

FILE

76

PUCO EXHIBIT FILING

Date of Hearing: 11-27-12

Case No. \_\_\_\_\_

BEFORE THE OHIO POWER SITING BOARD

In the Matter of the Application of Champaign Wind LLC for a Certificate to  
Construct a Wind-Powered Electric Generating Facility in Champaign County, Ohio.

Case No. 12-0160-EL-BGN

VOL. X

List of exhibits being filed:

Company - 25

UNIL - 27

28

29

Reporter's Signature: [Signature]  
Date Submitted: 11-29-12

PUCO

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Technician [Signature] Date Processed 12/11/12

BEFORE THE OHIO POWER SITING BOARD

- - -

In the Matter of the :  
Application of Champaign :  
Wind LLC for a :  
Certificate to Construct : Case No. 12-0160-EL-BGN  
a Wind-Powered Electric :  
Generating Facility in :  
Champaign County, Ohio. :

- - -

PROCEEDINGS

before Ms. Mandy Willey Chiles and Mr. Jonathan  
Tauber, Administrative Law Judges, at the Public  
Utilities Commission of Ohio, 180 East Broad Street,  
Room 11-A, Columbus, Ohio, called at 9:00 a.m. on  
Tuesday, November 27, 2012.

- - -

VOLUME X

- - -

ARMSTRONG & OKEY, INC.  
222 East Town Street, Second Floor  
Columbus, Ohio 43215  
(614) 224-9481 - (800) 223-9481  
Fax - (614) 224-5724

- - -

## Rostofer, Donald

---

**From:** Conway, Andrew  
**Sent:** Wednesday, September 26, 2012 8:23 AM  
**To:** Rostofer, Donald  
**Subject:** Nordex

As requested, here is my communication with manufacturers.

Sincerely,

**Andrew Conway, P.E.**

Ohio Power Siting Board  
Engineering Specialist, Siting  
(614) 466-5732  
[OPSB.ohio.gov](http://OPSB.ohio.gov)



*This message and any response to it may constitute a public record and thus may be publicly available to anyone who requests it.*

---

**From:** Caspari, Laura [<mailto:LCaspari@nordex-online.com>]  
**Sent:** Friday, September 07, 2012 12:57 PM  
**To:** Conway, Andrew  
**Subject:** RE: Setbacks

Andrew,

Nordex does not have any standard siting guidelines for our wind turbines that we typically provide to developers. We provide the technical documentation and rely on the developer to design a project which adheres to the local siting rules in their particular jurisdiction and generally offer input on siting only if asked. This applies to all particular issues such as noise, shadow flicker, ice-throw, blade failure, etc.

Kind regards,

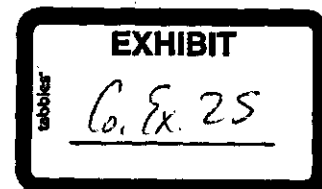
Laura Caspari  
Project Developer

---

Nordex USA, Inc.  
300 South Wacker Drive, Suite 1500  
Chicago, Illinois 60606, USA

direct +1 (312) 386-4278  
phone +1 (312) 386-4100  
fax +1 (312) 386-4101  
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email [lcaspari@nordex-online.com](mailto:lcaspari@nordex-online.com)  
web [www.nordex-online.com](http://www.nordex-online.com)

a Delaware corporation, registered n° 3149241



Board: Dr. Jürgen Zeschky (Chairman), Lars Krogsgaard, Bernard Schäferbarthold, Jörg Scholle, Ralf Sigrist

---

**From:** Conway, Andrew [<mailto:Andrew.Conway@puc.state.oh.us>]

**Sent:** Wednesday, September 05, 2012 10:19 AM

**To:** Caspari, Laura

**Subject:** Setbacks

Here is my contact information.

Sincerely,

**Andrew Conway, P.E.**

Public Utilities Commission of Ohio  
Energy and Environment Department

Engineering Specialist, Siting

Email: [Andrew.Conway@puc.state.oh.us](mailto:Andrew.Conway@puc.state.oh.us)

(614) 466-5732

[PUCO.ohio.gov](http://PUCO.ohio.gov)



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Thank you for your cooperation.

## Rostofer, Donald

---

**From:** Conway, Andrew  
**Sent:** Tuesday, September 18, 2012 3:28 PM  
**To:** Jason Dagger (jdagger@everpower.com)  
**Cc:** Rostofer, Donald  
**Subject:** Data Request

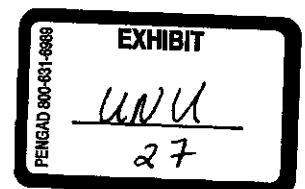
Jason –

1. Provide a parcel shapefile for Buckeye II.
2. Provide a complete copy of the manufacturer's safety manual or similar document for the GE 2.5 - 103 turbine.
3. For case 08-0666-EL-BGN, Staff received a copy of the manufacturer's safety manual for REpower MM92, are there any updates?
4. Does Vestas, GE, REpower, Gamesa, Nordex, or Everpower have any minimum setback recommendations/guidance?
  - a. If so, please provide these.
5. Provide any site-specific blade shear risk assessment study.

Sincerely,

**Andrew Conway, P.E.**  
Ohio Power Siting Board  
Engineering Specialist, Siting  
Email: [Andrew.Conway@puc.state.oh.us](mailto:Andrew.Conway@puc.state.oh.us)  
(614) 466-5732  
[OPSB.ohio.gov](http://OPSB.ohio.gov)  


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UNU 27

## Conway, Andrew

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**From:** Jason Dagger <JDagger@Everpower.com>  
**Sent:** Monday, October 01, 2012 1:53 PM  
**To:** Conway, Andrew  
**Cc:** Rostofer, Donald; Settineri, Michael J. (mjsettineri@vorys.com)  
**Subject:** questions

Andrew,

Please see my responses.

1. Provide a parcel shapefile for Buckeye II. The applicant provided as of 9/25
2. Provide a complete copy of the manufacturer's safety manual or similar document for the GE 2.5 - 103 turbine. We have contacted GE and are awaiting a response
3. For case 08-0666-EL-BGN, Staff received a copy of the manufacturer's safety manual for REpower MM92, are there any updates? The applicant does not have any knowledge of updates, should updates become available before construction the applicant will provide
4. Does Vestas, GE, REpower, Gamesa, Nordex, or Everpower have any minimum setback recommendations/guidance?
  - a. If so, please provide these. All manufactures rely on the developer to site turbines based on applicable law. Only GE has provide any siting guidance and can be found generally on line.
5. Provide any site-specific blade shear risk assessment study.- No assessment is available

Thanks  
Jason

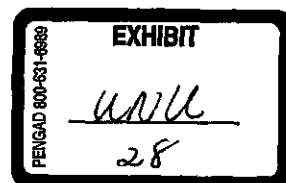
Jason Dagger  
Project Manager

**everpower**

<b>Address</b>	129 South Main Street, Bellefontaine, OH 43311
<b>Phone</b>	937.595.0305
<b>Fax</b>	937.292.7310
<b>Mobile</b>	937.604.8820
<b>Email</b>	<a href="mailto:JDagger@Everpower.com">JDagger@Everpower.com</a>

[click here to visit our website](#)

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UNU 28

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# Wind Turbine

## MM92

(60Hz)

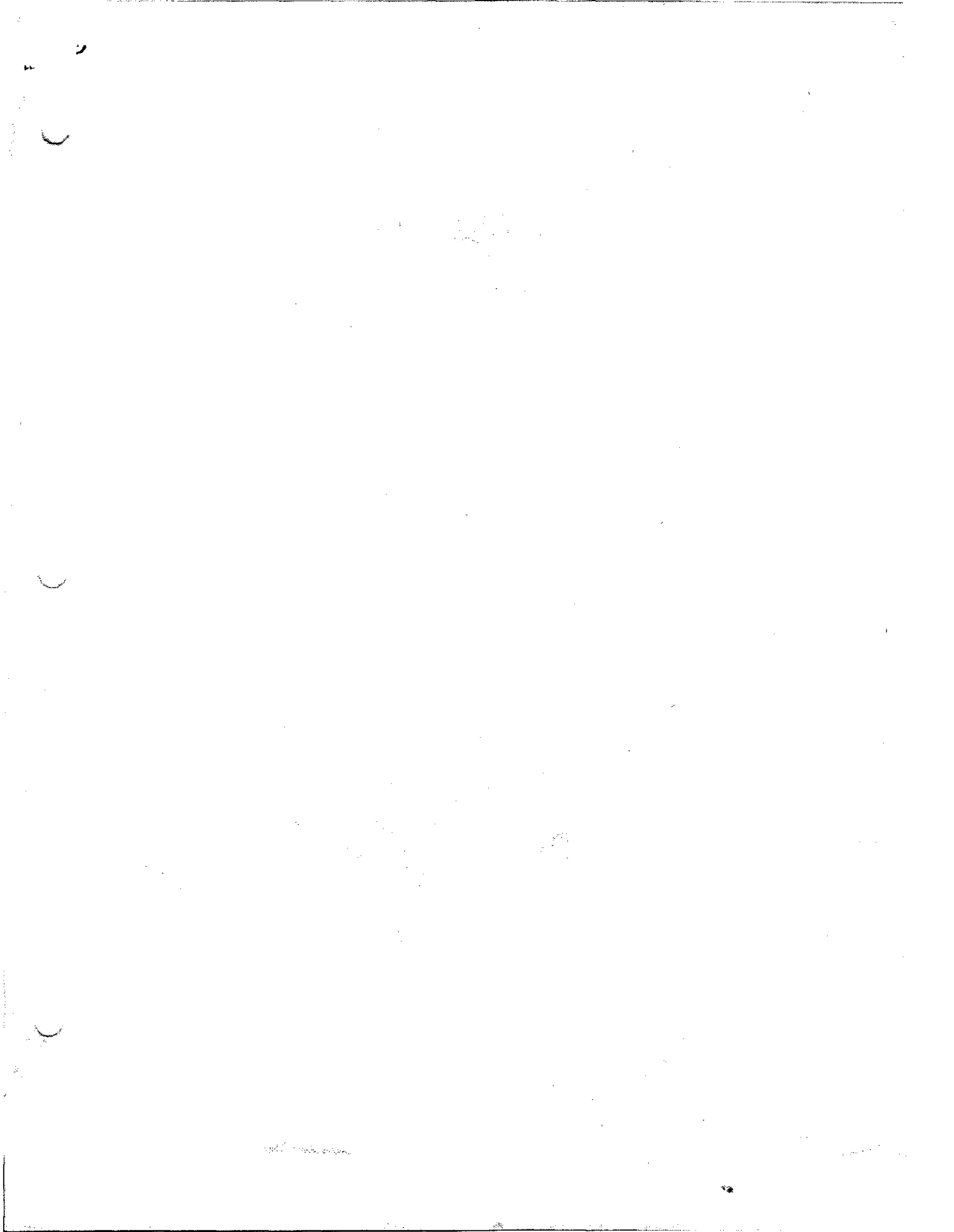
### Version B

Installation Manual  
for Project Goodnoe Hills (USA)

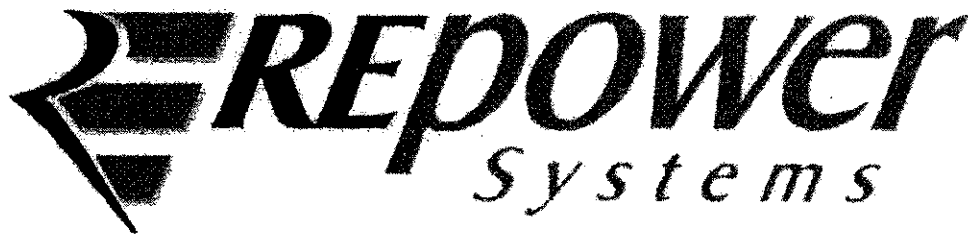
2007 August 24 | Document-No.: M-2.6-MO.AU.01-A-B-EN/US

This Manual corresponds with the document "Wind Turbine WEC REpower MD/ MM - On Site  
Erection Instructions" (V-1.1-MO.AU.01-B-B).





MM92 | Installation Instructions for Wind Turbines



Manual

## 4 GENERAL SAFETY INSTRUCTIONS



### DANGER

Incompetence leads to death!

- Only instructed, trained persons authorized by REpower Systems AG may work at/in the wind turbine!
- The following generally applies: Attested fitness (examination for capability of working at height with certificate) is a prerequisite for the work at/in a wind turbine.

#### 4.1 Used symbols, notes on safety and hazard warnings

The following symbols, notes on safety and hazard warnings are used in the wind turbine, in the manual, on working materials and on hazardous substances:

The ANSI Z535.6-2006 standard contains the following signal word definitions:



**DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.

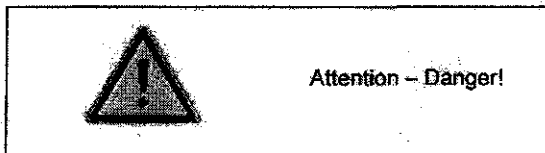
















**CAUTION**, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

































**Notice** is used to address practices not related to personal injury.





Notes on safety, hazard warnings, instructions, hazardous substances warnings and notes:



	Danger of electric shock!		Danger due to overhead load!
	Danger of falling!		Danger of squeezing!
	Danger of falling due to high load on the floor!		Danger of squeezing!
	Danger due to overhead load!		Danger due to hazardous substances!
	Danger of falling!		Radiation hazard!
	Electrical danger!		Danger of falling pieces of ice!
	Trip and slip hazards!		Danger due to iced ways and surfaces!

	Drilling prohibited!		Chemicals, the gases and vapors of which form explosive mixtures with the ambient air and chemicals that are easily flammable when near an ignition source. Point of ignition below 21°C.
	No trespassing in this area!		Chemicals that may lead to serious health injuries or to death!
	No trespassing!		Chemicals that may lead to health injuries or in larger quantities even to death!
	No smoking!		Chemicals that may lead to serious damages to skin, eyes and the mucosa!
	No trespassing of persons with pacemakers!		Chemicals that may cause redness or inflammations when in contact with skin, eyes or the mucosa!
	Chemicals that can explode due to heat, friction, impact or boosters!		Chemicals that may endanger the environment!
	Chemicals that are not flammable but can inflame flammable substances or support a fire without air supply (oxygen)!		Chemicals the gases and vapors of which form explosive mixtures with the ambient air and chemicals that are easily flammable when near an ignition source! Point of ignition below 0°C, boiling point below 35°C.

	Use personal protective equipment against falling down!		Use respiratory protection!
	Use locking device with the locking hook with fall absorber!		Use safety gloves!
	Use safety helmet!		Use safety clothes!
	Use safety shoes!		Use face protector!
	Use cell phone and radio telephone!		Use personal protective equipment against falling down!
	Disconnect voltage!		Use direction indications for the escape route hearing protection!
	Use hearing protection!		Direction indications for the escape route!
	Use direction indications for the escape route eye protection!		Direction indications for the escape route

	Use the telephone or cell phone!		Escape notes
	Use the fire extinguisher!		Place for deposited documentations



## 4.2 Required protective equipment and rescue devices

The following list gives an overview of the protective equipment that must be used:

### General Protective Equipment :

- 24. Cell phones and radio telephony
- 25. Safety helmet with lamp
- 26. Hearing protection
- 27. Gloves
- 28. Safety shoes
- 29. Work clothes
- 30. Protective glasses, face protector
- 31. Respiratory protection mask

### Personal protective equipment against falling down

- 32. Safety belt
- 33. Fall protection system
- 34. Fall absorber
- 35. Band fall absorber
- 36. Locking hook
- 37. Safety ropes
- 38. Rope clip and protective device for working at height
- 39. Protective device for working at height

### Rescue devices :

- 40. Strap bands
- 41. Lift descender device and slinging rope
- 42. Protective box, accessories

## 4.2.1 General protective equipment

### 4.2.1.1 Cell phone and radio telephony

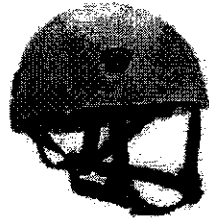


#### Death due to non-organized and omitted help!

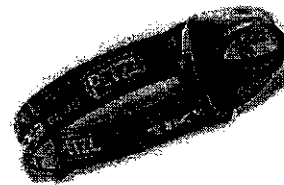
- For the communication and emergency calls, a cell phone and a radio telephone must be carried with!
- Communication among each other and with the environment must always be granted!



#### 4.2.1.2 Safety helmet with lamp



Safety helmet (EN397 / EN12492)  
Ecrin Best A06 gelb, Petzl



Lamp,  
Helm-Tikka Plus E47P, Petzl



#### Danger of fatal head injuries due to falling items from big height!

- On construction sites, with crane works, with access in the tower, with works on the roof of nacelles as well as with all other works in danger of falling areas a helmet must be worn!
- Persons not wearing a helmet have to be expressly adverted of the obligation to wear a helmet. This also applies to external companies, customers and visitors!



#### Helmets age and have to be destroyed after their date of expiry!

- Helmets are subject to a date of expiry according to the manufacturer's data and have to be destroyed after the date of expiry!



#### Head injuries due to interference edges upon works in the nacelle!

- With works in the nacelle, a bump cap must be worn!



#### 4.2.1.3 Hearing protection



**Danger of hearing damages due to works in metallic hollows!**

- Danger of hearing damages due to works in metallic hollows!
- Beginning with a noise level of  $\Rightarrow$  85 db (A) a hearing protection must be worn!



#### 4.2.1.4 Gloves



**Danger of hand injuries!**

- With all works where hand injuries can be caused, gloves have to be worn!
- With works with aggressive oils and hazardous substances, chemical-resistant gloves have to be worn. If there is the danger of skin contact with the aggressive substances, a barrier cream must be applied in advance!
- Use moisturizing hand cream after work!
- Use gloves with electro technical works in case of danger of accidental arcs!



#### 4.2.1.5 Safety shoes



**Danger of foot injuries and squeezes!**

- With all works, safety shoes with a protective cap and anti-perforation sole have to be worn!



#### 4.2.1.6 Protective clothes



**Injuries, burns without protective clothes!**

During all the working time, the protective clothes have to be worn!



#### 4.2.1.7 Protective glasses, protective visor



**Danger of eye injuries with grinding works, metal-removing works, works with poisonous or caustic liquids or those under pressure!**

- With all works with the drilling machine, grinding devices, works with poisonous or caustic liquids or those under pressure, protective glasses have to be worn!
- With works with gases and liquids under pressure (hydraulic components), protective glasses have to be worn!



#### 4.2.1.8 Respiratory protection mask

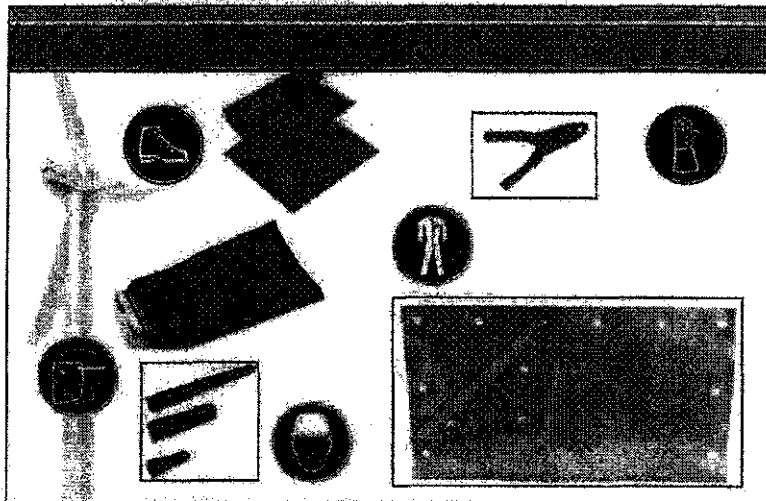
##### **WARNING**

Death due to injuries to the respiratory tract!

- Respiratory protection masks have to be worn in case of dust formation, degassing, varnishing works, GRP works and works with the slip ring unit!
- The selection and the use of different filters for the respective case of use (hazardous material class) have to be in accordance with the manufacturer's data!



#### 4.2.1.9 Personal protective equipment for electrical works

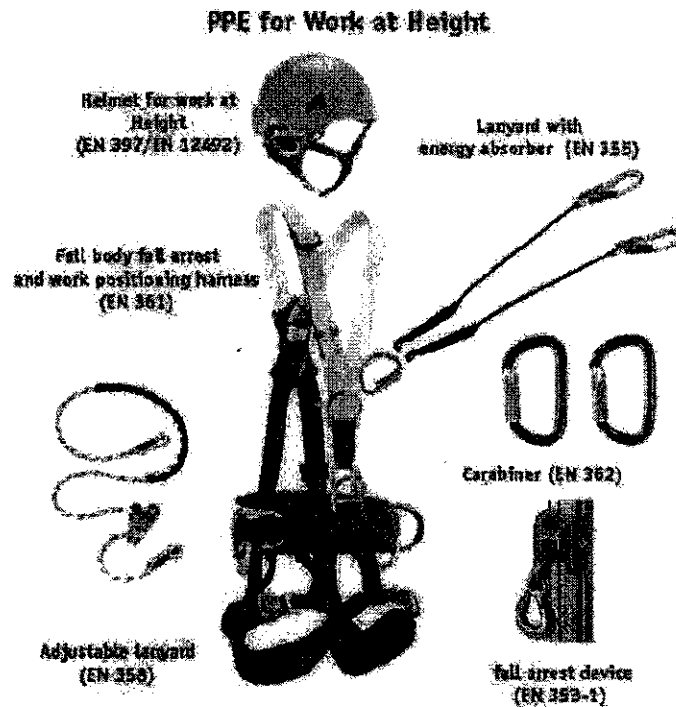


#### **Danger of injury with electro technical works!**

Protective equipment avoids corporal injuries.

- Use gloves against accidental arcs!
- Wear rigidly closed protective clothes!
- With works at/in the wind turbine a helmet must be worn!
- Wear a low-voltage/high-voltage fuse carrier with top when pulling low-voltage/high-voltage fuses!
- Use insulating mats and cloths!
- Use insulated clamps!
- The protective visor must be worn with every direct switching action (e.g. disassembly/assembly of the low-voltage/high-voltage fuses)!

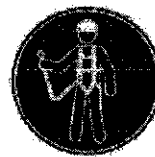
#### 4.2.2 Personal protective equipment against falling down



#### **⚠ DANGER**

##### **Danger of falling without safety devices!**

- The personal protective equipment against falling down in connection with the locking hook, the safety rope and the fall absorber always must be worn if there is the danger of falling!





**⚠ DANGER**

Incompetence leads to death!

Works at/in the wind turbine only for instructed users!

- Before using the personal protective equipment against falling, the protective equipment must be checked! Do not use any more if damaged!
- Use safe and suitable attachment points!
- Ensure rescue by training and instructing the employees!

**⚠ WARNING**

Danger of life in case of damaged ropes, belts and exceeded check date!

Ropes, belts have to be destroyed if :

- the check date is exceeded!
- the splice has untwisted!
- They are worn out!
- They have indentations/cuts!
- They are dirty or oily!

#### 4.2.2.1 Labeling

All components of the personal protective equipment against falling down can be identified – i.e. they are marked with badges, labels, the year of production, a serial number and the next check date.

In addition, details like the CE labeling, manufacturer's data and check notes can be found in the instruction manual.

**⚠ WARNING**

Danger of life in case of damages or exceeded check date!

- The date of expiry/destruction according to the manufacturer's data must be known to the user!
- Personal protective equipments against falling down that are damaged or equipment with exceeded check dates may not be used any more!

#### 4.2.2.2 Use of the personal protective equipment to avoid falling down

The contractor must have the personal protective equipment against falling down checked according to the conditions of use and to the operational situation according to needs, however at least once a year for faultless operation by an expert.

The check is carried out by persons authorized and qualified by REpower.

#### **WARNING**

##### Only work with checked protective equipment against falling down!

- It is prohibited to carry out modifications to the protective equipment!
- Prior to every use of the protective equipment against falling down, the user must visually check the equipment for proper condition and faultless functioning!
- Do not use damaged or not functioning protective equipment!
- Do not use protective equipment that exceeded the check date!

#### 4.2.2.3 Safety harnesses



Safety belt  
Petzl C71F Navaho Compl.Fast



Safety belt  
EKN ARG 50 Click Integral



#### 4.2.2.4 Fall protection systems

Fall protection systems are subject to a yearly check. The check dates are documented with a label on the access. The label also contains the fall protection slide admissible for the installation, admissible charges and information on the required protective equipment.

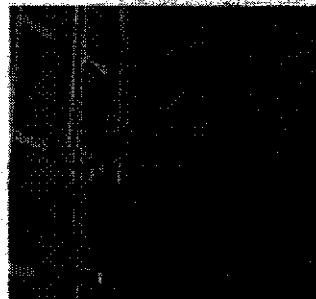


**Danger of falling down due to wrongful use of the fall protection slide!**

The label for the fall protection system on the access of the ladder must be read!

- The fall protection slide must be inserted in the upward direction of the arrow in the safety bar!
- Maximum charge of the fall protection slide: 330 lbs (150 kg)!
- Load distribution on the ladder:  
at least 3.3 feet (2m) distance between to ascending persons!
- Only use the type of fall protection slide documented on the fall protection slide system label!
- For the connection of the fall protection slide to the personal protective equipment against falling down, no additional, lengthening ropes or belts may be used!
- Ensure that the fall protection system is ready for use prior to using it!

**Fall protection system Hailo H50:**



**Securing with Hailo fall protection slide SPL 50**


**PROFESSIONAL**

**Achtung / Attention!**

Ordnung! Leiter, Zulässige Belastung beachten.  
Fixed ladders: Observe permitted load.  
Echelle fixe: Respecter charge max. autorisée.

Ladder complies to /  
Échelle conforme aux normes:

CSA 1926.1053 (a) (1) (ii)  
 OSHA 1926.1053 (a) (2)  
 CSA 1926.1053 (a) (3) (i)  
 OSHA 1926.1053 (a) (4) (i)  
 CSA 1926.1053 (a) (5)  
 OSHA 1926.1053 (a) (6) (i)  
 CSA 1926.1053 (a) (11)



**Hailo**

Leitern müssen gemäß den nationalen Bestimmungen geprüft werden. Falls einprüfbar, muss zusätzlich eine statische Überprüfung durch einen Sachkundigen.


Ladders have to be inspected according to national provisions. Falls not inspectable on site, a static inspection by an expert.


L'Échelle doit être inspectée conformément national. Hors recommandation, il faut une inspection statique par un expert.

**Montiert / Assembled / Montage**

2007 - 08 - 09 - 10 - 11 - 12 - 13 - 14 - 15

Zusätzlich bei der Montage eintragen bitte, anzuwenden:  
For assembly, enter as follows as applicable:  
Pour la montage, entrer les points selon le cas.





Q-0-0-RT-AS-03-A-A


Information on the prescribed Hailo fall protection slide system is attached to the access of the ladder.

**PROFESSIONAL**

**Stoßschutzsystem Hailo H50 nach EN 353-1/CE 0121**  
**Fall Arrest System Hailo H50 acc. to EN 353-1/CE 0121**  
**Système anti-chute conforme EN 353-1/CE 0121**

Das Stoßschutzgerät mit Hailo Aufhängemittel SP1-50 in Verbindung mit der Haltevorrichtung gemäß EN 341 geprüft worden.  
 System shall be used only with Hailo SP1-50 safety catchers.  
 L'appareil certifié conforme avec le système de réception SP1-50 du Hailo est représenté avec les points selon EN 341.


**Informationen beachten.**  
 Attention! Important! Notice!  
 Les informations le manuel d'information.



**Montiert / Assembled / Montage**

2007 - 08 - 09 - 10 - 11 - 12 - 13 - 14 - 15 - 16

Zusätzlich bei der Montage eintragen bitte, anzuwenden:  
 For assembly, enter as follows as applicable:  
 Pour la montage, entrer les points selon le cas.



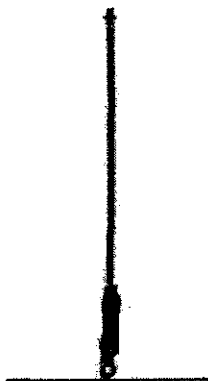
#### 4.2.2.6 Fall absorbers



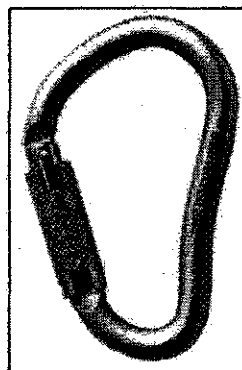
Band fall absorber

Y- , Absorbica-Y-MGO

#### 4.2.2.6 Safety ropes

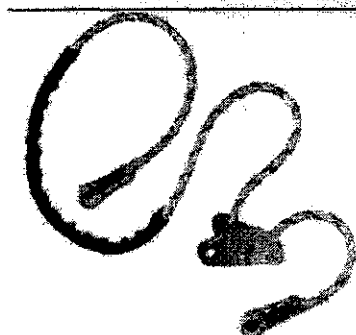


Band fall absorber  
Absorbica-I-MGO (2x)



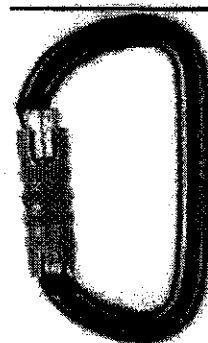
Locking hook steel  
Kador M73, Petzl (1x)

#### 4.2.2.7 Safety rope 6.6 feet or 9.8 feet

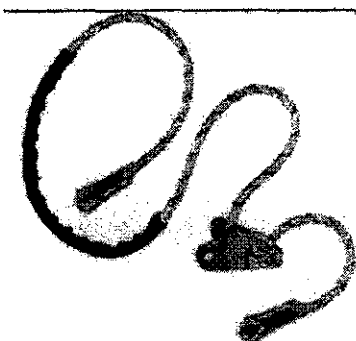


6.6 feet safety rope  
Grillon L52-2, Petzl (1x)

The 2m safety rope only in connection with this locking hook



Locking hook  
Am'D Triact M21, Petzl (2x)



9.8 feet safety rope  
Grillon L52-3, Petzl (1x)

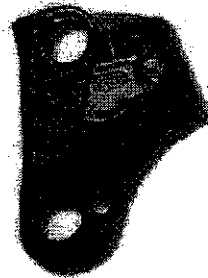
Only use the 3m/9.8 feet - safety rope in connection with this locking hook!



Locking hook steel  
Stahl- Kador M73, Petzl(2x)

#### 4.2.2.8 Rope clip and protective device for working at height

**Only use the rope clip in connection with this locking hook!**



Rope clip without handle  
Basic B18, Petzl



Locking hook  
Oval OK M70, Petzl



Protective device for working at height  
HSG 8.2 feet



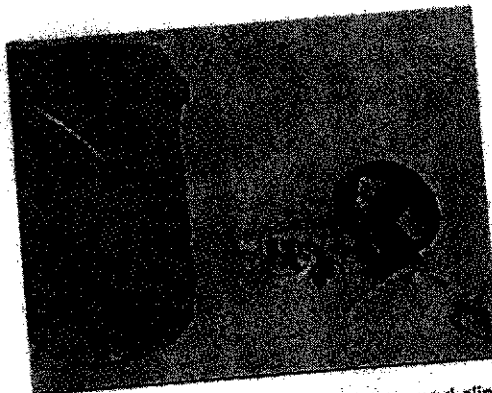
Strap bands with eye  
2.6 feet long

### 4.3 Rescue devices

**WARNING**

The rescue device must be available immediately!

If no rescue device/descender device is available in the nacelle, it must be brought to the nacelle upon beginning of the works!



Lift descender device "Milan" with rung adapter and slinging rope



Accessories for platform rescue





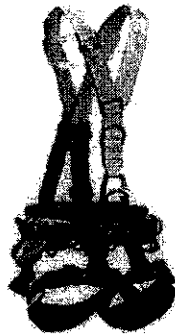
Seal pack

#### 4.4 Correct securing

Personal protective equipments against falling down are catching systems for the securing of persons at an attachment point.

The securing device has to either completely avoid a fall or the person must be caught safely.

The way of the fall is limited thereby and the impacts on the body are reduced to an acceptable amount. The human body can maximally cope with impacts of eight times its own weight.



The safety belt serves for

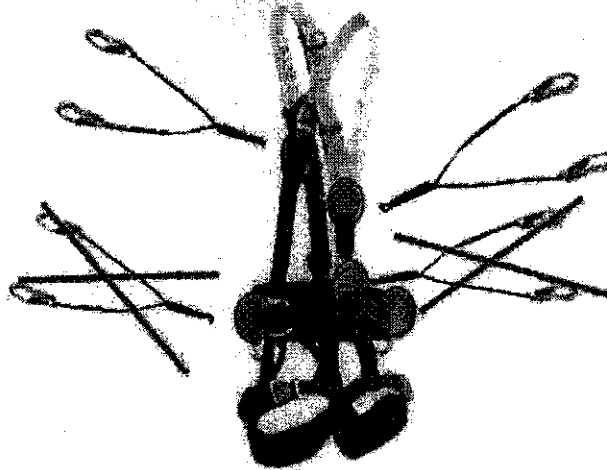
- fall protection
- positioning
- Rescue
- and evacuation



**Permanent securing!**

- The big locking hooks of the fall absorber have to be attached to stable buildings and loops!
- Permanent securing of the fall absorber with at least ONE attached locking hook!

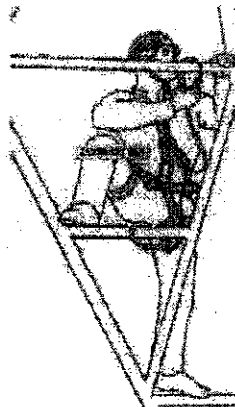
#### 4.4.1 Attachment points for the Fall Absorber



#### **CAUTION**

In case of a fall there is the danger of injury caused by the side securing of the personal protective equipment against falling down!

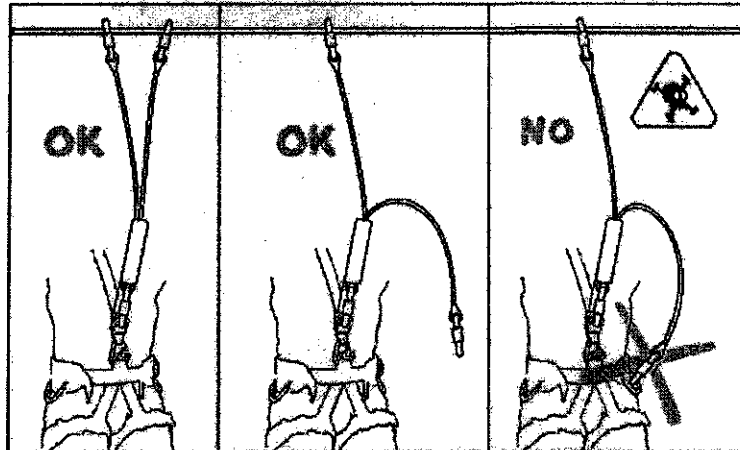
- Do not attach fall absorbers to the lateral attachment rings of the personal protective equipment against falling down! They serve for positioning - not for securing!



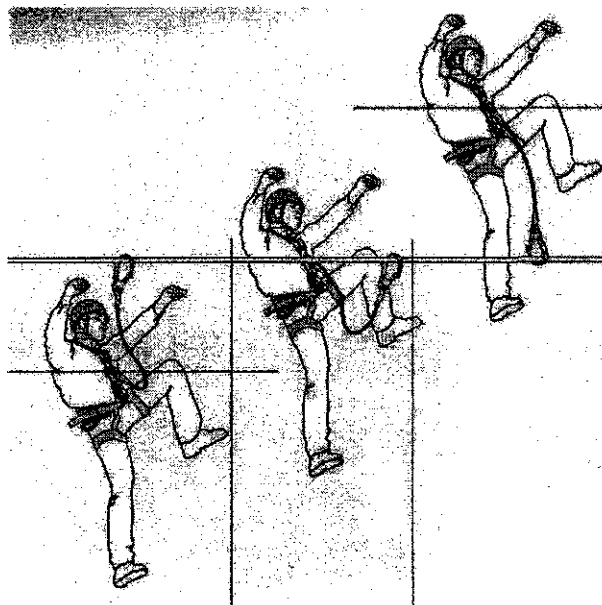
**Permanent securing with at least one fall absorber!**

**⚠ DANGER****Danger of life due to falling down!**

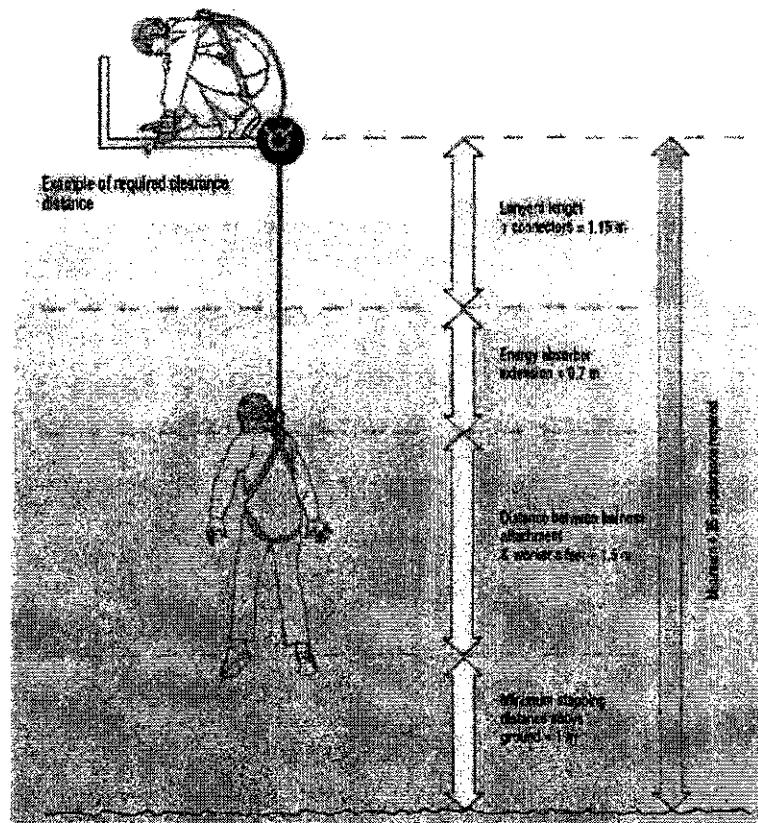
- Permanent securing of the fall absorber with at least one attached locking hook!



- 1 locking hook is always attached, the next one serves for hooking into!



- Consider short way of fall!
- If possible select the highest possible attachment point!

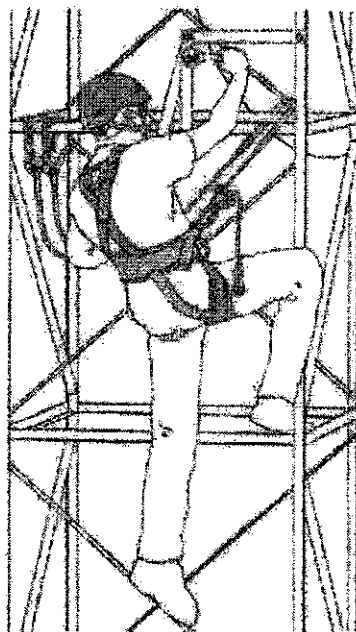
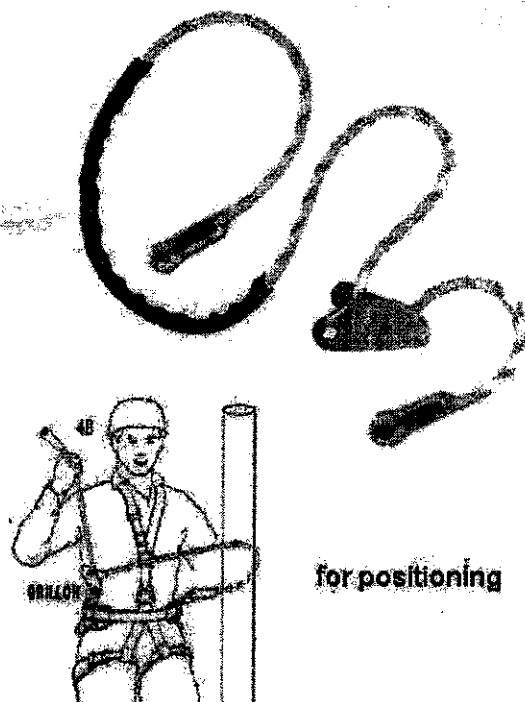


### **⚠ DANGER**

#### **Danger of life in case of insufficient height of fall!**

- The free way of fall with a fall absorber of a length of 6.6 feet must be at least 19.6 feet long.  
With fall absorber length 9.8 feet = 23 feet!
- Keep the safety distance to the impact surface or the impact edge!
- Hook the locking hook of the fall absorber in case of insufficient height of fall as high above the work place as possible!

#### 4.4.2 Positioning



#### WARNING

**Danger of life due to falling down! The positioning line is not a protection against falling down!**

- Permanent securing of the fall absorber with at least one attached locking hook!

## 4.5 Procedures for the rescue of people in an accident

### **DANGER**

After an accident, there is the danger of life for the savior and the person to be rescued!

- With the rescue of people in an accident, the following major points must be observed:
  1. emergency call to the rescue services
  2. self-securing during the rescue
  3. possibly quick rescue
- This requires careful, competent and trained behavior on part of the savior!

### 4.5.1 Rescue of a person from the wind turbine

A safe rescue of an injured person from the wind turbine (ladder, nacelle, hub, platform, blade etc.) can only be granted by training and after comprehensive instruction. The following pictures are an example for a rescue. Only due to training and instruction, the savior is able to take the right steps for the rescue in all situations.

The following generally applies: Attested fitness (examination for capability with certificate) is a prerequisite for the work at/in a wind turbine.

Below, an example for a rescue is documented:



1.

A rescuing person  
coming from above  
on the way to the  
injured person.



2.

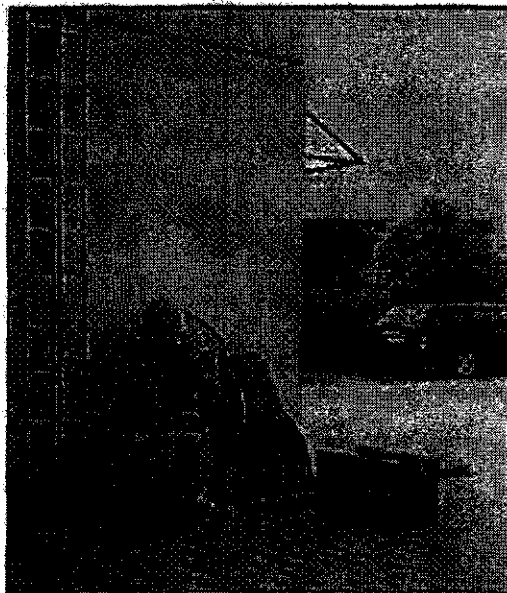
Lift injured person.





3.

Rescue injured  
person.



4.

First aid.

Immediate position-  
ing of the injured  
person after the  
rescue:

- Both legs are bent!

**⚠ DANGER****Danger of life due to motionless suspension in the belt!**

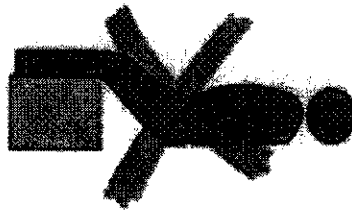
No prolonged suspension in the belt because already after a few minutes the danger of a suspension trauma begins! The blood circulation is no longer guaranteed by the belts!

- If the person concerned is still conscious, he/she must try to move legs and arms!
- A safety rope or a prepared sling serves as a standing support!
- Rescue the injured person as quick as possible - and afterwards bring the person into the crouching position with bent legs!
- No prolonged suspension in the belt because already after a few minutes the danger of a blood stasis (suspension trauma) begins!

## Positioning after the rescue:

**OK !**

- If the injured person is responsive, bring the person into the crouching position as quick as possible. Thus, a quick (fatal) circulation of the body with bad blood from the blood stasis can be avoided.
- This can only be regulated in the crouching position!

**⚠ DANGER**

## Danger of life due to cardiac failure!

- If the rescued person is responsive, bring the person into the crouching position!
- If the rescued person is not responsive, bring the person into the lateral recumbent position (with both legs bent) and monitor the vital functions!

## 4.6 Works at and in a wind turbine



**Danger of life with works in/at a wind turbine in case of strong wind and storm!**

- Maximally admissible wind speed for works at/in the wind turbine 35 knots for the ascension to the tower!
- Maximally admissible wind speed for works in the hub 29 knots!



**Works in a wind turbine are dangerous!**

- Only authorized persons may enter the wind turbine!
- 2 persons must be present on the wind turbine at a time!
- Communication must always be ensured (cell phone, radio and communication within calling distance)!
- It is prohibited to all persons to stay in a transfer station or compact station
- Only instructed personnel and personnel authorized by REpower may operate the control!
- Only persons authorized by REpower may modify control-relevant data and safety installations!
- Only persons authorized by REpower may manually operate the wind turbine and its components!
- After a manual stop, the wind turbine can be re-started remotely – call for active status so that the wind turbine can not be remotely activated!
- After a manual stop, the wind turbine is not free of tension and the rotor retaining brake remains open – there is danger due to electric power and rotating parts!
- Do not open control cabinets!
- Do not remove covers!



**Nacelle roof failure can result in fatal injuries!**

- Do not exceed maximum load: 600 lb/ft<sup>2</sup>.



**⚠ WARNING****High voltage!**

Fatal injuries due to electrocution.

- Do not add additional bores to the generator.

**⚠ CAUTION****Slip ring damage possible!**

- Do not step or stand in the area of the slip ring.

**⚠ CAUTION****Injuries due to falling lid!**

Lids not secured at hinge.

- Take off lid.

**⚠ CAUTION****Escape of pressurized caustic oil vapors!**

Danger of injury of the eyes when opening the gear!

- When opening the gear, protective glasses must be worn!



### 4.6.1 Emergency stop safety installations

In case of danger or with intended isolation of the installation, the emergency stop button must be pushed.

After pushing the EMERGENCY-STOP button, the wind turbine will be switched off immediately. The circuit breaker will open and thus the power section of the wind turbine is released of tension.

#### **CAUTION**

##### **Danger of injury after activation of the EMERGENCY STOP button!**

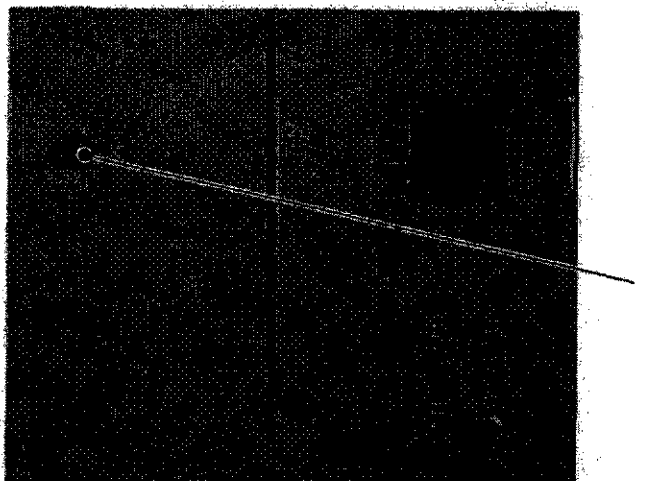
Strong swaying and occurrence of flying sparks, development of smoke and dust due to abrupt braking of the rotor after the activation of the EMERGENCY STOP.

- Hold on!

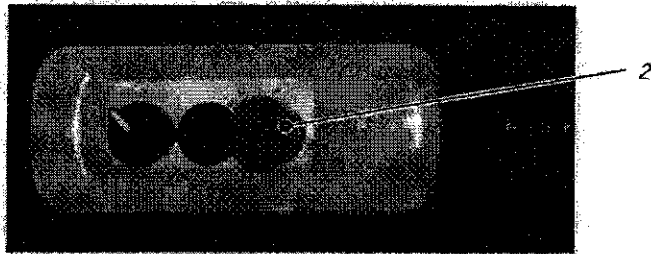
Three EMERGENCY STOP buttons are provided in the wind turbine. Two buttons are in the nacelle, one in the foot of the tower.

The EMERGENCY STOP buttons are only to be activated in dangerous situations or in order to protect against re-start during service measures.

The EMERGENCY STOP buttons in the nacelle are at the top box (1) and at the transportable switch unit (2).

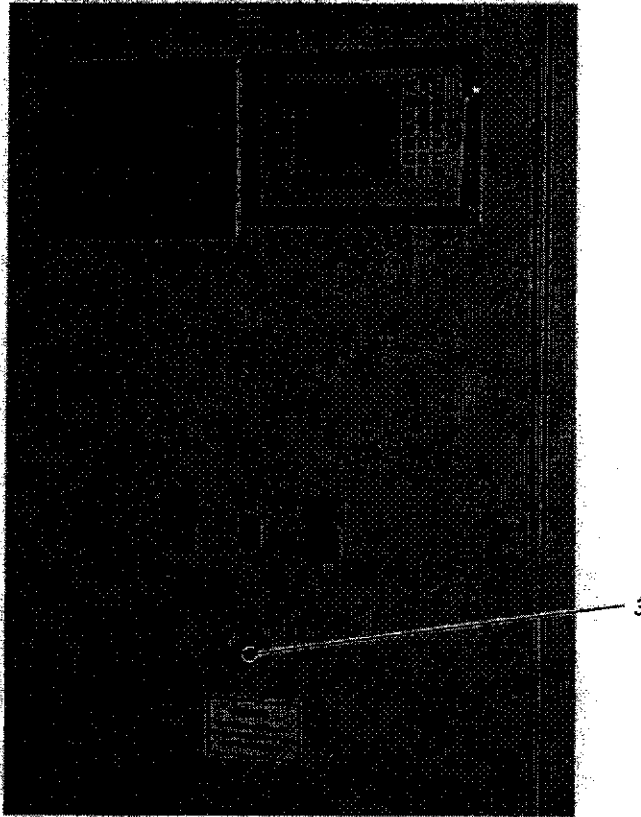


EMERGENCY STOP button in the nacelle at the top box



EMERGENCY STOP button in the nacelle at the transportable switch unit

The EMERGENCY STOP button in the foot of the tower is integrated in the commutation control cabinet (3).



EMERGENCY STOP button in the foot of the tower at the commutation control cabinet

## 4.6.2 Works at electrical installations

### WORKS IN A WIND TURBINE CAN BE DANGEROUS!

Electrical works may only be carried out by skilled and instructed certified electricians. The qualification has to be proven with documented qualification certificates and work-related instructions.

#### **⚠ DANGER**

#### **Danger of life due to electrical shock with electronic works!**

The contractor has to ensure that electrical installations and resources are built, modified and maintained by authorized certified electricians or under the direction and supervision of a certified electrician.

Certified electricians act according to 5 safety rules:

- Release!
- Save against re-start!
- Ascertain that the object is de-energized!
- Ground and short-circuit!
- Cover/fence off neighboring energized parts!

#### **⚠ WARNING**

#### **Electrical facility!**

- Unauthorized access is prohibited.
- For registration, call +49 (0)4841 – 662 8500.

#### **⚠ WARNING**

#### **High voltage!**

Fatal injuries due to electrocution.

- Access for authorized switchgear personnel only.



## SWITCHING FUNCTIONS FOR TURBINE TYPES MD AND MM

Only authorized switchgear personnel may work on the middle and low voltage switchgear.

- ▶ Read and understand the additional safety information:
  - safety instructions in the Operating Manual
  - supplier maintenance instructions

### **Stopping the system manually with generator switch inside the Inverter cabinet (SEG converter)**

- Rotor and stator power circuits are disconnected.
- Optionally, the main switch can be equipped with a closing system.
- All other circuits 575 V, 400 V and 230 V including UPS and pitch system will remain energized.

### **Emergency stop (activating safety chain)**

- When pushing the emergency shutdown button, the generator switch is opened and power is disconnected immediately.
- All automatic functions of the system (accessory drives) are blocked.
- All other circuits 575 V (except generator power circuit), 400 V and 230 V including UPS and pitch system will remain energized.
- Some manual functions can be performed via the maintenance menu.

### **UPS circuits**

- In event of a power failure, power will be supplied for approx. 30 min (computer supply, top box, pitch system).
- The converter controller has a separate UPS.

### **Pitch system (battery maintenance switch and 400 V main switch in the converter box)**

- Switching off the battery maintenance switch only de-energizes the battery voltage in the pitch converter box. The battery box and the cable to the pitch converter box remain energized (max. 260 V DC).
- Switching off the 400 V main switch only de-energizes the battery voltage inside the pitch converter box. The cable to the pitch converter box and the battery box remain energized.

### 4.6.3 Works at the transformer

**⚠ DANGER**

High voltage!

- Disconnect middle voltage and low voltage switchgear before entering the transformer area.



## SWITCHING FUNCTIONS FOR TURBINE TYPES MD AND MM (TT)

Only authorized switchgear personnel may work on the middle and low voltage switchgear.

► Read and understand the additional safety information:

- safety instructions in the Operating Manual
- supplier maintenance instructions

### **MV switchgear (transformer inside the tower)**

- The transformer can be de-energized via the field T2 (circuit breaker at transformer outlet).
- The UPS circuit and pitch systems will remain energized.
- The transformer can only be accessed after grounding the transformer via the MV switch (key lock).
- MV incomer and outlet may remain energized.

### **LV main switch (transformer inside the tower)**

- De-energize transformer on the secondary side via the LV main switch.
- The UPS circuit and pitch system will remain energized after the main switch.
- Access to transformer area is not allowed.

#### 4.6.4 Works at the tower, entry platform and ascension

With works at the tower, the entry platform and the ascension, the following rules must be complied with:



##### Danger of life due to falling down or falling items!

- With works at or in the wind turbine the protective equipment must be worn!
- With works at the wind turbine, the wind turbine must be in STOP/BREAK or similar status!
- It is prohibited to go up via the ladder or an ascension system without wearing the personal protective equipment against falling down!
- Tools may only be taken up in suitable secure transport bags!
- The hatches must be closed after going through!
- Only hook off of the ladder after securing with the fall absorber!
- A protective helmet with lamp and gloves must always be worn!
- Only one person may climb up the ladder to the next platform!
- Permanent securing with the fall absorber with a fall protection slide or with the locking hook!



##### Fatal injuries possible when rotor blades are icy!

Falling ice chunks!

- Keep distance when rotor is in motion!



##### Health hazard when working at the outer tower!

- If with works at the outer tower the distance to the tip of the blade is less than 16.4 feet, the rotor must be locked mechanically!



##### Exceed load limits will damage the platform!

- Do not exceed maximum loads:
  4. Concentrated load: 400lb/(0.6ft x 0.6ft)
  5. Area load: 60lb/ft²

#### 4.6.4.1 Attachment points for the ascension



##### **Danger of falling down !**

- Do not use the rungs of the ladder for securing!
- Secure at the ascension protection rail, side frames of the ladder or at the fixings of the ladder!
- The hatches of the platforms must be closed after going through!

#### 4.6.4.2 Use of ascension systems

When using ascension systems, the following rules must be complied with:



##### **Danger of accidents when using the ascension system!**

The ascension system may only be used by instructed persons!

- When descending someone manually, all the safety switch off installations of the ascension system are not functioning!
- Danger of squeezing when leaving the cabin to neighboring components (e.g. railing).
- Danger of collision of the cabin with persons and items!
- The complete personal protective equipment against falling down must be donned before ascending (power failure)!
- The rescue devices have to be carried along!
- The maximum working load according to the manufacturer's data must be observed! This is indicated at the ascension system!
- A cell phone and a radio device must be carried along.
- Use of marked attachment points.
- Automatic operation: It must be ensured that there is always a person at the target platform!
- In case of power failure/technical disturbances: Conduct according to the operation instructions – information via radio/cell phone!
- In order not to endanger other persons and oneself and not to damage the installation, it is important to always observe the way in ascension direction!

### 4.6.5 Working in the nacelle

During service works at the blade adjustment or at the strand of the drive, the EMERGENCY STOP button or maintenance button have to be activated (activation of the rotor retaining brake). After the activation of the rotor retaining brake, the rotor must be locked mechanically (refer to 4.6.8 in this chapter).

The rotor retaining brake should always remain activated. Only when working directly at the braking system or at the drive the rotor retaining brake may be opened as long as the ambient conditions and the state of the wind turbine are observed.



#### Danger of life with works in the operating status!

- With works in the nacelle of the wind turbine, the wind turbine must be in STOP/BREAK or similar status!
- The rotor must be locked mechanically!
- It is prohibited to work in the wind turbine when only the hydraulic brake is activated!
- Smoking is prohibited in the wind turbine!



#### Danger of injury of the eyes when opening the gear!

Escape of pressurized caustic oil vapors.

- When opening the gear, protective glasses must be worn!



#### Head injuries due to interference edges upon works in the nacelle!

- With works in the nacelle, a safety bump cap must be worn!



## SAFETY INSTRUCTIONS

### Observe the following when working in the nacelle:

- ▶ Wear fall protection equipment at all times:
  - safety harness
  - lanyard with energy absorber
  - adjustable lanyard
  - fall arrest device
  - safety shoes and helmet
- ▶ Before working in the nacelle, set the service switch on the top box to "Engage Brake" and select "Request activestate" in the control system computer.
- ▶ Do not touch moving parts.
- ▶ Observe safety signs in the wind turbine.
- ▶ Observe additional safety instructions in the Operating Manual.

### Observe the following when working on the electrical system:

- ▶ Before carrying out any work on the system, disconnect main power and secure it against being reconnected.

### Observe the following when working on the gear box and at the rotor brake:

- ▶ Push the emergency shutdown button to engage the rotor brake.
- ▶ Ensure the rotor is stationary.
- ▶ Lock the rotor.

### Observe the following when working on top of the nacelle roof:

- ▶ Use only the rear hatch above the generator to climb onto the roof of the nacelle.
- ▶ Secure the safety lanyard with energy absorber to the weather mast or to an eyebolt.
- ▶ Do not use the front hatch to climb onto the nacelle roof. There are no attachment points for the lanyard with energy absorber. The front hatch may only be used for controlling the rotor blades visually.

### Observe the following when working with the crane:

Make sure that only authorized and trained qualified personnel operate the crane.

- ▶ Make sure that the system is stationary.

## SAFETY INSTRUCTIONS

Only trained operators and service personnel are allowed access to the wind turbine. Other persons may only enter the wind turbine accompanied by trained operators or service personnel and after being instructed in the safety requirements.

**Observe the following at all times:**

- ▶ Never work alone in the wind turbine.
- ▶ Do not smoke.
- ▶ Read and understand the additional safety information:
  - safety signs inside the wind turbine
  - escape and rescue plan
  - directives
  - safety instructions in the Operating Manual

**Observe the following when ascending and descending the tower:**

Do not ascend when:

- wind speed  $\geq 35$  knots (18 m/s)
- the ladder is icy
- ▶ Before ascending the tower:
  - stop the wind turbine
  - switch on the tower lights
  - hang up the sign "Work in progress on this wind turbine" at the control cabinet
- ▶ Wear fall protection equipment when ascending and descending and for protection against falling objects:
  - safety harness
  - lanyard with energy absorber
  - adjustable lanyard
  - fall arrest device
  - safety shoes and helmet
- ▶ Carry a mobile phone to place emergency calls.
- ▶ Carry all tools and small parts in suitable transport pouches.
- ▶ When moving onto or off of the ladder, always secure the lanyard with energy absorber at an attachment point.

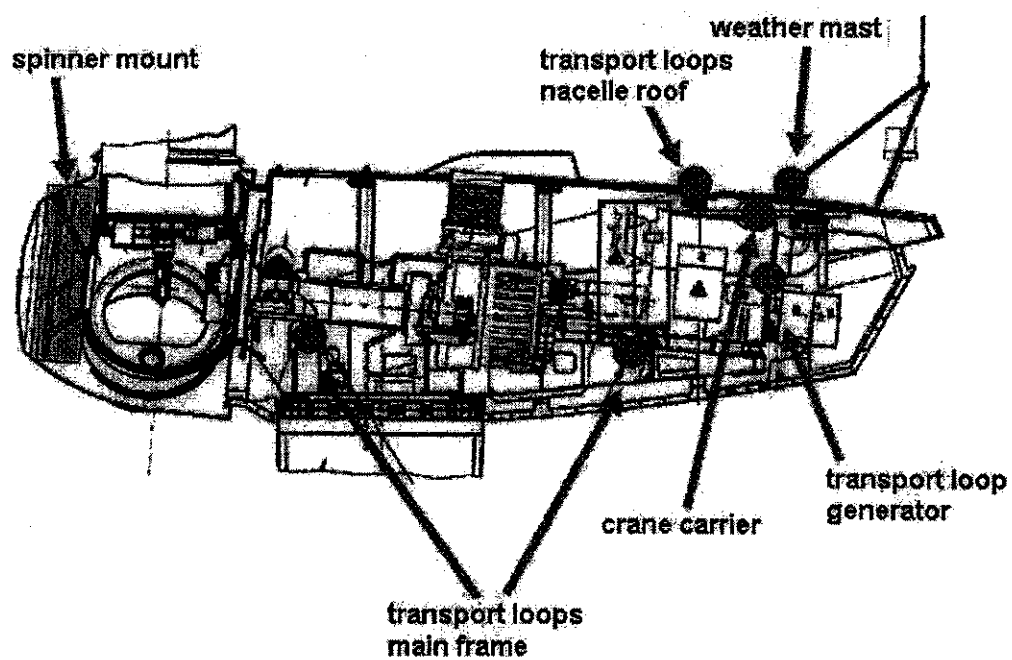
**Observe the following when working on the electrical system:**

- ▶ Disconnect main power switch and secure it from being reconnected before carrying out any work on the system.
- ▶ Ear protection must be worn when staying > 30 min due to noise emission from ventilators in transformer area and converter cabinet.

**Emergency equipment:**

- Fire extinguishers and first-aid kits are located in the tower base and in the nacelle respectively.
- An emergency flashlight is located in the nacelle.

#### 4.6.6 Attachment points of the nacelle





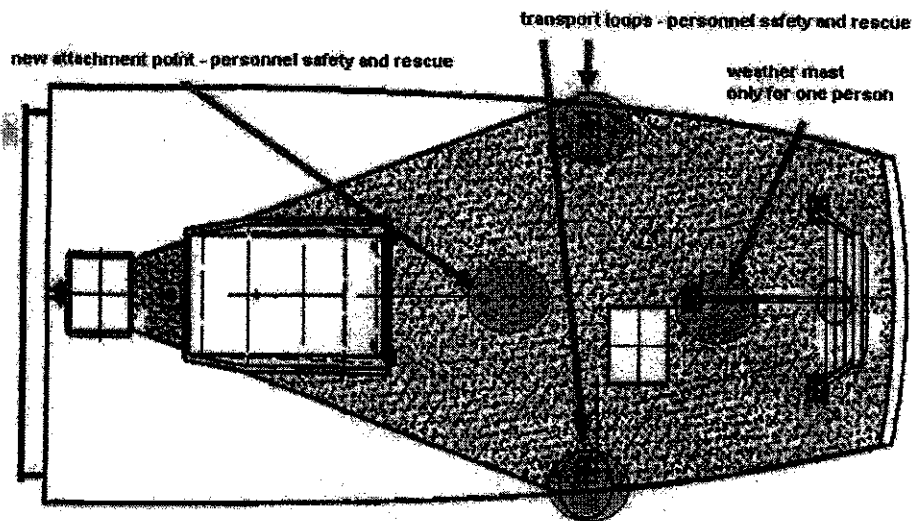
#### 4.6.7 Working on the roof of the nacelle

##### **⚠ DANGER**

**Danger of life due to falling down!**

- Working on the roof of the nacelle is only admitted with donned personal protective equipment against falling down!
- Works on the roof are only to be carried out with 2 fall absorbers and/or a Y fall absorber!
- The fall absorbers must be alternately fixed at attachment points with always one locking hook in one attachment point!
- The marked attachment points (weather mast/transport loops) must be used!
- With works on the roof of the nacelle, a protective helmet must be worn!

##### 4.6.7.1 Attachment points on the roof of the nacelle



##### **⚠ DANGER**

**Danger of life if the body is not secured with at least one fall absorber!**

- Permanent securing with at least one fall absorber!
- Permanent securing of the fall absorber with at least one attached locking hook!

#### 4.6.8 Working in the rotor hub / rotor locking

During service works at the blade adjustment or at the strand of the drive, the EMERGENCY STOP button or maintenance button must be activated (activation of the rotor retaining brake). After the activation of the rotor retaining brake, the rotor must be locked mechanically.

Only when working directly at the braking system or at the drive the rotor retaining brake may be opened as long as the ambient conditions and the state of the wind turbine are observed.

#### WARNING

##### Danger of life when working in the rotor hub!

The following rules must be complied with:

- The rotor locking may never be used to brake the rotor!
- Going through to the hub only after activating the EMERGENCY STOP and locking of both rotor lockings! Check for secure fit.
- The rotor locking and the rotor retaining brake (EMERGENCY STOP) always must be activated!
- Maximally admissible wind speed for works at/in the wind turbine = 29 knots!
- Acoustic warning after opening of the gate with unlocked rotor locking: Lock rotor locking!
- When all 3 blades are in feathering position (ca. 90° pitch angle), working in the hub is admissible after locking the rotor locking and activation of the EMERGENCY STOP button but only until a middle wind speed of  $V_{middle} = 29$  knots!
- When after a disturbance in the blade adjustment system one or more blades are not in the feathering position (ca. 90° pitch angle), working in the hub is admissible after locking the rotor locking and activation of the EMERGENCY STOP button but only until a middle wind speed of  $V_{middle} = 19$  knots!
- The collective adjustment of the blades with locked rotor is only admissible with a maximum wind speed of  $V_{max} = 23$  knots!
- The adjustment of a single blade (2 blades fix in feathering position) with locked rotor is only admitted until a wind speed of  $V_{middle} = 29$  knots in the 10 minutes average!
- If all 3 rotor blades should not be in the feathering position and at the same time the rotor retaining brake be without effect, the rotor locking has to remain locked!
- When the wind increases to higher wind speeds, the works have to be interrupted and the rotor hub has to be left!
- After the completion of works, the locking device has to be set back and secured completely!
- With electric works in the hub, there are special dangers due to the special conductivity of the room and due to the alimentation with batteries!

#### 4.6.8.1 Lock the rotor locking

Before the beginning of longer service works during which the rotor locking has to be locked, a weather forecast for the planned maintenance duration has to be consulted in order to ensure that the admissible wind conditions are not exceeded.

If the wind nevertheless increases to higher speeds than forecasted, the works must be interrupted. If possible, in such cases the locking must be released upon leaving the wind turbine.

If the release of the locking should not be technically possible, it must be ensured that all blades are in the feathering position and the wind tracking is activated. In this state, the wind turbine is designed for the first yearly storm of the respective wind class (different wind speeds for different hub heights).

#### **WARNING**

**Moving rotor can result in fatal injuries!**

Before entering:

- Ensure rotor is stationary!
- Lock rotor!

#### **WARNING**

**Rotor brake will disengage during power fails!**

Moving rotor can result in fatal injuries.

- Push emergency shutdown button to engage rotor brake!
- Ensure rotor is stationary!
- Lock rotor!

#### **NOTICE**

**Damages to the wind turbine with locked rotor locking with wind speeds higher than 29 knots!**

- Never use the rotor locking to brake the rotor!
- The activation of the rotor locking may only be carried out when all 3 blades are in the feathering position (approx. 90° pitch angle)!
- The locking may only be locked until a wind speed of up to 29 knots - precondition: all 3 blades are in the feathering position (approx. 90° pitch angle)!

## SAFETY INSTRUCTIONS

**Improper use of the rotor lock may result in serious injury and severe damage to the system!**

- ▶ Never use the rotor lock as brake.
- ▶ Do not lock the rotor unless
  - wind speed  $\leq 29$  knots (15 m/s)
  - all 3 blades are in the 90° feathered position

### **Lock rotor**

- ▶ Push emergency shutdown button to engage rotor brake.
- ▶ Make sure that rotor is stationary.
- ▶ Lock rotor using both locking pins:
  - insert left locking pin into the rotor locking disk
  - insert right locking pin into the rotor locking disk

### **After finishing work, unlock rotor:**

- ▶ Release and secure right locking pin.
- ▶ Release and secure left locking pin.

## WARNING

**Rotor brake will disengage during power fails!**

Moving rotor can result in fatal injuries.

- Push emergency shutdown button to engage rotor brake!
- Ensure rotor is stationary!
- Lock rotor!

## SAFETY INSTRUCTIONS

**In event of power failure, the rotor brake can be engaged manually for maintenance work.**

### **At the hydraulic unit:**

- ▶ Use the hand pump to apply hydraulic pressure to the reservoir.
- ▶ Engage the rotor brake with the brake valve.

#### 4.6.9 Working with the deck crane

When working with deck crane the following rules must be complied with:



##### Fall hazard!

Fatal injuries possible!

- Make sure that the system is stationary!
- Secure lanyard with energy absorber to crane carrier!
- Close safety gate before opening crane hatch!



##### Falling loads!

Fatal injuries possible!

- Do not exceed maximum lifting load: 550lb

## 4.7 Completion of the works at the wind turbine

Before the completion of the works, the following checks must be carried out:

### SAFETY INSTRUCTIONS

#### Check the following before finishing work:

- Rotor is not locked
- Active status is reset
- Status codes are reset
- All parameters are set to standard
- Service switch is set to position "0"
- Pitch power supply is turned on
- On the crane, the chain hoist is in upper end position and secured
- Crane hatch and roof hatches are secured

### 4.7.1 Start work at the wind turbine

Before start works, the following checks must be carried out:

#### COVERING

#### Danger of life due to unsafe state of the wind turbine!

The wind turbine may only be started if the following notes have been observed:

- no unauthorized persons in the nacelle
- no locking locked
- no manual switching states
- no open control cabinets
- no tools or other items in the wind turbine
- all covers have to be mounted
- all hatches of the nacelle and the tower have to be closed

## 4.8 Working materials

### 4.8.1 Electric appliances



**Danger of accident due to faulty electric appliances and their protection !**

The consequences due to faulty electric appliances and safety devices are the following:

6. Electric shock, ventricular fibrillation, cardiac arrest, electric arc, burns, falling down because of electric impacts, tool specific mechanical dangers
  7. Danger of squeezing and danger of accident when working with a hydraulic screwdriver!
- Visual check of the electric appliances for faults before use. Do not use faulty working materials! Daily check the fault-current circuit breaker (RCD) by pushing the test key!
  - Use only checked electrical appliances (approval sticker)

## 4.8.2 Hydraulic screwdriver

### **CAUTION**

**Danger of squeezing and danger of accident when working with a hydraulic screwdriver!**

Danger of squeezing between the torque arm (rest) and the component (abutment – e.g. other screws)!

- Use only after instructions have been carried out!
- Danger of squeezing between the torque arm (rest) and the component (abutment – e.g. other screws)!
- Only use hydraulic screwdriver when there are no visible oil leaks and leaks, when the approval date has not been exceeded and when the sockets are not worn!
- Do not stay within the pressure direction of the screwing device during work since components or the screw connections could tear and the device could spin off of the screwing!
- The remote control may only be operated by the person working with the tools. In the case of aggravated conditions, safe operation has to be granted by direct communication of the staff!
- Only transport and hold the device with the provided handles!
- The settings of the safety valve may not be changed!
- Make sure to have a safe and form-closed connection between the device and the screwing as well as between the rest and the abutment!
- Make sure to have a correct locking of the hose coupling. Securing the hose coupling with thread ring!



### 4.8.3 Hazardous substances

Hazardous substances are substances with dangerous characteristics which can harm to health and environment!

Hazardous substances come with the following symbols. If the working materials (hazardous substances) with the following symbols are used, the safety notes belonging to the warning symbols must be read (refer to chapter 7 in this manual).



**Explosive!**

- Is not used at REpower!



**Oxidizing!**

- Is not used at REpower!



**Highly flammable!**

- For safety instructions in the valid version refer to chapter 7 in this manual!

Asi-AW-083

Asi-AW-087

Asi-AW-088

Asi-AW-089

**Easily flammable!**

- For safety instructions in the valid version refer to chapter 7 in this manual

Asi-AW-036

**Flammable!**

- Is not used at REpower!

**Very toxic!**

- Is not used at REpower!

**Toxic!**

- Is not used at REpower!

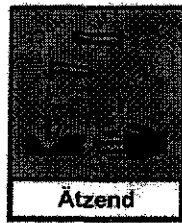
**Dangerous to health!**

- For safety instructions in the valid version refer to chapter 7 in this manual!

Asi-AW-082

Asi-AW-086

Asi-AW-089

**Caustic!**

- For safety instructions in the valid version refer to chapter 7 in this manual!

Asi-AW-085

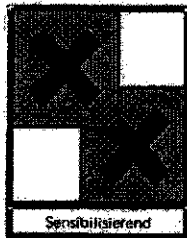
**Irritant!**

- For safety instructions in the valid version refer to chapter 7 in this manual!

Asi-AW-084

Asi-AW-087

Asi-AW-088

**Sensitizing!**

- Is not used at REpower!

**Carcinogenic, toxic for reproduction or mutagenic!**

- Is not used at REpower!

**Environmentally hazardous!**

- For safety instructions in the valid version refer to chapter 7 in this manual!

Asi-AW-085

Asi-AW-087

Asi-AW-090

**Danger of life due to the wrong use of hazardous substances!**

- For your own safety, it is absolutely necessary to read the COSHH operating instructions - Register of hazardous substances - COSHH and the safety data sheets (refer to chapter 7) belonging to the hazardous substances, before dealing with a hazardous substance!
- Hazardous substances and biological working substances must be packaged and labeled according to their dangerous characteristics!
- Containers/bundles must be stored at a well-ventilated place and must be kept closed.
- Keep away from ignition sources – do not smoke!
- Avoid eye and skin contact and contact with clothing!
- Do not inhale vapors!
- Wear suitable protective gloves made of plastic or PVC. In the case of risk of splashing, protective glasses are necessary!
- Use moisturizing hand cream after work!
- Product residuals and contaminated products as well as packaging are to be disposed of according to waste legislation!
- Do not dispose of together with domestic waste!
- Hazardous substances may not reach the sewerage system!
- Garbage cans and empty containers must be disposed of according to state legislation!

#### 4.8.4 Ladders and stairs

Safe use of ladders is very important for working with REpower.

Ladders have to be checked and must be in perfect condition. Every ladder must dispose of a test seal and operating instructions. Before use, check the ladder for damages.

#### CAUTION

Risk of injury at the access to the nacelle on the construction site!



The straight ladder is too short.

Danger of falling of lateral wooden boards – there is no barrier!

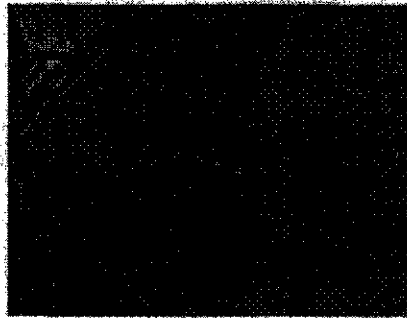
- Mounting with secured additional ladder!
- Hold onto fixed parts!

#### 4.8.4.1 Safe use of straight ladders

##### CAUTION

##### Risk of injury!

- Fasten the base points of the ladder!
- A load-bearing base must be built against subsiding!
- Slipping off must be avoided through skid proof base points or through tying!
- Create abutment through holding person!



##### CAUTION

##### Risk of injury!

- The upper point of application must be safe!
- The ladder has to rest on both points of application!
- Do not lean against glass panes, tensioning wires, rods or unclosed doors!



**CAUTION****Risk of injury!**

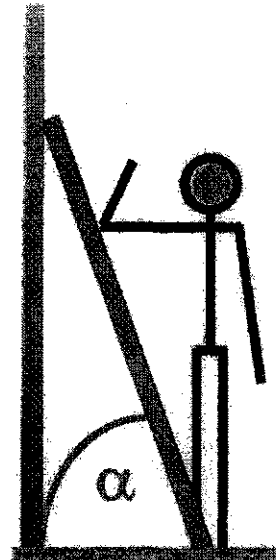
- Make sure to have the correct clearance angle!
- Correct clearance angle must be made sure through elbow test as shown!

Step ladders:

$\alpha = 60 - 70^\circ$

Rung ladders:

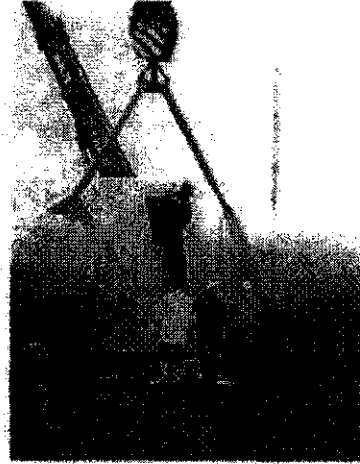
$\alpha = 65 - 75^\circ$

**CAUTION****Risk of injury!**

- Observe the standing height!
- Only use ladders that are high enough!
- Do not step on the upper rungs!
- Runners must not be extended as a makeshift!
- Standing surface max. 23 feet above floor!
- When climbing: The ladder has to jut out of the exit point at least 3 feet!

**⚠ CAUTION****Risk of injury!**

- Safe working through complying with the rules!
- When carrying out work, both feet on the rung!
- Never work longer than 2 hours standing on the straight ladder!
- Work which could make the ladder fall down is not admissible!
- Only carry along material and tools with less than 22 lbs!
- Do not carry along things with a wind surface of more than 10 ft²!
- Do not use hazardous substances which are an additional danger for the employees!



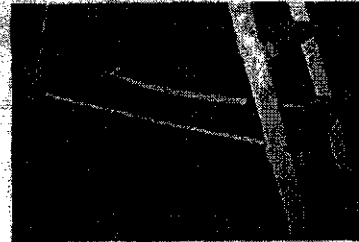


#### 4.8.4.2 Safe use of step ladders

##### CAUTION

##### Risk of injury!

- Spreading lock and stand protection must be effective!
- Do only work with fixed spreading locks!
- Erect in a stable position and protect against subsiding and against falling!



##### CAUTION

##### Risk of injury!

- Do not use the upper step without securing!
- Upper step or rung may only be mounted onto when using the ladder stabilizer and the holding appliance!
- Do not climb over from step ladders to other work places and traffic routes!
- Do not use step ladders as straight ladders!



## 4.9 Particular danger situations

In the environment of the wind turbine there are particular dangers due to fire, falling ice, storm and failure of technical components.

- In the environment and on access paths, danger signs pointing out to the respective dangers have to be installed!

### 4.9.1 Behavior in case of fire

In case of fire, there is always the risk of panic – stay calm! Follow the escape and rescue plan for the wind turbine (refer to chapter 7). Leave the wind turbine / the nacelle using the personal protective equipment against falling down and using rescue devices.



**Danger of life in the case of fire!**

Inhaling smoke of fire is life-threatening!

- Please follow the escape and rescue plan (refer to chapter 7)!
- In case of being in the nacelle, leave the wind turbine using the personal protective equipment and rescue devices via the marked attachment points / escape ways!
- In case of attempts to extinguish fire, this may only be done under consideration of the possible dangers to yourself!
- If the fire cannot be extinguished immediately, an area of 1640 feet around the wind turbine has to be cordoned!
- The emergency call has to be transmitted immediately, and special task forces have to be called for (rescue from heights).
- In case of emergency, the rescue device / rope-down device is only fixed at one of the marked attachment points!
- Users have to have had theoretical and practical training concerning the safe use of the personal protective equipment against falling down for rescuing people.
- Continuous securing of all persons within the area of risk of falling.
- The personal protective equipment against falling for rescuing has to be used according to the safety rules and the operating instructions.
- The personal protective equipment against falling for rescuing persons may not be used for other purposes.
- Take into consideration possible damages of the personal protective equipment against falling for rescuing due to sharp edges.



**The rescue device has to be available immediately!**

- If no rescue device / rope down device is available in the nacelle, it must be brought to the nacelle upon beginning of the works!

## 4.9.2 Escape and rescue plan

Refer to chapter 7.

## 4.9.3 Uncontrolled speeding up of the rotor

In case of failure of all 3 safety systems, which are independent of each other, there is the danger that the rotor speeds up in an uncontrolled manner. In this case, the following rules must be observed :

### DANGER

In case of uncontrolled rotor speed there is danger of life due to components and parts flying around!

- Label all installations and access paths to point out the respective dangers in the area around the wind turbine!
- Do not try to reduce damage – leave the wind turbine immediately and go away from the installation!
- There must not be any persons within the area of 1640 feet around!
- Organize barriers for the area of 1640 feet around!

## 4.9.4 Thunder storms

Wind turbines are endangered due to storms.

### WARNING

In case of storm there is danger of life due to lightning stroke or static charge!

- Works at the wind turbine must be interrupted immediately in case of a thunder storm gathering and the wind turbine must be left immediately!
- In case of thunder storm no persons may be on the wind turbine or next to the wind turbine!
- The wind turbine may be accessed again only 1 hour after a thunder storm (electrostatic charge)! - In case that there are still sizzling noises after one hour, keep on waiting until these noises cannot be heard anymore!
- If the service personnel cannot leave the nacelle in time, do not climb down! Stay in the nacelle and do not stand on metal parts or touch them!

#### 4.9.5 Falling ice

In case of ice on a wind turbine, the following rules must be observed:

**Danger of life due to falling ice!**

Staying next to an iced wind turbine is life threatening!

- In so far as the wind turbine is less distant to public ways or buildings than 820 feet, the operator must stop the wind turbine as soon as the rotors could be iced!

#### 4.10 Management of employees and organization of the construction site

On construction sites, there are various dangers which are registered, coordinated and controlled by the REpower construction site management. For this, responsible persons will be designated who organize the construction site, compile check lists and instruct employees. All measures are supervised with the REpower construction site management.

In order to avoid accidents, potential dangers and the required accident prevention measures are documented in a Safety and Health Protection Plan (SIGE-Plan).

The SIGE plan estimates the danger potentials for each danger and documents the corresponding accident prevention measures.

##### 4.10.1 REpower construction site and organization

The REpower construction site regulations must be known and understood by all participating parties! The instruction on the construction site regulations and its safety systems must be documented.

- The instruction has to enable the employees to carry out all relevant works according to the safety regulations. All risks and the required measures for the prevention of dangers have to be discussed, understood and organized!
- The instructions are carried out by persons authorized and qualified by REpower.