set at a minimum level to prevent frac-outs. During the pilot bore, maintain the drill annulus. Cutters and reamers will be pulled back into previously-drilled sections after each new joint of pipe is added.

Exit and entry pits shall be enclosed by silt fences and straw bales. The exit and entry pits shall be a minimum of 50 feet from the edge of the water resource. A spill kit shall be on-site and used if a frac-out occurs. Vacuum equipment shall be readily available on-site prior to and during all drilling operations. Containment materials (Straw, silt fencing, sand bags, frac-out spill kits, etc.) shall be staged on-site at locations where they are readily available and easily mobilized for immediate use in the event of an accidental release of drilling mud (frac-out). If necessary, barriers (straw bales or sedimentation fences) between the bore site and the edge of the water source shall be constructed, prior to drilling, to prevent released bentonite material from reaching the water.

Once the drill rig is in place, and drilling begins, the drill operator shall stop work whenever the pressure in the drill rig drops, or there is a lack of returns in the entrance pit. At this time the Site Supervisor/Foreman shall be informed of the potential frac-out. The Site Supervisor/Foreman and the drill rig operator(s) shall work to coordinate the likely location of the frac-out. The location of the frac-out shall be recorded and notes made on the location and measures taken to

address the concern. The following subsections shall be adhered to when addressing a frac-out situation.

Water containing mud, silt, bentonite, or other pollutants from equipment washing or other activities, shall not be allowed to enter a lake, flowing stream or any other water source. The bentonite used in the drilling process shall be either disposed of at an approved disposal facility or recycled in an approved manner. Other construction materials and wastes shall be recycled, or disposed of, as appropriate.

6.1 Vac-Equipment

A vacuum truck or trailer shall be staged at a location from which it can be mobilized and relocated so that any place along the drill shot can be reached by the apparatus, within 10 minutes of a frac-out.

6.2 Field Response to Frac-Out Occurrence

The response of the field crew to a frac-out release shall be immediate and in accordance with procedures identified in this plan. All appropriate emergency actions that do not pose additional threats to sensitive resources will be taken, as follows:

If the Frac-out is in a terrestrial setting:

a. Directional boring will stop immediately.
b. The bore stem will be pulled back to relieve pressure on frac-out.
c. The Site Supervisor/Foreman will be notified to ensure that management and the safety department is notified, adequate response actions are taken and notifications made.
d. The Site Supervisor/Foreman shall evaluate the situation and recommend the type and level of response warranted, including the level of notification required.
e. If the frac-out is minor, easily contained, has not reached the surface and is not threatening environmentally sensitive resources, a leak stopping compound shall be used to block the frac-out. If the use of leak stopping compound is not fully successful, the bore stem shall be redirected to a new location along the desired drill path where a frac-out has not occurred.
f. If the frac-out has reached the surface, any material contaminated with bentonite shall be removed by hand, to a depth of 2-feet, contained and properly disposed of, as required by law. A dike or berm may be constructed around the frac-out to entrap released drilling fluid, if necessary. Clean sand shall be placed and the area returned to pre-project contours and restored with vegetation that existed prior to impact.
g. If a frac-out occurs, reaches the surface, and becomes widespread, the Site Supervisor/Foreman shall authorize a readily accessible vacuum truck to be mobilized. The vacuum truck may be either positioned at either end of the line of the drill so that the frac-out can be reached by crews on foot, or may be pulled by a bulldozer, so that contaminated soils can be vacuumed up.

If the frac-out is in an aquatic setting (i.e., under water):

a. Erect isolation/containment environment immediately pending existing water flow conditions.
b. Monitor frac-out for four hours to determine if the drilling mud congeals. (Bentonite will usually harden, effectively sealing the frac-out location.)
c. If drilling mud congeals, take no other immediate action that would potentially suspend sediments in the water column. Coordinate with agencies on restoration measures. If bentonite material is spread over a extended area after congealing, manual collection methods would be used that may include use of the following equipment:
    - Hay bales
    - Sand bags
    - Silt fence
    - Plastic sheeting
    - Turbidity barriers
    - Shovels, pails
    - Push brooms
    - Squeegees
    - Pumps and sufficient hose
    - Mud storage tanks
    - Vacuum truck on 24-hour call
    - Light plant/generator

6.3 Response Close-out Procedures

When the release has been contained and cleaned up, response closeout activities will be conducted at the direction of the Site Supervisor/Foreman and shall include the following:

a. The recovered drilling fluid will either be recycled or hauled to an approved facility for disposal. No recovered drilling fluids will be discharged into streams, storm drains, or any other water source.
b. All frac-out excavation and clean-up sites will be returned to pre-project contours using clean fill, as necessary.
c. All containment measures (fiber rolls, straw bales, etc.) will be removed, unless otherwise specified by the Site Supervisor/Foreman.

6.4 Construction Re-start

For small releases not requiring external notification, drilling may continue if 100 percent containment is achieved through the use of a leak stopping compound or redirection of the bore and the clean-up crew remains at the frac-out location throughout the construction period.

For releases requiring external notification and/or other agencies, construction activities will not restart without prior approval from the safety department.

6.5 Bore Abandonment

Abandonment of the bore will only be required when all efforts to control the frac-out within the existing directional bore have failed.

7.0 Notification

In the event of a frac-out that reaches a water source, the Site Supervisor/Foreman will notify the safety department so they can notify the appropriate resource agencies. All agency notifications will occur within 24 hours and proper documentation will be accomplished in a timely and complete manner. The following information will be provided:

1. Name and telephone number of person reporting;
2. Location of the release;
3. Date and time of release;
4. Type and quantity, estimated size of release;
5. How the release occurred;
6. The type of activity that was occurring around the area of the frac-out;
7. Description of any sensitive areas, and their location in relation to the frac-out;
8. Description of the methods used to clean up or secure the site; and,
9. Listing of the current permits obtained for the project.

7.1 Communicating with Regulatory Agency Personnel

All employees and subcontractors will adhere to the following protocols when permitting Regulatory Agency Personnel arrive on site. Regulatory Agency Personnel will be required to comply with appropriate safety rules. Only the Site Supervisor/Foreman and the safety department are to coordinate communication with Regulatory Agency Personnel.

7.2 Documentation

The Site Supervisor/Foreman shall record the frac-out event in his or her daily log. The log will include the following details on the release event including:

1. An estimate of the amount of bentonite released;
2. The location and time of release, the size of the area impacted; and,
3. The success of the clean-up action.

The log report shall also include:

1. Name and telephone number of person reporting;
2. Date;
3. How the release occurred;
4. The type of activity that was occurring around the area of the frac-out;
5. Description of any sensitive areas, and their locations in relation to the frac-out;
6. Description of the methods used to clean up or secure the site, and,

7. A listing of the current permits obtained for the project restart.

8.0 Project Completion and Clean-up

a. All materials and any construction debris shall be removed from the construction zone at the end of each workday;
b. Sump pits at bore entry and exits will be filled and returned to natural grade; and,
c. All protective measures (fiber rolls, straw bales, silt fence, etc.) will be removed unless otherwise specified by the Site Supervisor/Foreman.

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Case No(s). 18-0091-EL-BGN

Summary: Application – Part 10 of 11 – Exhibits W through EE electronically filed by Christine M.T. Pirik on behalf of Paulding Wind Farm IV LLC