

Legal Department

December 28, 2010

Chairman Alan Schriber
Ohio Power Siting Board
Public Utilities Commission of Ohio
180 East Broad Street
Columbus, OH 43215-3793

Matthew J. Satterwhite
Senior Counsel –
Regulatory Services
(614) 716-1915 (P)
(614) 716-2014 (F)
mjsatterwhite@aep.com

Re: **In the Matter of Pickaway Manor**)
Care Ctr and Columbus Southern)
Power Company for Approval of a) **Case No. 10-1835-EL-EEC**
Special Arrangement Agreement)
with a Mercantile Customer)

Dear Chairman Schriber,

Attached please find the Joint Application of Columbus Southern Power (CSP) and mercantile customer **Pickaway Manor Care Ctr** for approval of a Special Arrangement of the commitment of energy efficiency/peak demand reduction (EE/PDR) resources toward compliance with the statutory benchmarks.

Amended Substitute Senate Bill 221 sets forth in R.C. 4928.66 EE/PDR benchmarks that electric distribution utilities shall be required to meet or exceed. The statute allows utilities to include EE/PDR resources committed by mercantile customers for integration into the utilities programs to be counted toward compliance with a utility's EE/PDR benchmarks. The statute also enables the Commission to approve special arrangements for mercantile customers that commit EE/PDR resources to be counted toward compliance with EE/PDR benchmarks.

The Commission's Order in Case No. 10-834-EL-EEC, established a streamlined process to expedite review of these special arrangements by developing a sample application process for parties to follow for consideration of such programs implemented during the prior three calendar years. Attached is CSP's version of that application and accompanying affidavit. Any confidential information referenced in the Joint Application has been filed in Commission Docket 10-1799-EL-EEC, under a request for protective treatment. CSP respectfully requests that the Commission treat the two cases as associated dockets.

Cordially,

/s/ Matthew J. Satterwhite
Matthew J. Satterwhite, Senior Counsel

Attachments



Public Utilities Commission

Application to Commit Energy Efficiency/Peak Demand Reduction Programs (Mercantile Customers Only)

Case No.: 10-1835-EL-EEC

Rule 4901:1-39-05(F), Ohio Administrative Code (O.A.C.), permits a mercantile customer to file, either individually or jointly with an electric utility, an application to commit the customer's existing demand reduction, demand response, and energy efficiency programs for integration with the electric utility's programs. The following application form is to be used by mercantile customers, either individually or jointly with their electric utility, to apply for commitment of such programs implemented during the prior three calendar years.

Completed applications requesting the cash rebate reasonable arrangement option (Option 1) in lieu of an exemption from the rider will be automatically approved on the sixty-first calendar day after filing, unless the Commission, or an attorney examiner, suspends or denies the application prior to that time. Completed applications requesting the exemption from the electric utilities' energy efficiency rider option (Option 2) will not qualify for the 60-day automatic approval.

Complete a separate application for each customer program. Projects undertaken by a customer as a single program at a single location or at various locations within the same service territory should be submitted together as a single program filing, when possible. Check all boxes that are applicable to your program. For each box checked, be sure to complete all subparts of the question, and provide all requested additional information. Submittal of incomplete applications may result in a suspension of the automatic approval process or denial of the application.

If you consider some of the items requested in the application to be confidential or trade secret information, please file a copy of the application under seal, along with a motion for protective order pertaining to the material you believe to be confidential. Please also file a copy of the application in the public docket, with the information you believe to be confidential redacted.

Section 1: Company Information

Name: PICKAWAY MANOR CARE CTR

Principal address: 391 Clark Drive, Circleville, Oh 43113

Address of facility for which this energy efficiency program applies: 391 Clark Dr,
Circleville, Oh 43113-1561

Name and telephone number for responses to questions:

Gary Roush, Pickaway Manor Care Ctr, (740) 474-6036

Electricity use by our company (at least one must apply to your company – check the box or boxes that apply):

- ☒ We use more than seven hundred thousand kilowatt hours per year at our facility. (Please attach documentation)

See Confidential and Proprietary Attachment 4 - Calculation of Rider Exemption and UCT which provides the facility consumption for the last three years, benchmark kWh, and the last 12 months usage.

- ☐ We are part of a national account involving multiple facilities in one or more states. (Please attach documentation.) When checked, see Attachment 6 - Supporting Documentation for a listing of the customer's name and service addresses of other accounts in the AEP Ohio service territory.

Section 2: Application Information

A) We are filing this application (choose which applies):

- ☐ Individually, on our own.
- ☒ Jointly with our electric utility.

B) Our electric utility is: Columbus Southern Power Company

The application to participate in the electric utility energy efficiency program is
"Confidential and Proprietary Attachment 3 – Self Direct Program Project
Completed Application."

C) We are offering to commit (choose which applies):

- ☐ Energy savings from our energy efficiency program. (Complete Sections 3, 5, 6, and 7.)
- ☐ Demand reduction from our demand response/demand reduction program. (Complete Sections 4, 5, 6, and 7.)
- ☒ Both the energy savings and the demand reduction from our energy efficiency program. (Complete all sections of the Application.)

Section 3: Energy Efficiency Programs

A) Our energy efficiency program involves (choose whichever applies):

- ☒ Early replacement of fully functioning equipment with new equipment. (Provide the date on which you replaced your fully functioning equipment, 8/19/2009 and the date on which you would have replaced your equipment if you had not replaced it early. Please include a brief explanation for how you determined this future replacement date (or, if not known, please explain why this is not known)).

The remaining life of the equipment varies and is not known with certainty. The future replacement date is unknown and has historically been at the end of equipment life. Replacement was completed early to achieve energy savings and to reduce future maintenance costs.

- ☐ Installation of new equipment to replace equipment that needed to be replaced. We installed our new equipment on the following date(s):
- ☐ Installation of new equipment for new construction or facility expansion. We installed our new equipment on the following date(s):

B) Energy savings achieved/to be achieved by your energy efficiency program:

- a) If you checked the box indicating that your project involves the early replacement of fully functioning equipment replaced with new equipment, then calculate the annual savings [(kWh used by the original equipment) - (kWh used by new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Unit Quantity (watts) = Existing (watts x units) - Installed (watts x units)

kWh Reduction (Annual Savings) = Unit Quantity x (Deemed kWh/Unit)

Annual savings: 35,912 kWh

See Confidential and Proprietary Attachment 5 - Self Direct Program Project Calculation for annual energy savings calculations and Attachment 8 - Prescriptive Protocols for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed.

- b) If you checked the box indicating that you installed new equipment to replace equipment that needed to be replaced, then calculate the annual savings [(kWh used by less efficient new equipment) - (kWh used by the higher efficiency new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Annual savings: kWh

Please describe the less efficient new equipment that you rejected in favor of the more efficient new equipment.

- c) If you checked the box indicating that your project involves equipment for new construction or facility expansion, then calculate the annual savings [(kWh used by less efficient new equipment) - (kWh used by higher efficiency new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Annual savings: kWh

Please describe the less efficient new equipment that you rejected in favor of the more efficient new equipment.

Section 4: Demand Reduction/Demand Response Programs

A) Our program involves (choose which applies):

- ☒ Coincident peak-demand savings from our energy efficiency program.
- ☐ Actual peak-demand reduction. (Attach a description and documentation of the peak-demand reduction.)
- ☐ Potential peak-demand reduction (choose which applies):

➤ Choose one or more of the following that applies:

- ☐ Our peak-demand reduction program meets the requirements to be counted as a capacity resource under a tariff of a regional transmission organization (RTO) approved by the Federal Energy Regulatory Commission.
- ☐ Our peak-demand reduction program meets the requirements to be counted as a capacity resource under a program that is equivalent to an RTO program, which has been approved by the Public Utilities Commission of Ohio.

B) What is the date your peak demand reduction program was initiated?

The coincident peak-demand savings are permanent installations that reduce demand through energy efficiency and were installed on the date specified in Section 3 A above.

C) What is the peak demand reduction achieved or capable of being achieved (show calculations through which this was determined):

Unit Quantity (watts) = Existing (watts x units) - Installed (watts x units)

KW Demand Reduction = Unit Quantity (watts) x (Deemed KW/Unit (watts))

4.2 kW

See Confidential and Proprietary Attachment 5 – Self Direct Program Project Calculation for peak demand reduction calculation, and Attachment 8 – Prescriptive Protocols for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed.

Section 5: Request for Cash Rebate Reasonable Arrangement (Option 1) or Exemption from Rider (Option 2)

Under this section, check the box that applies and fill in all blanks relating to that choice.

Note: If Option 2 is selected, the application will not qualify for the 60-day automatic approval. All applications, however, will be considered on a timely basis by the Commission.

A) We are applying for:

☒ Option 1: A cash rebate reasonable arrangement.

OR

☐ Option 2: An exemption from the cost recovery mechanism implemented by the electric utility.

B) The value of the option that we are seeking is:

Option 1: A cash rebate reasonable arrangement, which is the lesser of (show both amounts):

☐ A cash rebate, based on avoided generation cost, of \$_____ (Attach documentation showing the methodology used to determine the cash rebate value and calculations showing how this payment amount was determined.)

OR

☒ A cash rebate valued at no more than 50% of the total project cost, which is equal to \$ 1,235.06. (Attach documentation and calculations showing how this payment amount was determined.)

See Confidential and Proprietary Attachment 5 - Self Direct Program Project Calculation for incentive calculations for this mercantile program.

Option 2: An exemption from payment of the electric utility's energy efficiency/peak demand reduction rider.

☐ An exemption from payment of the electric utility's energy efficiency/peak demand reduction rider for _____ months (not to exceed 24 months). (Attach

calculations showing how this time period was determined.)

OR

- ☐ Ongoing exemption from payment of the electric utility's energy efficiency/peak demand reduction rider for an initial period of 24 months because this program is part of an ongoing efficiency program that is practiced by our organization. (Attach documentation that establishes your organization's ongoing efficiency program. In order to continue the exemption beyond the initial 24 month period your organization will need to provide a future application establishing additional energy savings and the continuance of the organization's energy efficiency program.)

Section 6: Cost Effectiveness

The program is cost effective because it has a benefit/cost ratio greater than 1 using the (choose which applies):

- ☐ Total Resource Cost (TRC) Test. The calculated TRC value is: _____
(Continue to Subsection 1, then skip Subsection 2)
- ☒ Utility Cost Test (UCT) . The calculated UCT value is: 9.9 (Skip to Subsection 2)

Subsection 1: IRC Test Used (please fill in all blanks).

The IRC value of the program is calculated by dividing the value of our avoided supply costs (capacity and energy) by the sum of our program costs and our electric utility's administrative costs to implement the program.

Our avoided supply costs were _____.

Our program costs were _____.

The utility's administrative costs were _____.

Subsection 2: UCT Used (please fill in all blanks).

We calculated the UCT value of our program by dividing the value of our avoided supply costs (capacity and energy) by the costs to our electric utility (including administrative costs and incentives paid or rider exemption costs) to obtain our commitment.

Our avoided supply costs were \$ 14,356.70

The utility's administrative costs were \$ 215.47

The utility's incentive costs/rebate costs were \$ 1,235.06.

Section 7: Additional Information

Please attach the following supporting documentation to this application:

- Narrative description of your program including, but not limited to, make, model, and year of any installed and replaced equipment

See Attachment 1 - Self Direct Project Overview and Commitment for a description of the project. See Attachment 6 - Supporting Documentation for the specifications of the replacement equipment Attachment 8 - Prescriptive Protocols for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed. Due to the length of time since the equipment replacement, the make, model and year of the replaced equipment is not available.

- A copy of the formal declaration or agreement that commits your program to the electric utility, including:

- 1) any confidentiality requirements associated with the agreement;

See Attachment 2 - Self Direct Program Project Blank Application including Rules and Requirements. All confidentiality requirements are pursuant to the Retrospective Projects/Rules and Requirements that are part of the signed application which is provided as Confidential and Proprietary Attachment 3 - Self Direct Program Project Completed Application.)

- 2) a description of any consequences of noncompliance with the terms of the commitment;

See Attachment 2 - Self Direct Program Project Blank Application including Rules and Requirements. All consequences of noncompliance are pursuant to the Retrospective Projects/Rules and Requirements that are part of the signed application which is provided as Confidential and Proprietary Attachment 3 - Self Direct Program Project Completed Application.

- 3) a description of coordination requirements between you and the electric utility with regard to peak demand reduction;

None required because the resources committed are permanent installations that reduce demand through increased efficiency during the Company's peak summer demand period generally defined as May through September and do not require specific coordination and communication to provide demand reduction capabilities to the Company.

- 4) permission by you to the electric utility and Commission staff and consultants to measure and verify energy savings and/or peak-demand reductions resulting from your program; and,

See Attachment 2 – Self Direct Program Blank Application including Rules and Requirements granting such permission pursuant to the Retrospective Projects/Rules and Requirements that are part of the signed application which is provided as Confidential and Proprietary Attachment 3 – Self Direct Program Project Completed Application.

- 5) a commitment by you to provide an annual report on your energy savings and electric utility peak-demand reductions achieved.

See Attachment 1 – Self Direct Project Overview and Commitment for the commitment to comply with any information and compliance reporting requirements imposed by rule or as part of the approval of this arrangement by the Public Utilities Commission of Ohio.

- A description of all methodologies, protocols, and practices used or proposed to be used in measuring and verifying program results. Additionally, identify and explain all deviations from any program measurement and verification guidelines that may be published by the Commission.

The Company applies the same methodologies, protocols, and practices to Self Direct Program retrospective projects that are screened and submitted for approval as it does to prospective projects submitted through its Prescriptive and Custom Programs. The Commission has not published a technical reference manual for use by the Company so deviations can not be identified. The project submitted is a prescriptive project and energy savings are determined as described in Confidential and Proprietary Attachment 5 – Self Direct Program Project Calculation, and Attachment 8 – Prescriptive Protocols for the work papers that provide all methodologies, protocols, and practices used in this application for prescriptive measures, as needed.



Public Utilities
Commission

Application to Commit
Energy Efficiency/Peak Demand
Reduction Programs
(Mercantile Customers Only)

Case No.: 10-1835-EL-EEC

State of OHIO:

JEFFREY ROE, Affiant, being duly sworn according to law, deposes and says that:

1. I am the duly authorized representative of:

KEMA Services, Inc agent of Columbus Southern Power
2. I have personally examined all the information contained in the foregoing application, including any exhibits and attachments. Based upon my examination and inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete.
3. I am aware of fines and penalties which may be imposed under Ohio Revised Code Sections 2921.11, 2921.31, 4903.02, 4903.03, and 4903.99 for submitting false information.

Jeffrey Roe ENERGY EFFICIENCY ENGINEER
Signature of Affiant & Title

Sworn and subscribed before me this 10th day of DECEMBER, 2010 Month/Year

Angie Doan
Signature of official administering oath

Angie Doan, Outreach Manager
Print Name and Title

My commission expires on 01-03-2011



Self Direct Project Overview & Commitment

The Public Utility Commission of Ohio (PUCO) will soon review your application for participation in AEP Ohio's Energy Efficiency/Peak Demand Response program. Based on your submitted project, please select by initialing one of the two options below, sign and fax to 877-607-0740.

Customer Name	PICKAWAY MANOR CARE CTR	
Project Number	AEP-10-01437	
Customer Premise Address	391 CLARK DR, CIRCLEVILLE, OH 43113-1561	
Customer Mailing Address	391 Clark Drive, Circleville, OH 43113	
Date Received	3/18/2010	
Project Installation Date	8/19/2009	
Annual kWh Reduction	35,912	
Total Project Cost	\$13,203.82	
Unadjusted Energy Efficiency Credit (EEC) Calculation	\$1,646.75	
Simple Payback (yrs)	4.5	
Utility Cost Test (UCT)	9.9	
<i>Please Choose One Option Below and Initial</i>		
Option 1 - Self Direct EEC: 75%	\$1,235.06	<input checked="" type="checkbox"/> Initial: <i>MPK</i>
Option 2 - EE/PDR Rider Exemption	5 Months (After PUCO Approval)	<input type="checkbox"/> Initial:

Note: This is a one time selection. By selecting Option 1, the customer will receive payment in the amount stated above. Selection of Option 2: EE/PDR rider exemption, will result in the customer not being eligible to participate in any other energy efficiency programs offered by AEP Ohio during the period of exemption. In addition, the term of Option 2: EE/PDR rider exemption is subject to ongoing review for compliance and could be changed by the PUCO.

If Option 1 has been selected, will the Energy Efficiency Funds selected help you move forward with other energy efficiency projects?

☒ YES ☐ NO

Project Overview:

The Self Direct (Prescriptive) project that the above has completed and applied is as follows.

Replaced (50) 4' 4L T12 fixtures with (75) 2' 2L T5 fixtures
Replaced (5) 4' 4L T12 fixtures with (5) 4' 2L T5 retrofitted fixtures

The documentation that was included with the application proved that the energy measures applied for were purchased and installed.

By signing this document, the Mercantile customer affirms its intention to commit and integrate the above listed energy efficiency resources into the utility's peak demand reduction, demand response, and energy efficiency programs. By signing, the Mercantile customer also agrees to serve as a joint applicant in any filings necessary to secure approval of this arrangement by the Public Utilities Commission of Ohio, and comply with any information and compliance reporting requirements imposed by rule or as part of that approval.

Columbus Southern Power Company

By: *Ja F. Williams*
Title: Manager
Date: 11/02/10

PICKAWAY MANOR CARE CTR

By: *Harold Bush* *Maria Managan*
Title: *Maria Managan*
Date: 11-2-10



Self-Direct Program Project Application

Application Instructions

- Read the Rules and Requirements for Retrospective Projects before completing an application.
- Complete a separate application form for each installation account number.
- Complete the appropriate Self-Direct Program Excel spreadsheet for each application:
 - The Self-Direct Prescriptive Spreadsheet for specific lighting conversions and installations covered in the Prescriptive Program.
 - The Self-Direct Custom Spreadsheet for lighting improvements not covered in the Prescriptive Program and for any other energy efficiency installation.
- Information necessary for complete applications includes:
 - The Self-Direct Program project description.
 - Full descriptions of each measure replaced and installed along with project costs, existing and new equipment inventories/operation descriptions, baseline and new usage measurements or detailed calculations, total energy and peak demand savings, and other specified information.
 - Detailed customer-approved invoices, proof of purchase, receipts.
 - Technical specifications, studies/proposals, up to five digital photos of the new equipment and, if available, the removed equipment.
 - All other documentation and verification to justify the project for energy efficiency credits (EEC).
 - NOTE: Sending inadequate invoice documentation, incomplete/incorrect forms or incomplete backup information, including detailed energy and peak demand calculations, will delay review of the application. Contact AEP Ohio if you require additional assistance in completing the application.
- Submit all information to AEP Ohio. All completed submissions become the property of AEP Ohio. Make a copy of all documents for your records.

FORM SUBMITTAL: Please note all Rules and Requirements.

Emailed submissions with attachments are preferred.

Return the signed, completed form and all required detailed documentation to:

Email: gridSMARTohio@kema.com
Mail: AEP Ohio
6031 East Main Street, Suite 190
Columbus, OH 43213
Fax: 877-607-0740
Questions: 877-607-0739

Visit **gridSMARTohio.com** for more information on the Self-Direct Program and other incentive programs offered by AEP Ohio.



Self-Direct Program Project Application

THIS APPLICATION FORM IS VALID THROUGH DECEMBER 31, 2010.

Will be assigned by AEP Ohio

PROJECT ID: _____

Account Qualification (Check one or both if applicable)

☐ 700,000 kWh per year ☐ National Account or Multiple Facilities (under the same name in Ohio)

SECTION 1: CUSTOMER INFORMATION

Company Name		Date (mm/dd/yyyy)	
Mailing Address		Contact E-mail*	
City	State	Zip Code	
Contact Name (print)	Phone () -	Fax () -	
Taxpayer ID #/SSN/FEIN (99-9999999)	Tax Status: <input type="checkbox"/> Corporation (Incl. INC, PC, etc.) <input type="checkbox"/> LLC <input type="checkbox"/> Tax Exempt (may receive 1099) <input type="checkbox"/> Individual <input type="checkbox"/> Other		

SECTION 2: PAYMENT RELEASE AUTHORIZATION (who will receive payment)

Payable to (if different from Customer)		Mailing Address	
City	State	Zip	
Taxpayer ID # of Recipient (if different from Customer) (99-9999999)	Tax Status: <input type="checkbox"/> Corporation (Incl. INC, PC, etc.) <input type="checkbox"/> LLC <input type="checkbox"/> Tax Exempt (may receive 1099) <input type="checkbox"/> Individual <input type="checkbox"/> Other		

SECTION 3: JOB SITE INFORMATION (where equipment was installed)

Job Site: Customer Name (as it appears on the electric service account)		Project Contact Name	
Job Site Address (physical location)		Project Contact Telephone () -	
City	State	Zip Code	Project Contact Email
Job Site Account Number		Primary Account Number (if different than Job Site)	

Construction Type: ☐ New Construction ☐ Existing Building ☐ Major Renovation

Building Type: ☐ Office ☐ School (K-12) ☐ College ☐ Retail/Service ☐ Restaurant ☐ Hotel/Motel ☐ Medical ☐ Grocery ☐ Warehouse ☐ Light industry ☐ Heavy Industry ☐ Government/Municipal ☐ Other

Project In-Service Date	Total Project Cost \$	Incremental Cost** \$
Total Annual kWh Claimed (applicable only to Custom measures)	Peak kW Demand Reduction Claimed (applicable only to Custom measures)	

SECTION 4: CONTRACTOR INFORMATION (equipment or service provider/ installer other than Customer). Attach additional sheets if needed.

Note: internal labor costs are not eligible project costs.

Contractor Name			
Contractor Street Address		City	State
Contractor Contact Name		Contact Telephone () -	Contact Email

SECTION 5: CUSTOMER ELECTION (your election in this section does not affect your qualification for EEC payment or EE/PDR rider exemption)

If I choose the energy efficiency credit payment:

- ☐ Yes, I plan to use it for future energy efficiency projects. *Please briefly describe your project here. A pre-approval application will be required to reserve your funds.*
- ☐ No, I have completed all cost-effective energy efficiency projects and intend to use my energy efficiency credit payment for other operational needs.

SECTION 6: CUSTOMER SIGNATURE

By signing here, I acknowledge the information on this application is accurate and complete. I confirm I have read, agree with and understand the Rules and Requirements of this application and I have the authority to execute on behalf of my company / corporation.

Customer Signature _____ Date _____

* By providing your e-mail address, you are granting AEP Ohio permission to send further e-mails regarding our programs and services.

** Cost of higher efficiency equipment option compared to standard efficiency equipment option.

Self-Direct Program

Rules and Requirements for Retrospective Projects

Columbus Southern Power Company and Ohio Power Company are collectively known as AEP Ohio ("AEP Ohio"). AEP Ohio provides energy efficiency credits (EEC) for the purchase and installation of qualifying cost-effective equipment in the Customer's facility (the Customer's "Commitment of Resources") under the Rules and Requirements provided in this application and subject to regulatory approvals.

Customer Qualifications

The Self-Direct Program (the "Program") applies to customers served at AEP Ohio's retail electric rates who meet the minimum energy usage requirements of 700,000 kWh per year or who are part of a national account involving multiple facilities in one or more states.

Terms and Conditions

- THIS APPLICATION FORM IS VALID FOR SUBMITTAL BY CUSTOMERS UNDER THE SELF DIRECT PROGRAM UNTIL DECEMBER 31, 2010. AEP Ohio programs may be changed or cancelled at any time without notice. The Customer and its contractor are solely responsible for contacting AEP Ohio to ask whether or not the program is still in effect and to verify program parameters.
- This application defines the Date of Acceptance.
- For applications submitted in 2010, projects must have a completion date and begun operation between January 1, 2007 and the Date of Acceptance into the Self-Direct Program. Energy efficiency credit levels, as shown in the table below, are based on the calendar year of installation / operation. Customer shall provide proof of equipment installation / operation start-up.
- Customer agrees to commit all energy and demand resources identified in this application to AEP Ohio's energy and demand targets / benchmarks as identified in Senate Bill 221.
- All documentation and verification is subject to strict confidentiality.
- The peak demand hours are defined as weekdays, 7:00 AM to 9:00 PM, May through September.
- All applications are subject to AEP Ohio, its contractor(s) / agent(s), and the Public Utility Commission of Ohio (PUCO) review and approval prior to any EEC payments or exemptions from the Energy Efficiency / Peak Demand Reduction (EE/PDR) Rider under this program.
- Energy efficient equipment must be installed on the AEP Ohio electric account listed on the application.
- EEC payments are limited and subject to availability while program funding lasts.
- While funding is available, the payment will be:
 - 75% of the calculated incentive under the Prescriptive Program, or
 - \$0.06 per annual kWh saved under the Custom Program, whichever is applicable to this project.
 - To ensure maximum program participation, AEP Ohio reserves the right to limit funding per project, per program and per business entity. A sliding scale incentive reduction will be incorporated when the calculated incentive exceeds \$120,000 per project.
- EEC payments will be capped at 37.5% of the project cost.
- In lieu of a one-time EEC payment, the Customer may elect to seek an exemption from the EE/PDR rider for the associated electric account. The exemption is defined in the table below.
- If an exemption is elected, the Customer is not eligible for other Prescriptive and Custom energy efficiency/peak demand reduction programs offered by AEP Ohio during the period of exemption. Unless additional approved resources are committed, the Customer will, after the specified number of months on this Application, be subject to the EE/PDR rider.
- If a one-time EEC payment is elected, the Customer will remain in the EE/PDR rider and may also participate in other AEP Ohio energy efficiency and/or demand reduction programs.
- Eligible measures must produce verifiable and persistent energy and/or demand reduction, for a period of no less than five (5) years from the date of installation, through an increase in efficiency or through the use of load-shifting technologies and/or demand reduction. Measurement and verification may be required.
- Ineligible measures:
 - Rely solely on changes in customer behavior and require no capital investment, or merely terminate existing processes, facilities and/or operations.
 - Are required by state or federal law, building or other codes or are standard industry practices.
 - Involve fuel switching, plug loads, or generate electricity.
 - Are easily reverted / removed or are installed entirely for reasons other than improving energy efficiency.
 - Include other conditions to be determined by AEP Ohio.

- All equipment must be new; used or rebuilt equipment is not eligible.
- Costs associated with internal labor are not eligible.
- Customer is allowed and encouraged to consider using all or a portion of the EEC payment, as received from AEP Ohio under this program, to help fund other customer-initiated energy efficiency and peak demand reduction projects in the future. Future projects can also qualify for participation in the Prescriptive or Custom Program.
- A signed application with documentation verifying installation of the project including, but not limited to, equipment, equipment specifications, invoices, purchase orders, approvals, photographs and other related information must be submitted to AEP Ohio.
- Customer projects that warrant special treatment (i.e., non-typical projects) will be considered on a case-by-case basis by AEP Ohio.
- AEP Ohio reserves the right to randomly inspect Customer facility(ies) for installation of materials listed on this application and will need access to survey the installed project. Customer understands and agrees that their installations submitted under this Program may also be subject to inspections by the PUCO or their designee, and photographs of installation may be required.
- If the inspection finds that Customer did not comply with program rules and requirements, any payment received under this Program must be returned to AEP Ohio including interest. Any rider exemptions will also be voided. In addition, AEP Ohio reserves the right to withhold payment or exemption for projects that do not meet reasonable industry standards as determined by AEP Ohio.
- AEP Ohio reserves the right to refuse payment and participation if the Customer or contractor violates program rules and requirements. AEP Ohio is not liable for EEC or rider exemptions promised to Customer as a result of program misrepresentation.
- Customer understands and agrees that all other terms and conditions, as specified in the application, including all attachments and exhibits attached to this application, which will serve as a contract for the Customer's commitment of energy and demand resources to AEP Ohio, shall apply.
- AEP Ohio reserves the right to request additional backup information, supporting details, calculations, manufacturer specification sheets, photographs or any other information prior to any payment or exemption.
- Equipment could have been installed in retrofit, replacement, or new construction applications and must meet reasonable industry standards. All equipment / measures must meet minimum cost effectiveness requirements as defined or determined by AEP Ohio. Customer must also provide evidence of measure life.
- AEP Ohio will issue approved EEC payments in the form of checks.
- Customer can not apply for EEC for future projects and elect after the fact to apply for exemption under this program.
- Customer shall be responsible to comply with any applicable codes or ordinances.
- Customer shall be responsible for the proper disposal of all waste and equipment.
- All submissions become the property of AEP Ohio. Keep a copy for your records.

Disclaimers

AEP Ohio:

- Does not endorse any particular manufacturer, product or system design by offering these EEC.
- Will not be responsible for any tax liability imposed on the Customer as a result of any payment for EEC. AEP Ohio will report EEC payments greater than \$600 as income on IRS form 1099. Such payments shall be taxable unless Customer meets acceptable tax exemption criteria. Customers are encouraged to consult with their tax advisors about the tax liability of any payments.
- Does not expressly or implicitly warrant the performance of installed equipment (contact your contractor or supplier for detailed equipment warranties).
- Is not responsible for the proper disposal/recycling of any waste generated as a result of this project.
- Is not liable for any damage caused by the operation or malfunction of the installed equipment.
- Does not guarantee that a specific level of energy or cost savings will result from the implementation of energy conservation measures or the use of products funded under this program.

OPTION #1 - ONE-TIME PAYMENT	
Energy Efficiency Credit Levels	75% of the calculated Prescriptive incentive payment or \$0.06/annual kWh saved under the Custom Program. Further funding limits may apply.
Min / Max Payback before Energy Efficiency Credit Applied	1 year Min / 7 Year Max Or pass cost effectiveness test(s) (determined by AEP Ohio)

OPTION #2 - EXEMPTION FROM EE / PDR RIDER
Exemption from the EE/PDR rider is determined by comparing the value of the one-time EEC payment with the estimated net present value (NPV) of the EE/PDR rider as calculated by AEP Ohio for the Customer's associated electric account. This NPV is defined as the Customer's financial contribution to AEP Ohio's efforts to reach EE/PDR targets.

Self-Direct Program

Retrospective Project Description: Project _____ of _____

Project Descriptive Name	Project In-service Date
Affected Electric Account Number	

Claimed Project Baseline (AEP Ohio will make the final determination of applicable baseline):

____ Retrofit (the project was an elective retrofit and the equipment was still operable)

____ Replacement (the project was a replacement of equipment at or near the end of its useful life)

____ New (the project was an addition of new equipment in an existing facility or new construction)

Describe the project including detail of energy savings equipment. Attach additional sheets if needed.

Describe the removed equipment and operating strategy. Please provide up to five digital photos of the equipment, if available. Attach additional sheets if needed.

Describe the installed equipment and operating strategy. Please provide up to five digital photos of the equipment. Attach additional sheets if needed.

Describe your calculation method for energy efficiency and attach all documentation of energy savings. Use additional sheets if needed.

Identify other benefits of proposed project in addition to electrical energy and/or demand reduction:

____ Conserves other utilities (gas, water, etc.)

____ Meets environmental regulations

____ Improves process flow

____ Reduces labor

____ Improves product quality

____ Saves energy

____ Increases production capacity

____ Uses fewer raw materials

____ Other _____

Project Technical Specifications

(This sheet provides an example of the required data for input to the Self-Direct spreadsheet. The Self-Direct spreadsheet provides additional guidance and streamlines the process for collecting, documenting and reporting this information to AEP Ohio, and it follows the format of this sheet. Please provide as much detail as possible on the Self-Direct spreadsheet to expedite review and processing of the application).

Please complete the Self-Direct spreadsheet for each measure installed and provide supporting documentation including engineering or equipment supplier studies, customer-approved invoices, purchase orders, detailed calculations of baseline and energy and peak demand savings. A detailed proposal and complete package will expedite review of application. This information is required by AEP Ohio and/or its consultants for project analysis.

	EQUIPMENT REMOVED OR LOWER EFFICIENCY OPTION	INSTALLED EQUIPMENT OR HIGHER EFFICIENCY OPTION
Equipment type		
Manufacturer of equipment (attach manufacturer specification sheets)		
Model number(s)		
Date of removal / In-service date		
Age of equipment at removal		
Estimated remaining useful life at time of removal or installation		
Efficiency rating		
Nameplate data: kW, tons, HP, watts, etc.		
Quantity		
Annual operating hours		
Annual energy savings (kWh)		
Peak reduction (kW)*		
Annual electric bill savings (\$)		
COST BREAKOUT		
Equipment		
Engineering		
Installation		
Other (explain)		
TOTAL PROJECT COST		
Incremental Cost = Cost of higher efficiency equipment option compared to standard efficiency equipment option.		
<p>* Determination of peak demand reduction (kW) from non-HVAC equipment: For non-HVAC measures, calculate the average kW reduction over the period from 7 a.m. to 9 p.m., weekdays, from May 1 through September 30. The preferred calculation method will estimate hourly kW demands over the peak demand period, and average the results. However, if measures do not vary significantly during those hours, a less rigorous estimation process may be applied if approved in advance by the program.</p>		
<p>* Determination of peak demand reduction (kW) within HVAC systems: Calculate the maximum HVAC peak demand reduction that occurs between 7 a.m. to 9 p.m. on a weekday from May 1 through September 30.</p>		



FEATURES & SPECIFICATIONS

INTENDED USE — 2RT5 is designed for applications that require the extremely energy efficient delivery of comfortable volumetric light from a lay-in fixture that is appealing and shallow in depth. Ideal for offices, schools, hospitals, retail and numerous other commercial applications. Certain airborne contaminants can diminish integrity of acrylic. Click here for Acrylic Environmental Compatibility table for suitable uses.

OPTICAL SYSTEM — Delivers volumetric lighting by filling the entire volume of space with light, delivering the ideal amount of light to walls, cubicles, work surfaces and people. Luminous characteristics are carefully managed at high angles, providing just enough intensity to deliver the volumetric effect.

Regressed, two-piece refractive system obscures and softens the lamp and smoothly washes the reflector with light.

Linear faceted reflector softens and distributes light into the space and minimizes the luminance ratio between the fixture and the ceiling.

Mechanical cut-off across the reflector and fresnel refraction along the refractor provide high angle shielding and a quiet ceiling.

Sloped endplates provide a balanced fixture to ceiling ratio while enhancing the perception of fixture depth.

CONSTRUCTION — Impact modified acrylic prismatic refractor with polymer light diffusing film.

Rugged, one-piece, cold-rolled steel reflector with embossed facets with coated polyester powder paint after fabrication.

Rigid structure with ballast box and endplates. End plates feature integral T-bar clips. Fixtures may be mounted end-to-end.

ELECTRICAL SYSTEM — Highly efficient program start electronic ballasts, Class P, thermally protected, resetting, HPF, non PCB, UL Listed, CSA Certified, sound rated A. F14T5 uses GEB115, producing 1.22 ballast factor standard for typical applications. F24T5HO is available for higher ceiling applications.

Bi-level dimming option allows system to be switched to 50% power for compliance with common energy codes while maintaining fixture appearance.

S5 option available for use with SIMPLY5™ Lighting Intelligence system with multi-level dimming. See SYNERGY® Control Systems specification sheets for more information.

MAINTENANCE — Side mounted ballast tray accessed by removing adjacent ceiling tile. Ballast tray may be removed from fixture during service.

Lamps accessed by squeezing refractor to release from retention tabs.

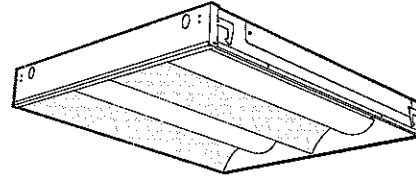
LISTING — UL Listed (standard). Optional: Canada CSA or cUL Mexico NOM

WARRANTY — Fixture guaranteed for one year against mechanical defects in manufacture. Lamp and ballast system warranty (24 months for lamp, 60 months for ballast) by lamp and ballast manufacturer.

Protected by one or more of US Patents Nos. 7,229,192; D541,467; D541,468; D544,633; D544,634; D544,992; D544,933 and additional patent pending.

Specifications subject to change without notice.

Catalog Number	
Notes	Type



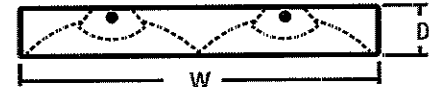
2RT5

2'x2'
2 Lamps
T5

SIMPLY5™
LIGHTING INTELLIGENCE

Specifications

Length: 24 (610)
Width: 24 (610)
Depth: 3-1/8 (79)



All dimensions are inches (millimeters) unless otherwise specified.

ORDERING INFORMATION

For shortest lead times, configure product using **standard options (shown in bold)**.

Example: 2RT5 14T5 MVOLT GEB115 LP835

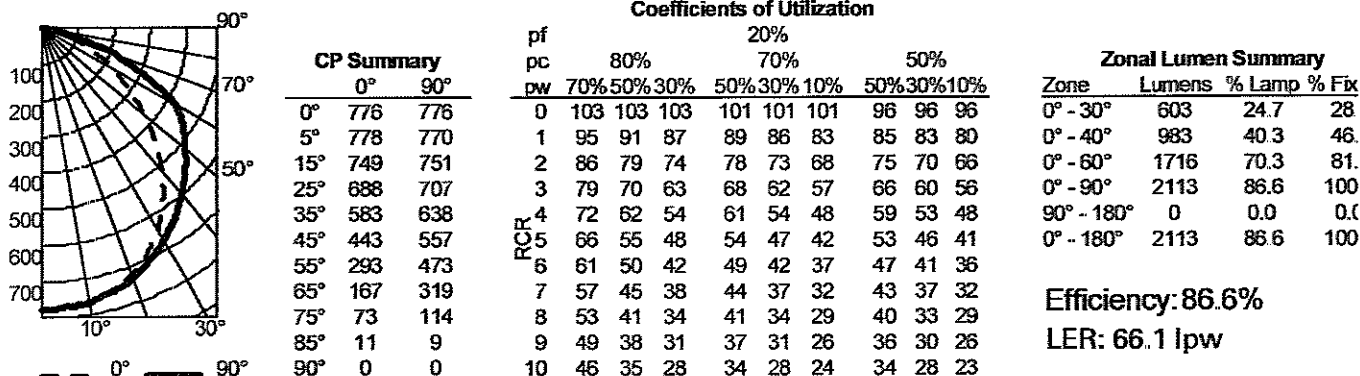
2RT5					
Series	Lamp type	Voltage	Ballast	Lamp ⁵	Options
2RT5 Recessed T5	14T5 14W T5 (22") 24T5HO 24W T5 (22") ¹	MVOLT ² 347 ³	GEB115 1.15 ballast factor GEB115S 1.15 ballast factor, step dimming GEB10PS 1.0 ballast factor, program start ¹ S5 0.95 ballast factor SIMPLY5 system ⁴	LP835 3500°K lamp LP830 3000°K lamp LP841 4100°K lamp	GLR Internal fast-blow fuse ⁶ PWS1836 6' prewire, 3/8" diameter, 18-gauge, 3-wire (n/a with GEB115S) ⁷ PWS1846 6' prewire, 3/8" diameter, 18-gauge, 4-wire ⁸ EL14 Emergency battery pack ⁹ HW Hardwire for SIMPLY5 system; replaces RELOC [®] CSA Listed and labeled to comply with Canadian standards QFC Quick-flex cable ⁹ BDP Ballast disconnect plug (meets codes that require in-fixture disconnect)

NOTES:

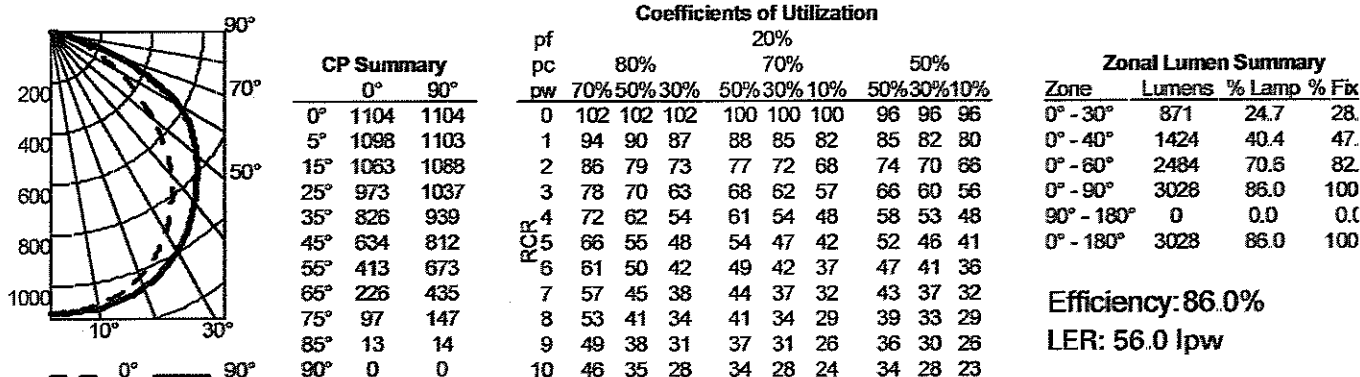
- For T5HO use GEB10PS only; not available with 14T5.
- MVOLT (120-277 volts), 50-60HZ.
- For 347V use GEB115S or GEB10PS ballast only.
- SIMPLY5 includes 13' S5 SSC RELOC[®] wiring system, specify voltage unless HW (hardwire or PWS) is ordered.
- Required. All fixtures shipped with lamps installed.
- Must specify voltage, 120 or 277.
- For use with standard ballast.
- For use with step dimming ballast.
- See PS1400QD spec sheet for EL lumen output information.

2RT5 Volumetric Recessed Lighting 2' x 2'

2RT5 14T5 GEB115, (2) FP24/841 lamps, 1220 lumens per lamp, s/m 1.2 (along) 1.3 (across), test no. LTL14130



2RT5 24T5HO GEB10PS LP835, (2) FP24/835 lamps, 1760 lumens per lamp, s/m 1.2 (along) 1.3 (across), test no. LTL12606



*The LER (Luminaire Efficacy Rating) is the lumens per watt rating for this fixture. It is used to compare the energy efficiency of various products. This photometric report is based upon IES testing procedures, as stated in LM-41-1993. The reported lumen rating is based upon lamp manufacturer's published lumen output for the cold spot temperature measured during lamp calibration.

Input Wattage

Wattage	Ballast	120V	277V
24T5HO	GEB10P	55	54
14T5	GEB115S	39	39
14T5 (50% step dimming)	GEB115S	22	22

T5/T8 Energy Comparison

System	Lamp Type	Ballast Factor	Input Watts	Watts Saved Compared to T8
2-lamp T8	F32T8U	0.88	58	—
2RT5 2-lamp T5	F14T5	1.22	39	19



FEATURES & SPECIFICATIONS

INTEND USE — The RT5™ relight assembly is the ideal solution for renovating obsolete parabolic systems, delivering quality of light and refreshing the space. RT5R volumetric lighting eliminates the parabolic cave effect by delivering the ideal amount of light to walls, cubicles, work surfaces and people. Certain airborne contaminants can diminish integrity of acrylic. [Click here for Acrylic Environmental Compatibility table](#) for suitable uses.

RT5R is suitable for replacing any 2' x 4' parabolic fixture with at least 4-3/8" overall depth. 2RT5R is not specifically designed for lensed troffers.

The RT5 relight assembly is recommended for offices, schools, hospitals, commercial and other general lighting applications.

OPTICAL SYSTEM — Luminous characteristics are carefully managed at high angles, providing just enough intensity to deliver the volumetric effect.

Regressed, one-piece refractive system obscures and softens the lamp and smoothly washes the reflector with light.

Linear faceted reflector softens and distributes light into the space and minimizes the contrast between the fixture and the ceiling. Mechanical cut-off across the reflector and fresnel refraction along the refractor provides high-angle shielding and a quiet ceiling.

Sloped endplates provide a balanced fixture-to-ceiling ratio while enhancing the perception of the fixture depth.

CONSTRUCTION — The relight assembly consists of five component parts that easily install into the host fixture.

End brackets are constructed of heavy-gauge powder-painted steel and attached to host fixture with secure mounting hardware. Brackets form the platform for the attachment of the light engine and trim assembly. The light engine serves as the reflector system and is finished in high-reflective white power paint. To reduce time and labor for installation, lamps, sockets and ballasts are shipped installed and prewired on light engine. A one-piece trim assembly serves as the instrument that delivers the light. Molded and recyclable PETE (polyethylene) reflector is firmly attached to the universal bracket via hinge and latch assembly. Included in this assembly are two prismatic acrylic refractors with light-diffusing finish for even illumination and lamp obscuration.

Splice box replaces the typical wireway by providing a cover for the connections of incoming supply wire, and is attached to host fixture with two TEK screws.

ELECTRICAL SYSTEM — Lamp type options include high-efficiency F28T5 with enhanced phosphors and 85 CRI. All lamps are ICLP compliant.

Ballasts are high-efficiency, program-start electronic, Class P, thermally protected, resetting, HPF, non-PCB, UL Listed, CSA Certified, sound rating A. Ballast options include .95 ballast factor for maximum energy savings, or 1.15 for higher mounting heights or applications requiring higher light levels. Both .95 and 1.15 options are available with step-dimming option which allows system to be switched to 50% power for compliance with common energy codes while maintaining fixture appearance.

SIMPLY5™ lighting intelligence system with multi-level dimming and direct-wire capability is available. For additional information, consult specification sheet on www.SIMPLY5.net.

MAINTENANCE — Trim hinges from either side. Lamp access by hinging trim down to 90°, providing hands-free access to lamps. For hands-free ballast access, continue process by removing two screws and hinging light engine down.

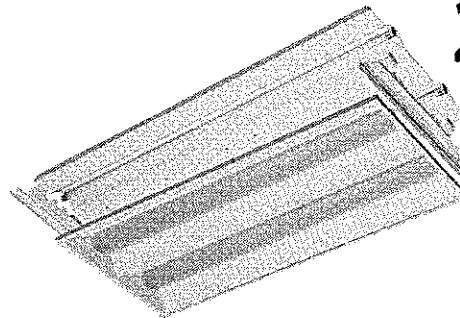
LISTING — UL/cUL Classified. Labeled for use in air-handling fixtures. Does not impact existing fixture UL listing. NYC approved (#49197).

Catalog Number
Notes
Type



Relight Volumetric Lighting

2RT5R



FLUORESCENT
2' X 4' Relight
2 Lamp
Premier TS

SIMPLY5
LIGHTING INTELLIGENCE

Specifications

Intended to be installed in any existing parabolic recessed fixture.

Weight: 20 lbs.

WARRANTY — Fixture guaranteed for one year against mechanical defects in manufacture. System lamp (24 months) and ballast (60 months) warranty is provided by lamp and ballast manufacturer. Protected by one or more of US Patents Nos. 7,229,192; D541,467; D541,468; D544,633; D544,634; D544,992; D544,933 and additional patents pending.

Specifications subject to change without notice.

ORDERING INFORMATION

For shortest lead times, configure products using **bolded options**.

Example: 2RT5R 24T5HO MVOLT GEB10PS LP835

2RT5R	2RT5				
Series	Lamp type	Voltage	Ballast	Lamp ⁵	Options
2RT5R Recessed relight	2RT5 28 W T5 (22")	MVOLT ² 347 ³	GEB95 0.95 ballast factor GEB95S 0.95 ballast factor, step dimming GEB115 1.15 ballast factor GEB115S 1.15 ballast factor, step dimming SS 0.95 ballast factor, SIMPLY 5 system ballast ⁴ SS115 1.15 ballast factor, SIMPLY 5 system ballast	LP835 Lamped with Premier 3500° K lamp LP830 Lamped with Premier 3000° K 2 lamp LP841 Lamped with Premier 4100° K 28 watt	EL14 Emergency battery pack JP16 Job packaging - 16 kits HW Hard wired system for SIMPLY5 WH White end brackets

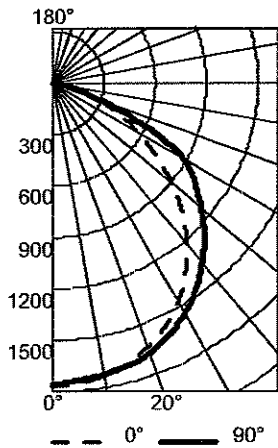
Accessories: For field restoration.	
RRCA	Side reveal cover (pair), available in sets of five (pairs) or 25 (pairs)

Notes

- 1 MVOLT (120-277 volts), 50-60HZ.
- 2 GEB95S or GEB10PS only.
- 3 Required. All fixtures shipped with lamps installed.
- 4 See PS140000 spec sheet for EL lumens output information.

2RT5R Volumetric Recessed Lighting 2' x 4'

2RT5R 28T5, (2) FP28/835/PM/ECO lamps, 2730 lumens per lamp, s/m 1.2 (along) 1.3 (across), test no. LTL16365



CP Summary		pf	Coefficients of Utilization												Zonal Lumen Summary			
			70%	80%	90%	10%	20%	30%	40%	50%	60%	70%	80%	90%				
0°	90°	pc	70%	80%	90%	10%	20%	30%	40%	50%	60%	70%	80%	90%	Zone	Lumens	% Lamp	% Fixture
0°	1759	1759	0	105	105	105	103	103	103	98	98	98	98	98	0° - 30°	1384	25.3	28.7
5°	1755	1737	1	97	93	89	91	88	85	87	85	82	87	85	0° - 40°	2269	41.6	47.1
15°	1693	1703	2	88	81	76	80	74	70	77	72	68	77	72	0° - 60°	3986	73.0	82.7
25°	1562	1617	3	81	72	65	70	64	59	68	62	58	68	62	0° - 90°	4819	88.3	100.0
35°	1350	1462	4	74	64	56	62	55	50	60	54	49	60	54	90° - 180°	0	0.0	0.0
45°	1068	1257	5	68	57	49	56	49	43	54	48	43	54	48	0° - 180°	4819	88.3	100.0
55°	736	1014	6	63	51	43	50	43	38	49	42	37	49	42				
65°	421	597	7	58	46	39	46	38	33	44	38	33	44	38				
75°	180	134	8	54	42	35	42	35	30	41	34	30	41	34				
85°	28	15	9	51	39	32	38	31	27	37	31	27	37	31				
90°	0	0	10	47	36	29	35	29	24	34	28	24	34	28				

Efficiency: 88.3%

*The LER (Luminaire Efficacy Rating) is the lumens per watt rating for this fixture. It is used to compare the energy of various products. This photometric report is based upon IES testing procedures, as stated in L-41-1998. The reported lumen rating is based upon lamp manufacturer's published lumen output for the cold spot temperature measured during lamp calibration.

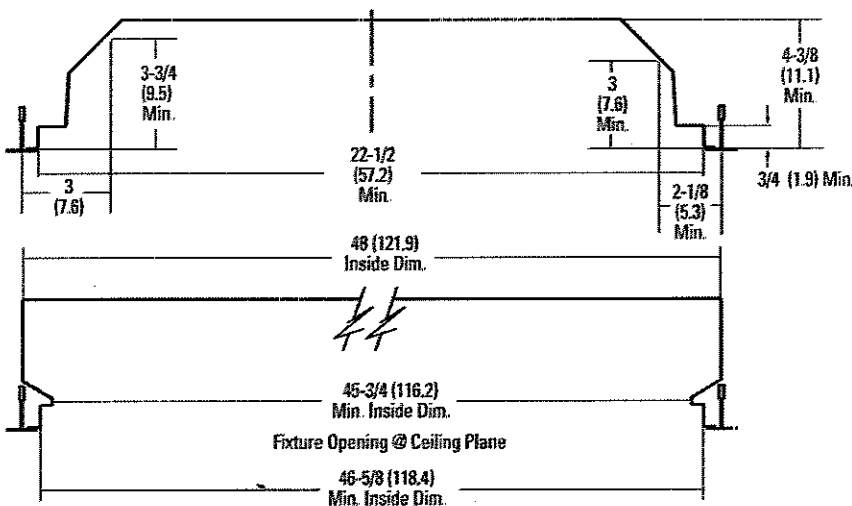
ENERGY AND LIGHT LEVEL COMPARISON							
System	Light level	Input watts	Watts/SF	Watts saved	% Savings	\$ Savings per year	LER
Parabolic, (3) 2800 lumen T8 lamps .88 ballast factor	69	88	1.06	Base	Base	Base	65
RT5R, (2) 2730 lumen T5 lamps, .95 ballast factor	50	58	0.72	30	34%	\$9.60	79

Light level in footcandles is calculated based on 8x10 mounting centers 9 foot ceilings, 60 x 60 room, 80/50/20 reflectances, .95 LLD, .90 LDD, horizontal light level on 2.5 foot workplane height.

Annual savings based on 4000 operating hours, \$.08/kwh. Luminaire Efficacy Rating (LER) is fixture lumen output divided by fixture input wattage.

FIT COMPATIBILITY

The RT5™ relight assembly (RT5R) was engineered to upgrade parabolic fixtures from all major manufacturers conforming to the following dimensions:



Dimensions are inches (centimeters).

Relight assemblies also will upgrade many existing "deep" lensed troffers conforming to these dimensions.
Relight assemblies will not upgrade "contractor-grade" lensed troffers or lensed troffers previously upgraded with parabolic renovator kits.
In addition to conforming to the dimensions above, Lithonia Lighting recommends a trial installation prior to purchasing project quantities.



2RT5R_2X4



Product Number: 20943

Order Abbreviation: FP28/835/PM/ECO

General Description: 28W, T5
PENTRON
PREMIER
fluorescent lamp.
3500K color
temperature, rare
earth phosphor, 85
CRI, ECOLOGIC

Product Information	
Abbrev. With Packaging Info.	FP28835PMECO 40/CS 1/SKU
Actual Length (in)	45.236
Actual Length (mm)	1149.00
Average Rated Life (hr)	20000
Base	Miniature Bipin
Bulb	T5
Color Rendering Index (CRI)	85
Color Temperature/CCT (K)	3500
Diameter (in)	0.630
Diameter (mm)	16.00
Family Brand Name	PENTRON® ECO®
Initial Lumens at 25C	2730
Initial Lumens at 35C	3050
Mean Lumens at 25C	2594
Mean Lumens at 35C	2898
Nominal Length (in)	45.236
Nominal Length (mm)	1149.00
Nominal Wattage (W)	28.00



ECOLOGIC

TM



Footnotes

- Approximate initial lumens after 100 hours operation
- The life ratings of fluorescent lamps are based on 3 hr burning cycles under specified conditions and with ballast meeting ANSI specifications. If burning cycle is increased, there will be a corresponding increase in the average hours life.
- Lumen output and life rated on high frequency operation.
- Minimum starting temperature is a function of the ballast; consult the ballast manufacturer.
- There is a NEMA supported, industry issue where T2, T4, and T5 fluorescent and compact fluorescent lamps operated on high frequency ballasts may experience an abnormal end-of-life phenomenon. This end-of-life phenomenon can result in one or both of the following: 1. Bulb wall cracking near the lamp base. 2. The lamp can overheat in the base area and possibly melt the base and socket. NEMA recommends that high frequency compact fluorescent ballasts have an end-of-life shutdown circuit which will safely and reliably shut down the system in the rare event of an abnormal end-of-life failure mode described above. The final requirements of this system are yet to be defined by ANSI. For additional information refer to NEMA papers on their WEBSITE at www.NEMA.org.
- SYLVANIA ECOLOGIC fluorescent lamps are designed to pass the Federal Toxic Characteristic Leaching Procedure (TCLP) criteria for classification as non-hazardous waste in most states. TCLP test results are available upon request. Lamp disposal regulations may vary; check your local & state regulations. For more information, please visit www.lamprecycle.org.

<10% THD Electronic T5 Fluorescent PENTRON PREMIER™ Systems QUICKTRONIC PREMIER™ PROStart® T5 UNIVERSAL & 347V BALLAST Professional and QUICKSTEP® Series

PENTRON PREMIER ECOLOGIC® Lamps

Lamp/Ballast Guide

28W T5 - PENTRON®

2-lamp QTP2x28T5/UNVPS115SC
QTP2x28T5/UNVPS95SC
QS2x28T5/UNVPS115SC
QS2x28T5/UNVPS95SC

347V QS2x28T5/347PS95SC

Also operates:

FP14 and FP21T5 lamps

Key System Features

- High system efficiency
- First T5 system to achieve up to 100 LPW (lm/w)
- Universal voltage (120-277 & 347V)
- QUICKSTEP Stepped Switching bi-level light output
- QUICKSENSE® ballast technology (end-of-lamp-life sensing)
- PROStart programmed start
- Suitable for use with occupancy sensors
- Operates at >40 KHz to reduce potential interference with infrared control systems
- High power factor (>98%)
- <10% THD total harmonic distortion at full power
- UL, CSA, FCC
- Small Can Enclosure

Application Information

SYLVANIA QUICKTRONIC PREMIER T5

is ideally suited for:

- Office
- Schools
- Commercial
- Retail
- Hospitality
- Institutional
- New Construction
- Renovations

SYLVANIA'S QUICKTRONIC

PREMIER T5 ballasts operate the new PENTRON PREMIER T5 ECOLOGIC lamps at various lumen outputs to offer a range of high efficiency T5 lighting systems. The system includes SYLVANIA's new line of QUICKSTEP stepped switching ballasts. QUICKSTEP ballasts are specially designed to meet California Energy Commission's Title 24 requirements for multi-level lighting controls (Section 131). The combined lamp and ballast system offers a high efficiency system for T5 fixtures along with the high performance features that are standard on SYLVANIA's Professional Series of ballasts.

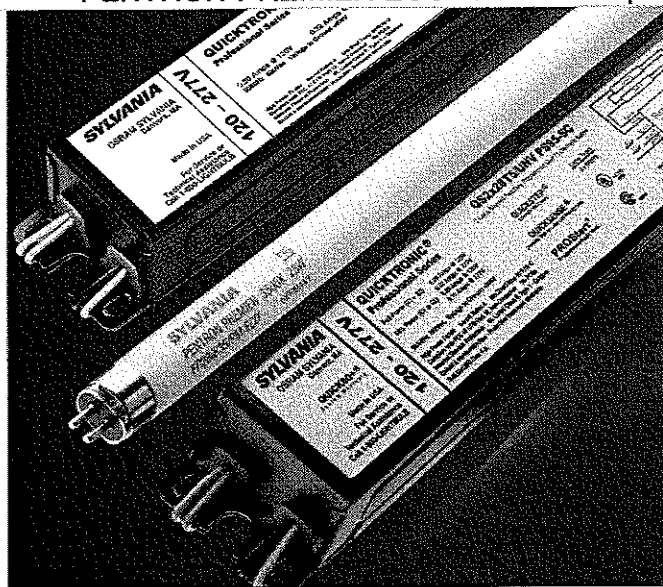
QUICKTRONIC PREMIER T5 ballasts contain QUICKSENSE ballast technology, a patented circuitry designed to shut down the system reliably and safely when lamps reach end-of-life.

System Information

QUICKTRONIC PREMIER UNV Systems operate from 120V through 277V, 50 or 60Hz, eliminating "wrong voltage" wiring errors and reducing the number of models in inventory by half. A 347V model is also available.

PROStart ballasts deliver optimum starting conditions to provide up to 100,000 switching cycles for use on occupancy sensors and building control systems.

QUICKSENSE ballast technology helps to protect against overheated bases and sockets, as well as cracking of the glass wall, and uses dynamic end-of-lamp-life sensing to avoid false shutdowns caused by some static sensing methods. QUICKSENSE ballast technology will auto reset when the end-of-life lamps are replaced with new ones.



Setting the standard for quality, PENTRON PREMIER Systems are also covered by our QUICK 60+® warranty, the first and most comprehensive system warranty in the industry.

QUICKTRONIC PREMIER T5 is available in two-lamp models with two ballast factors to cover a wide range of applications.

System Comparisons	Input Wattage	Initial Lumens	System LPW
QTP2x28T5/UNV PS95SC - FP28T5PM/ECO (2 lamp)	60/58	5795	97/100
QTP2x28T5/UNV PS115SC - FP28T5PM/ECO (2 lamp)	73/71	7015	96/99
F34T12 - Energy Saver Magnetic (2 lamp)	72	4660	65
F32T8- 3 lamp Instant Start Electronic	88	7525	86

The QUICKSTEP system has two AC line inputs in addition to the neutral wire. These AC line inputs must be connected to the same phase of the line voltage. The two line inputs can be configured to provide a bi-level light output system by wiring the system with two switches. Each switch provides 50% power to the ballast. When both switches are on, the lamps operate at full light output.

When either switch is off, the lamps operate in a dimmed mode and the ballast draws 50% of the full light power.

Alternatively, QUICKSTEP ballasts can be controlled by occupancy sensors allowing for customized zone controls and various energy saving configurations.

**QUICKTRONIC
PREMIER™
PROStart™ T5
UNV & 347V
QUICKSTEP® Bi-level**

Performance Guide

Rated lamp lumens and performance data based on PENTRON PREMIER ECOLOGIC® lamps

Data shown for the new 347V product is preliminary and subject to change.

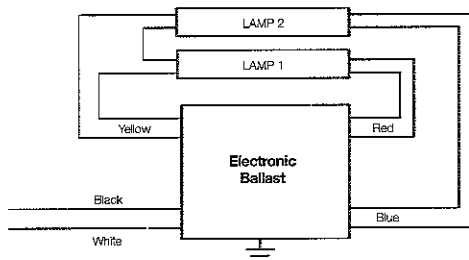
<10% THD Electronic T5 High Efficiency PENTRON PREMIER™ Fluorescent Systems

NAED Number	Description	Input Voltage (VAC)	Input Current (AMPS)	Lamp ¹ Type	Rated ^{2,3} Lumens (lm)	No. of Lamps	Ballast ² Factor (BF)	System ² Lumens	Input Power (Watts)	System Efficacy (lm/W)
QUICKSTEP Bi-Level 100-50% Power Switchable Models (High Efficiency Systems)										
49412	QS 2x28T5/UNV PS95SC (50% Power Bi-Level Mode)	120-277	0.50/0.22 0.25/0.11	FP28T5PM/ECO	3050	2	0.95 0.35	5795 2135	60/58 28	97/100 76
49413	QS 2x28T5/UNV PS115SC (50% Power Bi-Level Mode)	120-277	0.61/0.26 0.31/0.13	FP28T5PM/ECO	3050	2	1.15 0.48	7015 2930	73/71 35	96/99 84
49438	QS 2x28T5/347 PS95SC (50% Power Bi-Level Mode)	347	0.18 0.09	FP28T5PM/ECO	3050	2	0.95 0.35	5795 2135	60 28	97 76
QTP Fixed Output BF0.95 & BF1.15 (High Efficiency Systems)										
49410	QTP 2x28T5/UNV PS95SC	120-277	0.50/0.22	FP28T5PM/ECO	3050	2	0.95	5795	60/58	97/100
49411	QTP 2x28T5/UNV PS115SC	120-277	0.61/0.26	FP28T5PM/ECO	3050	2	1.15	7015	73/71	96/99

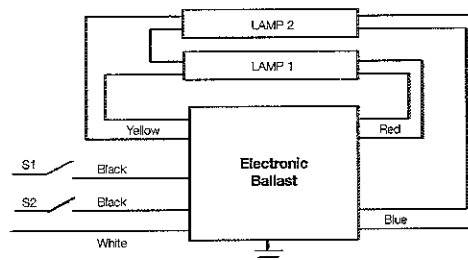
- 1 Also compatible with equivalent lamp types that meet ANSI standards.
2 Rated lamp lumens and performance data based on PENTRON PREMIER ECOLOGIC lamps.
3 At 35°C lamp ambient temperature.

Installation Notes

- Install in accordance with National & Local Electric Code
- Ground ballast case
- For QUICKSTEP ballasts, the AC line inputs must be connected to the same phase of the line voltage
- DO NOT CONNECT two separate phases of line voltage to the input of QUICKSTEP ballasts



2-Lamp QTP
Fixed output only



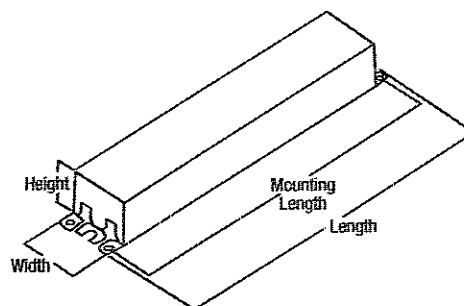
2-Lamp QS (QUICKSTEP)
Full light output (full power) S1 & S2 closed (on)
Bi-level mode (50% power) S1 or S2 open (off)

Dimensions:

Small Can (SC) enclosure size:
Overall: 9.5" L x 1.68" W x 1.18" H
Mounting: 8.90"

Wiring:
Leads only

Packaging:
Quantity: 840 pc pallet
Weight: 1.6 lbs each (approx)



EXAMPLES:

QUICKTRONIC PROFESSIONAL (QTP) or also available in QUICKSTEP (QS) ———— QS 2 x 28 T5/UNV PS95 SC ———— Enclosure Type (SC - Small Can)
Number of Lamps ———— Ballast Factor (95 or 115)
Primary Lamp Wattage/Type ———— Starting Type - PROStart
Line Voltage (120-277V) or 347V

Specifications

Starting Method: Programmed Start
Circuit Type: Series
Lamp Frequency: > 40 KHz
Lamp CCF: Less than 1.6
Starting Temp: 32°F (0°C) minimum
Input Frequency: 50/60 Hz
Low THD: < 10% (Full power)
< 20% THD (@50% power)
Power Factor: > 98% (Full power)
Voltage Range: +/-10% of Rated Input

UL Listed Class P, Type 1, Outdoor, CSA Certified
70°C Max Case Temperature
FCC 47CFR Part 18 Non-Consumer Class A+ Sound Rating
ANSI C62.41 CaL A Transient Protection
Dynamic End-of-Lamp-Life Sensing
Remote Mounting up to 8 feet for QTP models and 7 feet for QS models.

System Life / Warranty

QUICKTRONIC products are covered by our QUICK 60+® warranty, a comprehensive lamp and ballast system warranty. For additional details, refer to our QUICK 60+® warranty bulletin.

Ordering Guide

Specifications subject to change without notice.



AEP GridSMART

KEMA Operations Manual

Supplement – Summary of Deemed Savings with
Multipliers for Incentives Year 2010

gridSMARTSM

From **AEP OHIO[®]**



Summary of Common Deemed Savings Measures

The below table contains prescriptive measures in a convenient format for viewing the default deemed savings. These values are multiplied by business type using the chart found in the next section

Measure	Unit	Incentive Per Unit	kW Per Unit	Total kWh Per Unit	Years Life	Savings Category
Interior T8/T5 New Fluorescent Fixture w/ Electronic Ballast	Watts Reduced	0.35	0.000916	4.9141	11	Interior Non CFL Lighting
Exterior T8/T5 New Fluorescent Fixture w/ Electronic Ballast	Watts Reduced	0.30	0	4.1	11	Exterior Lighting
Garage T8/T5 New Fluorescent Fixture w/ Electronic Ballast	Watts Reduced	0.35	0.001	8.76	11	Garage Lighting
CFL - Screw-in (15W or Less)	Lamp	2.00	0.029	157	2.5	Interior CFL Lighting
CFL - Screw-in (16W to 26W)	Lamp	2.00	0.054	292	2.5	Interior CFL Lighting
CFL - Screw-in (27W or Greater)	Lamp	3.00	0.069	371	2.5	Interior CFL Lighting
HW CFL - 29W or Less	Fixture	30.00	0.052	280	12	Interior CFL Lighting
HW CFL - 30W or Greater	Fixture	60.00	0.103	551	12	Interior CFL Lighting
Permanent Lamp Removal - 2-ft Lamp	Lamp Removed	5.00	0.019	104.6	11	Interior Non CFL Lighting
Permanent Lamp Removal - 3-ft Lamp	Lamp Removed	5.00	0.028	152.3	11	Interior Non CFL Lighting
Permanent Lamp Removal - 4-ft Lamp	Lamp Removed	7.00	0.032	172.3	11	Interior Non CFL Lighting
Permanent Lamp Removal - 8-ft Lamp	Lamp Removed	12.00	0.062	333.7	11	Interior Non CFL Lighting
HP or RW T8 - 4-ft Lamp and Ballast	Lamp	7.00	0.012	62	11	Interior Non CFL Lighting
HP or RW T8 - 4-ft Reduced Watt Lamp only	Lamp	1.00	0.005	28.8	3	Interior Non CFL Lighting
CFL - Downlight Dimmable or 3-way	Lamp	10.00	0.05	266	2.5	Interior CFL Lighting
RW T8 - 8-ft Lamp and Ballast	Lamp	7.00	0.015	78.7	11	Interior Non CFL Lighting
RW T8 - 8-ft Lamp only	Lamp	1.00	0.005	24.6	3	Interior Non CFL Lighting
2-ft T12 to T8	Lamp	6.00	0.01	51.6	11	Interior Non CFL Lighting



3-ft T12 to T8	Lamp	6.00	0.013	69.5	11	Interior Non CFL Lighting
4-ft T12 to T8 - Includes U Lamps	Lamp	7.00	0.009	46.7	11	Interior Non CFL Lighting
T12 to T5	Lamp	7.00	0.012	65.1	11	Interior Non CFL Lighting
LED Lamp/Fixture	Lamp	15.00	0.03	160.9	16	Interior CFL Lighting
LED, T-1 or Electroluminescent Exit Signs	Signs	25.00	0.042	343.4	16	None
LED Open Sign	Signs	40.00	0.145	776.7	16	Interior Non CFL Lighting
LED Channel Sign <= 2 feet Interior	Letter	15.00	0.034	147	16	Interior Non CFL Lighting
LED Channel Sign > 2 feet Interior	Letter	45.00	0.086	378	16	Interior Non CFL Lighting
Integrated Ballast Ceramic Metal Halide Lamps	Fixture	10.00	0.044	231.1	8	Interior Non CFL Lighting
Pulse Start or Ceramic 100W or Less	Fixture	20.00	0.048	211	16	Interior Non CFL Lighting
Pulse Start or Ceramic 101W - 200W	Fixture	35.00	0.065	285	16	Interior Non CFL Lighting
Pulse Start or Ceramic 201W - 350W	Fixture	40.00	0.126	553	16	Interior Non CFL Lighting
Interior Induction Fixture	Fixture	35.00	0.063	337.7	16	Interior Non CFL Lighting
Cold Cathode	Lamp	5.00	0.02	108	5	Interior CFL Lighting
Occupancy Sensor	Watts Controlled	0.10	0.0003	1.385	8	Interior Non CFL Lighting
Daylight Sensor Controls	Watts Controlled	0.12	0.0003	1.475	8	Interior Non CFL Lighting
Bi-level Stairwell/Hall/Garage Fixture w/ integrated sensors	Fixture	30.00	0	340	11	Interior Non CFL Lighting
Lighting Density	W Reduction	0.40	0.000916	4.914	11	Interior Non CFL Lighting
Exterior High Wattage Screw-in CFLs	Lamp	10.00	0	1382.5	2.5	Exterior Lighting
LED Channel Sign <= 2 feet Outdoor	Letter	6.00	0	93	16	Exterior Lighting
LED Channel Sign > 2 feet Outdoor	Letter	20.00	0	237	16	Exterior Lighting
LED traffic lights - Green 8"	Lamp	25.00	0.06	226	10	Exterior Lighting
LED traffic lights - Green 12"	Lamp	35.00	0.14	520	10	Exterior Lighting

LED traffic lights - Red 8"	Lamp	25.00	0.06	299	10	Exterior Lighting
LED traffic lights - Red 12"	Lamp	35.00	0.14	694	10	Exterior Lighting
LED traffic lights - Walk/Don't Walk - 9"	Lamp	40.00	0.06	491	10	Exterior Lighting
LED traffic lights - Walk/Don't Walk - 12"	Lamp	50.00	0.11	946	10	Exterior Lighting
Pulse Start or Ceramic 350W - 400W	Fixture	40.00	0	1623	16	Exterior Lighting
Exterior LED or Induction replacing 175W or Less HID	Fixture	35.00	0	275	16	Exterior Lighting
Exterior LED or Induction replacing 176W - 250W HID	Fixture	45.00	0	484	16	Exterior Lighting
Exterior LED or Induction replacing 251W - 400W HID	Fixture	65.00	0	589	16	Exterior Lighting
Bi-Level Parking Lot Fixture	Fixture	100.00	0	482	8	Exterior Lighting
Bi-Level Wall Pack Fixture	Fixture	135.00	0	1194	8	Exterior Lighting
Exterior Lighting Bi-Level Control w/ Override 150W-1000W HID	Fixture	60.00	0	743	10	Exterior Lighting
Photocells	Watts Controlled	0.05	0	0.28	8	Exterior Lighting
Time Clocks	Watts Controlled	0.05	0	1.248	8	Exterior Lighting
Interior Garage LED or Induction replacing 175W or Less HID	Fixture	65.00	0.042	369	16	Garage Lighting
Interior Garage LED or Induction replacing 176W - 250W HID	Fixture	80.00	0.067	587	16	Garage Lighting
Interior Garage LED or Induction replacing 251W - 400W HID	Fixture	125.00	0.131	1146	16	Garage Lighting
Interior Garage High Wattage Screw-in CFLs	Fixture	20.00	0.158	1382.5	2.5	Garage Lighting
Interior Garage Metal Halides (Pulse start or Ceramic) 350W- 400W	Fixture	70.00	0.396	3467	16	Garage Lighting
Exterior Garage High Wattage Screw-in CFLs	Lamp	20.00	0	574.5	2.5	Garage Lighting



VFD for HVAC Fans	HP	60.00	0.025	503	15	VFD for HVAC Fans
VFD for HVAC Pumps	HP	60.00	0.025	503	15	VFD for HVAC Pumps
VFD for Kitchen Exhaust Fan - New Hood	HP	300.00	0.76	4486	15	None
VFD for Kitchen Exhaust Fan - Retrofit Hood	HP	400.00	0.76	4486	15	None
VFD for HVAC Chillers	HP	30.00	0.025	421	15	VFD for HVAC Chillers
Ice Maker 101-200 lbs / 24 hrs	Per Ice Maker	150.00	0.118	1029	12	None
Ice Maker 201-300 lbs / 24 hrs	Per Ice Maker	150.00	0.177	1551	12	None
Ice Maker 301-400 lbs / 24 hrs	Per Ice Maker	150.00	0.21	1840	12	None
Ice Maker 401-500 lbs / 24 hrs	Per Ice Maker	225.00	0.229	2004	12	None
Ice Maker 501-1000 lbs / 24 hrs	Per Ice Maker	225.00	0.363	3176	12	None
Ice Maker 1001-1500 lbs / 24 hrs	Per Ice Maker	350.00	0.573	5019	12	None
Ice Maker >1500 lbs / 24 hrs	Per Ice Maker	350.00	0.638	5585	12	None
Refrigeration Strip Curtains on Walk-in	Square Foot	4.00	0.01	139	4	None
Refrigeration Anti-Sweat Heater Controls	Linear Foot	30.00	0.007	402	12	None
Refrigeration EC Motor for Walk-in	Motor	50.00	0.044	401	15	None
Refrigeration EC Motor for Reach-in Refrigerator cases	Motor	35.00	0.033	345	15	None
Refrigeration Evaporator Fan Controls	Motor	60.00	0.06	478	16	None
Refrigeration Door Gaskets	Linear Foot	4.00	0.011	13	4	None
Refrigeration Automatic Door Closers for Walk-in Coolers	Door	70.00	0.137	943	8	None
Refrigeration Automatic Door Closers for Walk-in Freezers	Door	100.00	0.309	2307	8	None



Refrigeration LED Refrigeration Case Lighting	Door	45.00	0.061	375	16	None
Refrigeration ENERGY STAR Solid Door Freezer	Unit	150.00	0.193	1695	12	None
Refrigeration ENERGY STAR Glass Door Freezer	Unit	400.00	0.676	5923	12	None
Food Service Steam Cookers	Unit	450.00	1	4419	12	None
Food Service Combination Oven	Unit	1,500.00	0.96	4208	12	None
Food Service Hot Holding Cabinet	Unit	300.00	0.6	2628	12	None
Food Service Beverage Machine Controls	Unit	100.00	0	1612	10	None
Food Service Snack Machine Controls	Unit	30.00	0	387	10	None
Food Service ENERGY STAR Refrigerated Vending Machine	Unit	150.00	0	1576	14	None
Networked Power Management Software	PC Controlled	10.00	0	200	10	None
Plug Load Occ Sensors	Sensor	20.00	0.091	258	8	None

HVAC Savings

Measure SubCategory	Measure	Building Type	Unit	Coincident kW Savings	kWh Savings
Unitary&Split AC and ASHP	< 65 000 Btu/h (5 4 tons) - 14 SEER	College/University	Tons	0.07	49.1
Unitary&Split AC and ASHP	< 65 000 Btu/h (5 4 tons) - 14 SEER	Grocery	Tons	0.07	87.8
Unitary&Split AC and ASHP	< 65 000 Btu/h (5 4 tons) - 14 SEER	Heavy Industry	Tons	0.07	40.4
Unitary&Split AC and ASHP	< 65 000 Btu/h (5 4 tons) - 14 SEER	Hotel/Motel	Tons	0.07	87.3
Unitary&Split AC and ASHP	< 65 000 Btu/h (5 4 tons) - 14 SEER	Light Industry	Tons	0.07	41.5
Unitary&Split AC and ASHP	< 65 000 Btu/h (5 4 tons) - 14 SEER	Medical	Tons	0.07	96.7
Unitary&Split AC and ASHP	< 65 000 Btu/h (5 4 tons) - 14 SEER	Office	Tons	0.07	41.2
Unitary&Split AC and ASHP	< 65,000 Btu/h (5 4 tons) - 14 SEER	Restaurant	Tons	0.07	54.4



Unitary&Split AC and ASHP	< 65,000 Btu/h (5.4 tons) - 14 SEER	Retail/Service	Tons	0.07	65
Unitary&Split AC and ASHP	< 65,000 Btu/h (5.4 tons) - 14 SEER	School	Tons	0.07	20.7
Unitary&Split AC and ASHP	< 65 000 Btu/h (5.4 tons) - 14 SEER	Warehouse	Tons	0.07	36
Unitary&Split AC and ASHP	< 65 000 Btu/h (5.4 tons) - 14 SEER	Miscellaneous	Tons	0.07	56.4
Unitary&Split AC and ASHP	< 65,000 Btu/h (5.4 tons) - 15 SEER	College/University	Tons	0.13	91.6
Unitary&Split AC and ASHP	< 65 000 Btu/h (5.4 tons) - 15 SEER	Grocery	Tons	0.13	164
Unitary&Split AC and ASHP	< 65 000 Btu/h (5.4 tons) - 15 SEER	Heavy Industry	Tons	0.12	75.5
Unitary&Split AC and ASHP	< 65 000 Btu/h (5.4 tons) - 15 SEER	Hotel/Motel	Tons	0.2	163
Unitary&Split AC and ASHP	< 65,000 Btu/h (5.4 tons) - 15 SEER	Light Industry	Tons	0.13	77.4
Unitary&Split AC and ASHP	< 65,000 Btu/h (5.4 tons) - 15 SEER	Medical	Tons	0.13	181
Unitary&Split AC and ASHP	< 65 000 Btu/h (5.4 tons) - 15 SEER	Office	Tons	0.13	76.8
Unitary&Split AC and ASHP	< 65 000 Btu/h (5.4 tons) - 15 SEER	Restaurant	Tons	0.13	102
Unitary&Split AC and ASHP	< 65 000 Btu/h (5.4 tons) - 15 SEER	Retail/Service	Tons	0.13	121
Unitary&Split AC and ASHP	< 65,000 Btu/h (5.4 tons) - 15 SEER	School	Tons	0.12	38.6
Unitary&Split AC and ASHP	< 65,000 Btu/h (5.4 tons) - 15 SEER	Warehouse	Tons	0.13	67.1
Unitary&Split AC and ASHP	< 65,000 Btu/h (5.4 tons) - 15 SEER	Miscellaneous	Tons	0.13	105
Unitary&Split AC and ASHP	>= 65,000 Btu/h and < 120 000 Btu/h (5.5-10 tons)	College/University	Tons	0.09	64
Unitary&Split AC and ASHP	>= 65 000 Btu/h and < 120 000 Btu/h (5.5-10 tons)	Grocery	Tons	0.09	114
Unitary&Split AC and ASHP	>= 65,000 Btu/h and < 120 000 Btu/h (5.5-10 tons)	Heavy Industry	Tons	0.09	52.6
Unitary&Split AC and ASHP	>= 65,000 Btu/h and < 120 000 Btu/h (5.5-10 tons)	Hotel/Motel	Tons	0.09	114
Unitary&Split AC and ASHP	>= 65 000 Btu/h and < 120 000 Btu/h (5.5-10 tons)	Light Industry	Tons	0.09	54.1
Unitary&Split AC and ASHP	>= 65 000 Btu/h and < 120 000 Btu/h (5.5-10 tons)	Medical	Tons	0.1	139
Unitary&Split AC and ASHP	>= 65,000 Btu/h and < 120 000 Btu/h (5.5-10 tons)	Office	Tons	0.09	53.6



ASHP	120 000 Btu/h (5 5-10 tons)				
Unitary&Split AC and ASHP	>= 65 000 Btu/h and < 120 000 Btu/h (5 5-10 tons)	Restaurant	Tons	0.09	70.8
Unitary&Split AC and ASHP	>= 65 000 Btu/h and < 120 000 Btu/h (5 5-10 tons)	Retail/Service	Tons	0.09	84.7
Unitary&Split AC and ASHP	>= 65 000 Btu/h and < 120,000 Btu/h (5 5-10 tons)	School	Tons	0.09	27
Unitary&Split AC and ASHP	>= 65 000 Btu/h and < 120 000 Btu/h (5 5-10 tons)	Warehouse	Tons	0.09	46.8
Unitary&Split AC and ASHP	>= 65 000 Btu/h and < 120,000 Btu/h (5 5-10 tons)	Miscellaneous	Tons	0.09	74.6
Unitary&Split AC and ASHP	>=120 000 Btu/h and < 240,000 Btu/h (10-20 tons)	College/University	Tons	0.11	71.3
Unitary&Split AC and ASHP	>=120 000 Btu/h and < 240,000 Btu/h (10-20 tons)	Grocery	Tons	0.11	127
Unitary&Split AC and ASHP	>=120 000 Btu/h and < 240,000 Btu/h (10-20 tons)	Heavy Industry	Tons	0.11	65.4
Unitary&Split AC and ASHP	>=120,000 Btu/h and < 240,000 Btu/h (10-20 tons)	Hotel/Motel	Tons	0.12	123
Unitary&Split AC and ASHP	>=120 000 Btu/h and < 240,000 Btu/h (10-20 tons)	Light Industry	Tons	0.11	68.9
Unitary&Split AC and ASHP	>=120 000 Btu/h and < 240,000 Btu/h (10-20 tons)	Medical	Tons	0.11	126
Unitary&Split AC and ASHP	>=120 000 Btu/h and < 240,000 Btu/h (10-20 tons)	Office	Tons	0.12	60.7
Unitary&Split AC and ASHP	>=120 000 Btu/h and < 240,000 Btu/h (10-20 tons)	Restaurant	Tons	0.11	82.9
Unitary&Split AC and ASHP	>=120,000 Btu/h and < 240,000 Btu/h (10-20 tons)	Retail/Service	Tons	0.11	92.3
Unitary&Split AC and ASHP	>=120,000 Btu/h and < 240,000 Btu/h (10-20 tons)	School	Tons	0.11	31.3
Unitary&Split AC and ASHP	>=120 000 Btu/h and < 240,000 Btu/h (10-20 tons)	Warehouse	Tons	0.12	58
Unitary&Split AC and ASHP	>=120 000 Btu/h and < 240,000 Btu/h (10-20 tons)	Miscellaneous	Tons	0.11	82.3
Unitary&Split AC and ASHP	>= 240 000 Btu/h and < 760,000 Btu/h (21-63 tons)	College/University	Tons	0.1	66.1
Unitary&Split AC and ASHP	>= 240 000 Btu/h and < 760,000 Btu/h (21-63 tons)	Grocery	Tons	0.11	117
Unitary&Split AC and ASHP	>= 240 000 Btu/h and < 760,000 Btu/h (21-63 tons)	Heavy Industry	Tons	0.1	61.9
Unitary&Split AC and ASHP	>= 240,000 Btu/h and < 760,000 Btu/h (21-63 tons)	Hotel/Motel	Tons	0.11	114
Unitary&Split AC and ASHP	>= 240 000 Btu/h and < 760,000 Btu/h (21-63 tons)	Light Industry	Tons	0.11	63.9



Unitary&Split AC and ASHP	>= 240,000 Btu/h and < 760,000 Btu/h (21-63 tons)	Medical	Tons	0.1	116
Unitary&Split AC and ASHP	>= 240,000 Btu/h and < 760,000 Btu/h (21-63 tons)	Office	Tons	0.11	56.2
Unitary&Split AC and ASHP	>= 240 000 Btu/h and < 760,000 Btu/h (21-63 tons)	Restaurant	Tons	0.1	76.7
Unitary&Split AC and ASHP	>= 240 000 Btu/h and < 760,000 Btu/h (21-63 tons)	Retail/Service	Tons	0.11	90.5
Unitary&Split AC and ASHP	>= 240,000 Btu/h and < 760,000 Btu/h (21-63 tons)	School	Tons	0.1	28.9
Unitary&Split AC and ASHP	>= 240 000 Btu/h and < 760,000 Btu/h (21-63 tons)	Warehouse	Tons	0.11	53.8
Unitary&Split AC and ASHP	>= 240 000 Btu/h and < 760,000 Btu/h (21-63 tons)	Miscellaneous	Tons	0.11	76.8
Unitary&Split AC and ASHP	>= 760,000 Btu/h (> 63 tons)	College/University	Tons	0.08	50.5
Unitary&Split AC and ASHP	>= 760,000 Btu/h (> 63 tons)	Grocery	Tons	0.08	89.7
Unitary&Split AC and ASHP	>= 760 000 Btu/h (> 63 tons)	Heavy Industry	Tons	0.08	47.3
Unitary&Split AC and ASHP	>= 760 000 Btu/h (> 63 tons)	Hotel/Motel	Tons	0.08	86.9
Unitary&Split AC and ASHP	>= 760 000 Btu/h (> 63 tons)	Light Industry	Tons	0.08	48.9
Unitary&Split AC and ASHP	>= 760 000 Btu/h (> 63 tons)	Medical	Tons	0.08	88.9
Unitary&Split AC and ASHP	>= 760 000 Btu/h (> 63 tons)	Office	Tons	0.08	42.4
Unitary&Split AC and ASHP	>= 760 000 Btu/h (> 63 tons)	Restaurant	Tons	0.08	58.7
Unitary&Split AC and ASHP	>= 760 000 Btu/h (> 63 tons)	Retail/Service	Tons	0.08	69.3
Unitary&Split AC and ASHP	>= 760 000 Btu/h (> 63 tons)	School	Tons	0.08	22.1
Unitary&Split AC and ASHP	>= 760 000 Btu/h (> 63 tons)	Warehouse	Tons	0.08	41.1
Unitary&Split AC and ASHP	>= 760 000 Btu/h (> 63 tons)	Miscellaneous	Tons	0.08	58.7
Water Cooled Chillers Centrifugal	<= 150 tons - Level 1	College/University	Tons	0.06	72.4
Water Cooled Chillers Centrifugal	<= 150 tons - Level 1	Grocery	Tons	0.07	115
Water Cooled Chillers Centrifugal	<= 150 tons - Level 1	Heavy Industry	Tons	0.07	69.4
Water Cooled Chillers Centrifugal	<= 150 tons - Level 1	Hotel/Motel	Tons	0.08	104
Water Cooled Chillers, Centrifugal	<= 150 tons - Level 1	Light Industry	Tons	0.07	43.1
Water Cooled Chillers Centrifugal	<= 150 tons - Level 1	Medical	Tons	0.07	91.2
Water Cooled Chillers, Centrifugal	<= 150 tons - Level 1	Office	Tons	0.07	45.6



Centrifugal					
Water Cooled Chillers Centrifugal	<= 150 tons - Level 1	Restaurant	Tons	0.07	89.4
Water Cooled Chillers, Centrifugal	<= 150 tons - Level 1	Retail/Service	Tons	0.06	67.3
Water Cooled Chillers Centrifugal	<= 150 tons - Level 1	School	Tons	0.06	38.7
Water Cooled Chillers Centrifugal	<= 150 tons - Level 1	Warehouse	Tons	0.07	46.1
Water Cooled Chillers, Centrifugal	<= 150 tons - Level 1	Miscellaneous	Tons	0.07	71.1
Water Cooled Chillers Centrifugal	<= 150 tons - Level 2	College/University	Tons	0.12	134
Water Cooled Chillers Centrifugal	<= 150 tons - Level 2	Grocery	Tons	0.13	213
Water Cooled Chillers, Centrifugal	<= 150 tons - Level 2	Heavy Industry	Tons	0.13	129
Water Cooled Chillers, Centrifugal	<= 150 tons - Level 2	Hotel/Motel	Tons	0.15	194
Water Cooled Chillers, Centrifugal	<= 150 tons - Level 2	Light Industry	Tons	0.13	80.1
Water Cooled Chillers, Centrifugal	<= 150 tons - Level 2	Medical	Tons	0.13	169
Water Cooled Chillers Centrifugal	<= 150 tons - Level 2	Office	Tons	0.13	84.8
Water Cooled Chillers Centrifugal	<= 150 tons - Level 2	Restaurant	Tons	0.13	166
Water Cooled Chillers Centrifugal	<= 150 tons - Level 2	Retail/Service	Tons	0.12	125
Water Cooled Chillers, Centrifugal	<= 150 tons - Level 2	School	Tons	0.12	71.8
Water Cooled Chillers, Centrifugal	<= 150 tons - Level 2	Warehouse	Tons	0.13	85.6
Water Cooled Chillers, Centrifugal	<= 150 tons - Level 2	Miscellaneous	Tons	0.13	132
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 1	College/University	Tons	0.05	62
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 1	Grocery	Tons	0.06	98.2
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 1	Heavy Industry	Tons	0.06	59.4
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 1	Hotel/Motel	Tons	0.07	89.4
Water Cooled Chillers, Centrifugal	151 to 300 tons - Level 1	Light Industry	Tons	0.06	50.1
Water Cooled Chillers, Centrifugal	151 to 300 tons - Level 1	Medical	Tons	0.06	78.1
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 1	Office	Tons	0.06	39.1
Water Cooled Chillers, Centrifugal	151 to 300 tons - Level 1	Restaurant	Tons	0.06	76.5



Water Cooled Chillers Centrifugal	151 to 300 tons - Level 1	Retail/Service	Tons	0.06	58.7
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 1	School	Tons	0.06	33.1
Water Cooled Chillers, Centrifugal	151 to 300 tons - Level 1	Warehouse	Tons	0.12	41.5
Water Cooled Chillers, Centrifugal	151 to 300 tons - Level 1	Miscellaneous	Tons	0.07	62.4
Water Cooled Chillers, Centrifugal	151 to 300 tons - Level 2	College/University	Tons	0.11	124
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 2	Grocery	Tons	0.13	196
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 2	Heavy Industry	Tons	0.12	119
Water Cooled Chillers, Centrifugal	151 to 300 tons - Level 2	Hotel/Motel	Tons	0.14	179
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 2	Light Industry	Tons	0.12	100
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 2	Medical	Tons	0.12	156
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 2	Office	Tons	0.12	78.1
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 2	Restaurant	Tons	0.12	153
Water Cooled Chillers, Centrifugal	151 to 300 tons - Level 2	Retail/Service	Tons	0.11	117
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 2	School	Tons	0.11	66.1
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 2	Warehouse	Tons	0.18	82.9
Water Cooled Chillers Centrifugal	151 to 300 tons - Level 2	Miscellaneous	Tons	0.12	125
Water Cooled Chillers Centrifugal	> 300 tons - Level 1	College/University	Tons	0.05	62
Water Cooled Chillers Centrifugal	> 300 tons - Level 1	Grocery	Tons	0.06	98.1
Water Cooled Chillers Centrifugal	> 300 tons - Level 1	Heavy Industry	Tons	0.06	59.4
Water Cooled Chillers, Centrifugal	> 300 tons - Level 1	Hotel/Motel	Tons	0.07	89.3
Water Cooled Chillers, Centrifugal	> 300 tons - Level 1	Light Industry	Tons	0.06	50.1
Water Cooled Chillers, Centrifugal	> 300 tons - Level 1	Medical	Tons	0.06	78
Water Cooled Chillers Centrifugal	> 300 tons - Level 1	Office	Tons	0.06	39
Water Cooled Chillers Centrifugal	> 300 tons - Level 1	Restaurant	Tons	0.06	76.5
Water Cooled Chillers Centrifugal	> 300 tons - Level 1	Retail/Service	Tons	0.06	63
Water Cooled Chillers, Centrifugal	> 300 tons - Level 1	School	Tons	0.06	33

Centrifugal					
Water Cooled Chillers Centrifugal	> 300 tons - Level 1	Warehouse	Tons	0.06	44.5
Water Cooled Chillers Centrifugal	> 300 tons - Level 1	Miscellaneous	Tons	0.06	63
Water Cooled Chillers Centrifugal	> 300 tons - Level 2	College/University	Tons	0.1	114
Water Cooled Chillers Centrifugal	> 300 tons - Level 2	Grocery	Tons	0.11	180
Water Cooled Chillers Centrifugal	> 300 tons - Level 2	Heavy Industry	Tons	0.11	109
Water Cooled Chillers, Centrifugal	> 300 tons - Level 2	Hotel/Motel	Tons	0.13	164
Water Cooled Chillers, Centrifugal	> 300 tons - Level 2	Light Industry	Tons	0.11	91.8
Water Cooled Chillers Centrifugal	> 300 tons - Level 2	Medical	Tons	0.11	143
Water Cooled Chillers Centrifugal	> 300 tons - Level 2	Office	Tons	0.11	71.6
Water Cooled Chillers Centrifugal	> 300 tons - Level 2	Restaurant	Tons	0.11	140
Water Cooled Chillers Centrifugal	> 300 tons - Level 2	Retail/Service	Tons	0.11	116
Water Cooled Chillers Centrifugal	> 300 tons - Level 2	School	Tons	0.1	60.6
Water Cooled Chillers Centrifugal	> 300 tons - Level 2	Warehouse	Tons	0.11	81.6
Water Cooled Chillers Centrifugal	> 300 tons - Level 2	Miscellaneous	Tons	0.11	116
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 1	College/University	Tons	0.06	55.5
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 1	Grocery	Tons	0.07	82.6
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 1	Heavy Industry	Tons	0.06	47.6
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 1	Hotel/Motel	Tons	0.07	79.9
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 1	Light Industry	Tons	0.07	35.6
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 1	Medical	Tons	0.07	75
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 1	Office	Tons	0.07	40.5
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 1	Restaurant	Tons	0.08	58.5
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 1	Retail/Service	Tons	0.07	54.6
Water Cooled Chillers, Rotary, Scroll, or Screw	<= 150 tons - Level 1	School	Tons	0.06	29.3
Water Cooled Chillers, Rotary, Scroll, or Screw	<= 150 tons - Level 1	Warehouse	Tons	0.07	39.8



Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 1	Miscellaneous	Tons	0.07	54.5
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 2	College/University	Tons	0.12	111
Water Cooled Chillers, Rotary, Scroll, or Screw	<= 150 tons - Level 2	Grocery	Tons	0.14	166
Water Cooled Chillers, Rotary, Scroll, or Screw	<= 150 tons - Level 2	Heavy Industry	Tons	0.12	95.3
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 2	Hotel/Motel	Tons	0.14	160
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 2	Light Industry	Tons	0.14	71.2
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 2	Medical	Tons	0.14	150
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 2	Office	Tons	0.14	81.2
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 2	Restaurant	Tons	0.15	117
Water Cooled Chillers Rotary, Scroll, or Screw	<= 150 tons - Level 2	Retail/Service	Tons	0.16	110
Water Cooled Chillers, Rotary, Scroll, or Screw	<= 150 tons - Level 2	School	Tons	0.12	58.7
Water Cooled Chillers, Rotary, Scroll, or Screw	<= 150 tons - Level 2	Warehouse	Tons	0.14	79.7
Water Cooled Chillers, Rotary, Scroll, or Screw	<= 150 tons - Level 2	Miscellaneous	Tons	0.14	109
Water Cooled Chillers Rotary, Scroll, or Screw	151 to 300 tons - Level 1	College/University	Tons	0.05	47.7
Water Cooled Chillers Rotary, Scroll, or Screw	151 to 300 tons - Level 1	Grocery	Tons	0.06	71
Water Cooled Chillers Rotary, Scroll, or Screw	151 to 300 tons - Level 1	Heavy Industry	Tons	0.05	40.9
Water Cooled Chillers Rotary, Scroll, or Screw	151 to 300 tons - Level 1	Hotel/Motel	Tons	0.06	68.7
Water Cooled Chillers, Rotary, Scroll, or Screw	151 to 300 tons - Level 1	Light Industry	Tons	0.06	33.8
Water Cooled Chillers, Rotary, Scroll, or Screw	151 to 300 tons - Level 1	Medical	Tons	0.06	64.4
Water Cooled Chillers, Rotary, Scroll, or Screw	151 to 300 tons - Level 1	Office	Tons	0.06	34.8
Water Cooled Chillers Rotary, Scroll, or Screw	151 to 300 tons - Level 1	Restaurant	Tons	0.06	50.2
Water Cooled Chillers Rotary, Scroll, or Screw	151 to 300 tons - Level 1	Retail/Service	Tons	0.08	47.4
Water Cooled Chillers Rotary, Scroll, or Screw	151 to 300 tons - Level 1	School	Tons	0.05	25.2
Water Cooled Chillers Rotary, Scroll, or Screw	151 to 300 tons - Level 1	Warehouse	Tons	0.06	35
Water Cooled Chillers, Rotary, Scroll, or Screw	151 to 300 tons - Level 1	Miscellaneous	Tons	0.06	47.2
Water Cooled Chillers, Rotary, Scroll, or Screw	151 to 300 tons - Level 2	College/University	Tons	0.11	104



Rotary, Scroll, or Screw					
Water Cooled Chillers					
Rotary, Scroll, or Screw	151 to 300 tons - Level 2	Grocery	Tons	0.13	154
Water Cooled Chillers,					
Rotary, Scroll, or Screw	151 to 300 tons - Level 2	Heavy Industry	Tons	0.12	88.7
Water Cooled Chillers					
Rotary, Scroll, or Screw	151 to 300 tons - Level 2	Hotel/Motel	Tons	0.13	149
Water Cooled Chillers					
Rotary, Scroll, or Screw	151 to 300 tons - Level 2	Light Industry	Tons	0.13	73.3
Water Cooled Chillers,					
Rotary, Scroll, or Screw	151 to 300 tons - Level 2	Medical	Tons	0.13	140
Water Cooled Chillers,					
Rotary, Scroll, or Screw	151 to 300 tons - Level 2	Office	Tons	0.13	75.6
Water Cooled Chillers					
Rotary, Scroll, or Screw	151 to 300 tons - Level 2	Restaurant	Tons	0.13	109
Water Cooled Chillers					
Rotary, Scroll, or Screw	151 to 300 tons - Level 2	Retail/Service	Tons	0.15	103
Water Cooled Chillers,					
Rotary, Scroll, or Screw	151 to 300 tons - Level 2	School	Tons	0.11	54.7
Water Cooled Chillers,					
Rotary, Scroll, or Screw	151 to 300 tons - Level 2	Warehouse	Tons	0.19	76
Water Cooled Chillers,					
Rotary, Scroll, or Screw	151 to 300 tons - Level 2	Miscellaneous	Tons	0.13	102
Water Cooled Chillers					
Rotary, Scroll, or Screw	> 300 tons - Level 1	College/University	Tons	0.05	47.8
Water Cooled Chillers					
Rotary, Scroll, or Screw	> 300 tons - Level 1	Grocery	Tons	0.06	71.2
Water Cooled Chillers,					
Rotary, Scroll, or Screw	> 300 tons - Level 1	Heavy Industry	Tons	0.05	41
Water Cooled Chillers,					
Rotary, Scroll, or Screw	> 300 tons - Level 1	Hotel/Motel	Tons	0.06	68.8
Water Cooled Chillers,					
Rotary, Scroll, or Screw	> 300 tons - Level 1	Light Industry	Tons	0.06	33.9
Water Cooled Chillers,					
Rotary, Scroll, or Screw	> 300 tons - Level 1	Medical	Tons	0.06	64.6
Water Cooled Chillers,					
Rotary, Scroll, or Screw	> 300 tons - Level 1	Office	Tons	0.06	35
Water Cooled Chillers					
Rotary, Scroll, or Screw	> 300 tons - Level 1	Restaurant	Tons	0.06	50.4
Water Cooled Chillers					
Rotary, Scroll, or Screw	> 300 tons - Level 1	Retail/Service	Tons	0.06	56.9
Water Cooled Chillers					
Rotary, Scroll, or Screw	> 300 tons - Level 1	School	Tons	0.05	25.3
Water Cooled Chillers					
Rotary, Scroll, or Screw	> 300 tons - Level 1	Warehouse	Tons	0.06	36
Water Cooled Chillers					
Rotary, Scroll, or Screw	> 300 tons - Level 1	Miscellaneous	Tons	0.06	48.3
Water Cooled Chillers,					
Rotary, Scroll, or Screw	> 300 tons - Level 2	College/University	Tons	0.1	87.8
Water Cooled Chillers,					
Rotary, Scroll, or Screw	> 300 tons - Level 2	Grocery	Tons	0.11	131



Water Cooled Chillers Rotary, Scroll, or Screw	> 300 tons - Level 2	Heavy Industry	Tons	0.1	75.2
Water Cooled Chillers Rotary, Scroll, or Screw	> 300 tons - Level 2	Hotel/Motel	Tons	0.11	126
Water Cooled Chillers, Rotary, Scroll, or Screw	> 300 tons - Level 2	Light Industry	Tons	0.11	62.2
Water Cooled Chillers, Rotary, Scroll, or Screw	> 300 tons - Level 2	Medical	Tons	0.11	119
Water Cooled Chillers Rotary, Scroll, or Screw	> 300 tons - Level 2	Office	Tons	0.11	64.2
Water Cooled Chillers Rotary, Scroll, or Screw	> 300 tons - Level 2	Restaurant	Tons	0.11	92.5
Water Cooled Chillers Rotary, Scroll, or Screw	> 300 tons - Level 2	Retail/Service	Tons	0.11	94.5
Water Cooled Chillers Rotary, Scroll, or Screw	> 300 tons - Level 2	School	Tons	0.1	46.4
Water Cooled Chillers Rotary, Scroll, or Screw	> 300 tons - Level 2	Warehouse	Tons	0.18	66.1
Water Cooled Chillers Rotary, Scroll, or Screw	> 300 tons - Level 2	Miscellaneous	Tons	0.11	87.7
Water Cooled Chillers, Reciprocal	Level 1	College/University	Tons	0.06	56.4
Water Cooled Chillers, Reciprocal	Level 1	Grocery	Tons	0.07	74.5
Water Cooled Chillers, Reciprocal	Level 1	Heavy Industry	Tons	0.06	46.3
Water Cooled Chillers Reciprocal	Level 1	Hotel/Motel	Tons	0.06	81.2
Water Cooled Chillers Reciprocal	Level 1	Light Industry	Tons	0.07	37.9
Water Cooled Chillers Reciprocal	Level 1	Medical	Tons	0.06	75.5
Water Cooled Chillers Reciprocal	Level 1	Office	Tons	0.08	39.9
Water Cooled Chillers, Reciprocal	Level 1	Restaurant	Tons	0.07	56.9
Water Cooled Chillers, Reciprocal	Level 1	Retail/Service	Tons	0.07	53.8
Water Cooled Chillers, Reciprocal	Level 1	School	Tons	0.06	28.8
Water Cooled Chillers Reciprocal	Level 1	Warehouse	Tons	0.07	40.5
Water Cooled Chillers Reciprocal	Level 1	Miscellaneous	Tons	0.07	53.8
Water Cooled Chillers Reciprocal	Level 2	College/University	Tons	0.12	113
Water Cooled Chillers Reciprocal	Level 2	Grocery	Tons	0.14	149
Water Cooled Chillers Reciprocal	Level 2	Heavy Industry	Tons	0.13	92.7
Water Cooled Chillers, Reciprocal	Level 2	Hotel/Motel	Tons	0.13	163



Reciprocal					
Water Cooled Chillers Reciprocal	Level 2	Light Industry	Tons	0.13	75.9
Water Cooled Chillers Reciprocal	Level 2	Medical	Tons	0.13	151
Water Cooled Chillers, Reciprocal	Level 2	Office	Tons	0.14	79.9
Water Cooled Chillers Reciprocal	Level 2	Restaurant	Tons	0.15	114
Water Cooled Chillers Reciprocal	Level 2	Retail/Service	Tons	0.16	108
Water Cooled Chillers, Reciprocal	Level 2	School	Tons	0.12	57.6
Water Cooled Chillers Reciprocal	Level 2	Warehouse	Tons	0.14	81.1
Water Cooled Chillers Reciprocal	Level 2	Miscellaneous	Tons	0.13	108
Air-Cooled Chillers	Air-Cooled Chillers	College/University	Tons	0.15	144
Air-Cooled Chillers	Air-Cooled Chillers	Grocery	Tons	0.16	176
Air-Cooled Chillers	Air-Cooled Chillers	Heavy Industry	Tons	0.15	119
Air-Cooled Chillers	Air-Cooled Chillers	Hotel/Motel	Tons	0.16	201
Air-Cooled Chillers	Air-Cooled Chillers	Light Industry	Tons	0.16	88.2
Air-Cooled Chillers	Air-Cooled Chillers	Medical	Tons	0.16	194
Air-Cooled Chillers	Air-Cooled Chillers	Office	Tons	0.17	102
Air-Cooled Chillers	Air-Cooled Chillers	Restaurant	Tons	0.16	147
Air-Cooled Chillers	Air-Cooled Chillers	Retail/Service	Tons	0.15	136
Air-Cooled Chillers	Air-Cooled Chillers	School	Tons	0.14	73
Air-Cooled Chillers	Air-Cooled Chillers	Warehouse	Tons	0.15	100
Air-Cooled Chillers	Air-Cooled Chillers	Miscellaneous	Tons	0.1	87.1
Air-Cooled Chillers	Air-Cooled Chillers	College/University	Tons	0.15	144
Air-Cooled Chillers	Air-Cooled Chillers	Grocery	Tons	0.16	176
Air-Cooled Chillers	Air-Cooled Chillers	Heavy Industry	Tons	0.15	119
Air-Cooled Chillers	Air-Cooled Chillers	Hotel/Motel	Tons	0.16	201
Air-Cooled Chillers	Air-Cooled Chillers	Light Industry	Tons	0.17	106
Air-Cooled Chillers	Air-Cooled Chillers	Medical	Tons	0.16	194
Air-Cooled Chillers	Air-Cooled Chillers	Office	Tons	0.17	102
Air-Cooled Chillers	Air-Cooled Chillers	Restaurant	Tons	0.16	147
Air-Cooled Chillers	Air-Cooled Chillers	Retail/Service	Tons	0.15	141
Air-Cooled Chillers	Air-Cooled Chillers	School	Tons	0.14	73
Air-Cooled Chillers	Air-Cooled Chillers	Warehouse	Tons	0.15	105
Air-Cooled Chillers	Air-Cooled Chillers	Miscellaneous	Tons	0.1	88.7
Air-Cooled Chillers	Air-Cooled Chillers	College/University	Tons	0.15	144
Air-Cooled Chillers	Air-Cooled Chillers	Grocery	Tons	0.16	176
Air-Cooled Chillers	Air-Cooled Chillers	Heavy Industry	Tons	0.15	119
Air-Cooled Chillers	Air-Cooled Chillers	Hotel/Motel	Tons	0.16	201
Air-Cooled Chillers	Air-Cooled Chillers	Light Industry	Tons	0.17	106
Air-Cooled Chillers	Air-Cooled Chillers	Medical	Tons	0.16	194
Air-Cooled Chillers	Air-Cooled Chillers	Office	Tons	0.17	102



Air-Cooled Chillers	Air-Cooled Chillers	Restaurant	Tons	0.16	147
Air-Cooled Chillers	Air-Cooled Chillers	Retail/Service	Tons	0.15	137
Air-Cooled Chillers	Air-Cooled Chillers	School	Tons	0.14	73
Air-Cooled Chillers	Air-Cooled Chillers	Warehouse	Tons	0.15	102
Air-Cooled Chillers	Air-Cooled Chillers	Miscellaneous	Tons	0.1	88.3
Room Air Conditioners	Room AC < 8,000 Btu/h (0.67 tons)	College/University	Tons	0.15	116
Room Air Conditioners	Room AC < 8,000 Btu/h (0.67 tons)	Grocery	Tons	0.15	116
Room Air Conditioners	Room AC < 8 000 Btu/h (0.67 tons)	Heavy Industry	Tons	0.15	116
Room Air Conditioners	Room AC < 8 000 Btu/h (0.67 tons)	Hotel/Motel	Tons	0.15	116
Room Air Conditioners	Room AC < 8 000 Btu/h (0.67 tons)	Light Industry	Tons	0.15	116
Room Air Conditioners	Room AC < 8 000 Btu/h (0.67 tons)	Medical	Tons	0.15	116
Room Air Conditioners	Room AC < 8 000 Btu/h (0.67 tons)	Office	Tons	0.15	116
Room Air Conditioners	Room AC < 8 000 Btu/h (0.67 tons)	Restaurant	Tons	0.15	116
Room Air Conditioners	Room AC < 8 000 Btu/h (0.67 tons)	Retail/Service	Tons	0.15	116
Room Air Conditioners	Room AC < 8 000 Btu/h (0.67 tons)	School	Tons	0.15	116
Room Air Conditioners	Room AC < 8,000 Btu/h (0.67 tons)	Warehouse	Tons	0.15	116
Room Air Conditioners	Room AC < 8 000 Btu/h (0.67 tons)	Miscellaneous	Tons	0.15	116
Room Air Conditioners	Room AC >= 8 000 Btu/h and < 14 000 Btu/h (0.67 - 1.2 tons)	College/University	Tons	114	0.15
Room Air Conditioners	Room AC >= 8 000 Btu/h and < 14 000 Btu/h (0.67 - 1.2 tons)	Grocery	Tons	114	0.15
Room Air Conditioners	Room AC >= 8 000 Btu/h and < 14 000 Btu/h (0.67 - 1.2 tons)	Heavy Industry	Tons	114	0.15
Room Air Conditioners	Room AC >= 8 000 Btu/h and < 14 000 Btu/h (0.67 - 1.2 tons)	Hotel/Motel	Tons	114	0.15
Room Air Conditioners	Room AC >= 8 000 Btu/h and < 14 000 Btu/h (0.67 - 1.2 tons)	Light Industry	Tons	114	0.15
Room Air Conditioners	Room AC >= 8 000 Btu/h and < 14 000 Btu/h (0.67 - 1.2 tons)	Medical	Tons	114	0.15
Room Air Conditioners	Room AC >= 8 000 Btu/h and < 14,000 Btu/h (0.67 - 1.2 tons)	Office	Tons	114	0.15
Room Air Conditioners	Room AC >= 8,000 Btu/h	Restaurant	Tons	114	0.15



	and < 14 000 Btu/h (0.67 - 1.2 tons)				
Room Air Conditioners	Room AC >= 8 000 Btu/h and < 14 000 Btu/h (0.67 - 1.2 tons)	Retail/Service	Tons	114	0.15
Room Air Conditioners	Room AC >= 8 000 Btu/h and < 14,000 Btu/h (0.67 - 1.2 tons)	School	Tons	114	0.15
Room Air Conditioners	Room AC >= 8 000 Btu/h and < 14 000 Btu/h (0.67 - 1.2 tons)	Warehouse	Tons	114	0.15
Room Air Conditioners	Room AC >= 8 000 Btu/h and < 14 000 Btu/h (0.67 - 1.2 tons)	Miscellaneous	Tons	114	0.15
Room Air Conditioners	Room AC >= 14 000 Btu/h and < 20 000 Btu/h (1.3 - 1.7 tons)	College/University	Tons	0.15	116
Room Air Conditioners	Room AC >= 14 000 Btu/h and < 20 000 Btu/h (1.3 - 1.7 tons)	Grocery	Tons	0.15	116
Room Air Conditioners	Room AC >= 14 000 Btu/h and < 20,000 Btu/h (1.3 - 1.7 tons)	Heavy Industry	Tons	0.15	116
Room Air Conditioners	Room AC >= 14 000 Btu/h and < 20,000 Btu/h (1.3 - 1.7 tons)	Hotel/Motel	Tons	0.15	116
Room Air Conditioners	Room AC >= 14 000 Btu/h and < 20,000 Btu/h (1.3 - 1.7 tons)	Light Industry	Tons	0.15	116
Room Air Conditioners	Room AC >= 14 000 Btu/h and < 20 000 Btu/h (1.3 - 1.7 tons)	Medical	Tons	0.15	116
Room Air Conditioners	Room AC >= 14 000 Btu/h and < 20 000 Btu/h (1.3 - 1.7 tons)	Office	Tons	0.15	116
Room Air Conditioners	Room AC >= 14,000 Btu/h and < 20 000 Btu/h (1.3 - 1.7 tons)	Restaurant	Tons	0.15	116
Room Air Conditioners	Room AC >= 14,000 Btu/h and < 20 000 Btu/h (1.3 - 1.7 tons)	Retail/Service	Tons	0.15	116
Room Air Conditioners	Room AC >= 14 000 Btu/h and < 20 000 Btu/h (1.3 - 1.7 tons)	School	Tons	0.15	116
Room Air Conditioners	Room AC >= 14 000 Btu/h and < 20 000 Btu/h (1.3 - 1.7 tons)	Warehouse	Tons	0.15	116
Room Air Conditioners	Room AC >= 14,000 Btu/h and < 20 000 Btu/h (1.3 - 1.7 tons)	Miscellaneous	Tons	0.15	116
Room Air Conditioners	Room AC >= 20,000 Btu/h	College/University	Tons	0.17	131



	(> 1.7 tons)				
Room Air Conditioners	Room AC >= 20,000 Btu/h (> 1.7 tons)	Grocery	Tons	0.17	131
Room Air Conditioners	Room AC >= 20,000 Btu/h (> 1.7 tons)	Heavy Industry	Tons	0.17	131
Room Air Conditioners	Room AC >= 20 000 Btu/h (> 1.7 tons)	Hotel/Motel	Tons	0.17	131
Room Air Conditioners	Room AC >= 20 000 Btu/h (> 1.7 tons)	Light Industry	Tons	0.17	131
Room Air Conditioners	Room AC >= 20 000 Btu/h (> 1.7 tons)	Medical	Tons	0.17	131
Room Air Conditioners	Room AC >= 20 000 Btu/h (> 1.7 tons)	Office	Tons	0.17	131
Room Air Conditioners	Room AC >= 20 000 Btu/h (> 1.7 tons)	Restaurant	Tons	0.17	131
Room Air Conditioners	Room AC >= 20,000 Btu/h (> 1.7 tons)	Retail/Service	Tons	0.17	131
Room Air Conditioners	Room AC >= 20,000 Btu/h (> 1.7 tons)	School	Tons	0.17	131
Room Air Conditioners	Room AC >= 20,000 Btu/h (> 1.7 tons)	Warehouse	Tons	0.17	131
Room Air Conditioners	Room AC >= 20 000 Btu/h (> 1.7 tons)	Miscellaneous	Tons	0.17	131
PTAC/PTHP	PTAC/PTHP	College/University	Tons	0.22	211
PTAC/PTHP	PTAC/PTHP	Grocery	Tons	0.22	301
PTAC/PTHP	PTAC/PTHP	Heavy Industry	Tons	0.22	147
PTAC/PTHP	PTAC/PTHP	Hotel/Motel	Tons	0.22	328
PTAC/PTHP	PTAC/PTHP	Light Industry	Tons	0.22	147
PTAC/PTHP	PTAC/PTHP	Medical	Tons	0.22	315
PTAC/PTHP	PTAC/PTHP	Office	Tons	0.22	136
PTAC/PTHP	PTAC/PTHP	Restaurant	Tons	0.22	288
PTAC/PTHP	PTAC/PTHP	Retail/Service	Tons	0.22	216
PTAC/PTHP	PTAC/PTHP	School	Tons	0.22	105
PTAC/PTHP	PTAC/PTHP	Warehouse	Tons	0.22	148
PTAC/PTHP	PTAC/PTHP	Miscellaneous	Tons	0.22	219

Motor Coincident kW Savings

MOTOR HORSEPOWER	1200 RPM		1800 RPM		3600 RPM	
	ODP MOTOR Coincident Demand Reduction (kW)	TEFC MOTOR Coincident Demand Reduction (kW)	ODP MOTOR Coincident Demand Reduction (kW)	TEFC MOTOR Coincident Demand Reduction (kW)	ODP MOTOR Coincident Demand Reduction (kW)	TEFC MOTOR Coincident Demand Reduction (kW)
1	0.016	0.016	0.018	0.018	0.011	0.011
1.5	0.021	0.017	0.021	0.021	0.013	0.013
2	0.022	0.022	0.028	0.028	0.017	0.017
3	0.032	0.032	0.048	0.032	0.026	0.017
5	0.053	0.053	0.053	0.053	0.028	0.027
7.5	0.066	0.057	0.096	0.083	0.040	0.039
10	0.075	0.076	0.111	0.111	0.052	0.036



15	0.113	0.113	0.147	0.103	0.054	0.061
20	0.138	0.150	0.196	0.196	0.081	0.081
25	0.158	0.158	0.229	0.144	0.087	0.087
30	0.172	0.189	0.243	0.172	0.104	0.104
40	0.208	0.208	0.208	0.208	0.137	0.137
50	0.260	0.260	0.353	0.353	0.145	0.145
60	0.253	0.253	0.391	0.391	0.171	0.171
75	0.316	0.316	0.313	0.450	0.214	0.214
100	0.417	0.417	0.600	0.413	0.285	0.235
125	0.521	0.521	0.517	0.517	0.294	0.288
150	0.620	0.546	0.546	0.546	0.353	0.346
200	0.827	0.728	0.728	1.087	0.461	0.365

Motor kWh Savings

MOTOR HORSEPOWER	1200 RPM		1800 RPM		3600 RPM	
	ODP MOTOR Annual Savings (kWh)	TEFC MOTOR Annual Savings (kWh)	ODP MOTOR Annual Savings (kWh)	TEFC MOTOR Annual Savings (kWh)	ODP MOTOR Annual Savings (kWh)	TEFC MOTOR Annual Savings (kWh)
1	58	58	65	65		40
1.5	79	62	79	79	50	50
2	82	80	106	106	64	64
3	120	118	179	118	96	62
5	196	196	196	196	104	99
7.5	303	262	442	381	184	180
10	344	349	509	509	240	165
15	516	516	673	474	247	277
20	632	688	897	897	370	370
25	867	867	1,259	789	477	477
30	947	1,041	1,335	947	573	573
40	1,144	1,144	1,144	1,144	752	752
50	1,430	1,430	1,942	1,942	794	794
60	1,820	1,820	2,817	2,817	1,233	1,233
75	2,275	2,275	2,251	3,238	1,541	1,541
100	3,002	3,002	4,318	2,977	2,055	1,693
125	3,661	3,661	3,631	3,631	2,065	2,025
150	4,357	3,836	3,836	3,836	2,477	2,431
200	5,809	5,115	5,115	7,640	3,241	2,568



Savings Multipliers for Business Types

Savings claimed in the 2010 AEP GridSMART Program varies by business type. Savings presented in this document are averages across different business types. To calculate savings for a particular building type the appropriate multiplier need to be applied to the average savings value. The following table presents these KEMA calculated multipliers. The multipliers can vary across business and measure types. They also can differ for kW and kWh savings given a single measure type and business type.

For Light Industrial, Heavy Industrial and Warehouse business types, further breakdowns are used. Since these sectors present a wide range of operating hours, multipliers have been determined for 24/7, 16/5 and 8/5 facility schedules.

Measure and Building Type Multipliers

Business Type	Shift	Data	Exterior Lighting	Food Service	Garage Lighting	Interior CFL Lighting	Interior Non CFL Lighting	Miscellaneous	Motors	None	VFD for HVAC Chillers	VFD for HVAC Fans	VFD for HVAC Pumps
College / University		kW Savings Multiplier	1.00	1.00	1.00	0.92	0.83	1.00	1.00	1.00	1.00	1.00	1.00
		kWh Savings Multiplier	1.00	1.00	1.00	0.82	0.80	1.00	1.00	1.00	1.02	1.03	1.03
Grocery		kW Savings Multiplier	1.00	1.00	1.00	1.12	1.08	1.00	1.00	1.00	1.00	1.00	1.00
		kWh Savings Multiplier	1.00	1.00	1.00	1.36	1.34	1.00	1.00	1.00	1.70	1.42	1.42
Heavy Industry		kW Savings Multiplier	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00	1.00
		kWh Savings Multiplier	1.00	1.00	1.00			1.00	1.00	1.00	1.28	0.87	0.87
	16/5	kW Savings Multiplier				1.17	1.17						
		kWh Savings Multiplier				1.06	1.06						
	24/7	kW Savings Multiplier				1.17	1.17						
		kWh Savings Multiplier				1.85	1.85						
	8/5	kW Savings Multiplier				1.17	1.17						
		kWh Savings Multiplier				0.44	0.44						
		kW Savings Multiplier	1.00	1.00	1.00	0.84	0.83	1.00	1.00	1.00	1.00	1.00	1.00
		kWh Savings Multiplier	1.00	1.00	1.00	1.16	1.15	1.00	1.00	1.00	0.98	1.67	1.67
Light													
kW Savings			1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00	1.00



Industry		Multiplier											
		kWh Savings Multiplier	1.00	1.00	1.00			1.00	1.00	1.00	0.88	0.60	0.60
Industry	16/5	kW Savings Multiplier				1.17	1.17						
		kWh Savings Multiplier				1.06	1.06						
	24/7	kW Savings Multiplier				1.17	1.17						
		kWh Savings Multiplier				1.85	1.85						
	8/5	kW Savings Multiplier				1.17	1.17						
		kWh Savings Multiplier				0.44	0.44						
Medical		kW Savings Multiplier	1.00	1.00	1.00	1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		kWh Savings Multiplier	1.00	1.00	1.00	1.58	1.55	1.00	1.00	1.00	0.77	1.67	1.67
Miscellaneous		kW Savings Multiplier	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
		kWh Savings Multiplier	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Office		kW Savings Multiplier	1.00	1.00	1.00	1.12	1.08	1.00	1.00	1.00	1.00	1.00	1.00
		kWh Savings Multiplier	1.00	1.00	1.00	0.63	0.67	1.00	1.00	1.00	0.36	0.43	0.43
Restaurant		kW Savings Multiplier	1.00	1.00	1.00	0.94	0.92	1.00	1.00	1.00	1.00	1.00	1.00
		kWh Savings Multiplier	1.00	1.00	1.00	1.14	1.23	1.00	1.00	1.00	1.54	1.14	1.14
Retail / Service		kW Savings Multiplier	1.00	1.00	1.00	1.14	1.08	1.00	1.00	1.00	1.00	1.00	1.00
		kWh Savings Multiplier	1.00	1.00	1.00	0.94	0.95	1.00	1.00	1.00	0.98	0.84	0.84
School		kW Savings Multiplier	1.00	1.00	1.00	0.56	0.58	1.00	1.00	1.00	1.00	1.00	1.00
		kWh Savings Multiplier	1.00	1.00	1.00	0.44	0.44	1.00	1.00	1.00	0.55	0.54	0.54
Warehouse		kW Savings Multiplier	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00	1.00
		kWh Savings Multiplier	1.00	1.00	1.00			1.00	1.00	1.00	0.94	0.79	0.79
	16/5	kW Savings Multiplier				1.00	1.00						
		kWh Savings Multiplier				1.08	1.08						
	24/7	kW Savings Multiplier				1.00	1.00						
		kWh Savings Multiplier				1.89	1.89						
	8/5	kW Savings Multiplier				1.00	1.00						
		kWh Savings Multiplier				0.45	0.45						
Other		kW Savings Multiplier								1.00			
		kWh Savings Multiplier								1.00			



AEP GridSMART

KEMA Operations Manual

Appendix A – AEP Ohio Prescriptive Lighting
Protocols

gridSMARTSM

From





Table of Contents

Lighting	3
Compact Fluorescent Lamps, Screw-In	11
T5 Lamp and Ballast	15
High Performance and Reduced Wattage 4-foot T8 Lamps and Ballast	17
High-Performance T8 Specifications	18
Reduced Wattage 4-foot Lamp Only	21
Reduced Wattage 8-foot	24
U-Tube T8 Lamps and Ballast	27
2-foot & 3-foot T8 Lamps and Ballast	30
Ceramic Metal Halides or Pulse Start Metal Halides	33
Table 42 Ceramic Metal Halides or Pulse Start Metal Halides	33
New T5/T8 Fluorescent Fixtures	37
Exit Signs	39
LED Lamps	42
LED Refrigerated Case Lighting	45
LED Open Signs	47
LED Channel Signs, Indoor	50
Interior Induction Fixtures	52
Compact Fluorescent Fixtures, Hardwired	55
Cold Cathode	59
Specialty Screw-In CFL	62
Permanent Lamp Removal	64
Occupancy Sensors	68
Plug Load Occupancy Sensors	71
Daylighting Controls	73
Bi-level Stairwell/Hall/Garage Light Fixtures	75
Sensor-controlled LED Parking Lot Bi-Level Fixture	77
Sensor-controlled Wallpack Fixtures	79
Exterior LED and Induction Lighting	81
New T5/T8 Fluorescent Fixtures (Parking Garage)	85
High Wattage Screw-In CFLs for Parking Structures	88
Ceramic Metal Halides or Pulse Start Metal Halides (Parking Lots and Garages)	91
LED Channel Signs, Outdoor	95
Photocells	97



Time Clocks for Lighting	99
LED Traffic Signals	101
Lighting Density	103
Cooling	106
Unitary or Split Air Conditioning Systems and Air Source Heat Pumps	107
Water-Cooled Chillers and Air-Cooled Chillers	111
Room Air Conditioners	114
Package Terminal Air Conditioners/Heat Pumps	117
Lodging – Guest Room Energy Management System (GREM)	119
Variable-Speed Drives for HVAC Applications	120
Commercial Kitchen Demand Ventilation Controls	122
Premium Motors	124
NEMA® Premium-Efficiency Motors	125
Refrigeration	132
Strip Curtains	133
Anti-Sweat Heater Controls	137
Electronically Commutated Motors (ECM)	139
Refrigeration Economizer	143
Evaporator Fan Control	145
Automatic Door Closer for Walk-In Coolers	147
Automatic Door Closer for Walk-in Freezers	148
Door Gaskets	149
LED Refrigerated Case Lighting	151
Beverage Machine Controls	153
Snack Machine Controls	154
ENERGY STAR Refrigerated Beverage Vending Machine	155
Food Service	159
ENERGY STAR® Combination Oven	163
ENERGY STAR® Hot Food Holding Cabinet	167
ENERGY STAR® Solid Door Reach-In Freezer	169
ENERGY STAR® Solid Door Reach-In Freezer	171
Miscellaneous	173
Engineered Nozzle	174
Network PC Management Software	178
Addendum: Savings Multipliers for Business Types	181



Lighting



Most lighting measures presented in these work papers use the same methodology. The following provides the assumptions and methods used for calculating energy savings.

Baseline and retrofit equipment assumptions, i.e. wattages, are specific to the measure. Most lighting retrofits assume an early replacement of existing technologies where the baseline represents the equipment removed.

Savings are calculated by applying operating hours and other parameters that define the energy savings. These workpapers base the energy savings methodology on the California 2005 DEER Study¹ assumptions. The DEER database is a tool that was jointly developed by the California Public Utilities Commission (CPUC) and the California Energy Commission with support and input from the Investor-Owned Utilities and other interested stakeholders. DEER provides operating hours, interactive effects and coincidence factors by building type; however, savings for AEP Ohio Program will not be dependent on building type. Savings presented here are calculated using averages of DEER building type values.

Lighting factors used in savings calculations are listed in the table below. This document explains how these values and the resulting savings were derived.

Table 1: Average Lighting Factors

CFL Annual Operating Hours	Other Lighting Annual Operating Hours	Demand Interactive Effects	Coincident Diversity Factors	Energy Interactive Effects
4,321	4,389	1.19	0.77	1.12

Annual energy savings and the peak coincident demand savings were calculated using the equations below:

Non-coincident kW reduction = kW of existing equipment - kW of replacement equipment

Energy savings are based on the difference between baseline and efficient equipment connected wattage and annual operating hours, according to the following formula:

¹ 2005 Database for Energy Efficiency Resources (DEER) Update Study Final Report - Residential and Commercial Non-Weather Sensitive Measures



$$\text{kWh Reduction} = (\text{kW of existing equipment} - \text{kW of replacement equipment}) * (\text{Annual operating hours}) * (\text{Energy Interactive Effects})$$

Coincident demand savings are calculated by applying the coincidence factor and the demand interactive effect, according to the following formula:

$$\text{Coincident kW savings} = \text{non-coincident kW savings} * \text{Coincidence Factor} * \text{Demand interactive effect}$$

Interactive factors account for savings that the measures achieve through avoided air conditioning load because of reduced internal heat gains from energy-efficient lighting. The interactive effects do not apply to exterior lighting.

The annual operating hours, the coincidence factors, and the interactive effect factors are all derived from DEER figures.

The following table lists building types set by DEER. A straight average across DEER building types would heavily weight sectors that happen to have multiple DEER categories. For instance, DEER has four sectors in education and only two in medical. A straight average of operating hours would have weighted the education sector twice as heavily as the medical sector where in reality the two are similar in electric demand.² Instead, our average values are that of sector groupings as stated in the table below.

² AEP Ohio 2009 to 2028 Energy Efficiency, Peak Demand Reduction Potential Study, Volume 2. Page 48.
Summit Blue Consulting, Inc. August 13, 2009



Table 2: DEER Building Types

DEER	Average Grouping
Education – Primary School	K-12 School
Education – Secondary School	
Education – Community College	College/University
Education – University	
Grocery	Grocery
Health/Medical – Hospital	Medical
Health/Medical – Nursing Home	
Lodging – Hotel	Hotel/Motel
Lodging – Motel	
Lodging – Guest Room	
Manufacturing – Light Industrial	Light Industry
Office – Large	Office
Office – Small	
Restaurant – Sit-Down	Restaurant
Restaurant – Fast-Food	
Retail – 3-Story Large	Retail/Service
Retail – Single-Story Large	
Retail – Small	
Storage – Conditioned	Warehouse
Storage – Unconditioned	
Warehouse – Refrigerated	

The following tables list DEER values. Compact fluorescent lamps (CFLs), LED lighting (unless otherwise noted), and integrated ballast ceramic metal halides have CFL lighting operating hours. Other lighting categories have different operating hours as shown below.



Table 3: Interactive Effects by Building Type from DEER

DEER Market Sector	Demand Interactive Effects	Energy Interactive Effects
Education – Primary School	1.23	1.15
Education – Secondary School	1.23	1.15
Education – Community College	1.22	1.15
Education – University	1.22	1.15
Grocery	1.25	1.13
Medical – Hospital	1.26	1.18
Medical – Clinic	1.26	1.18
Lodging Hotel	1.14	1.14
Lodging Motel	1.14	1.14
Lodging – Guest Rooms	1.14	1.14
Manufacturing – Light Industrial	1.08	1.04
Office – Large	1.25	1.17
Office – Small	1.25	1.17
Restaurant – Sit-Down	1.26	1.15
Restaurant – Fast-Food	1.26	1.15
Retail – 3-Story Large	1.19	1.11
Retail – Single-Story Large	1.19	1.11
Retail – Small	1.19	1.11
Storage Conditioned	1.09	1.06
Storage Unconditioned	1.09	1.06
Warehouse	1.09	1.06



Table 4: Coincident Diversity Factors from DEER

DEER Market Sector	Coincident Diversity Factors
Education – Primary School	0.42
Education – Secondary School	0.42
Education – Community College	0.68
Education – University	0.68
Grocery	0.81
Medical – Hospital	0.74
Medical – Clinic	0.74
Lodging Hotel	0.67
Lodging Motel	0.67
Lodging – Guest Rooms	0.67
Manufacturing – Light Industrial	0.99
Office – Large	0.81
Office – Small	0.81
Restaurant – Sit-Down	0.68
Restaurant – Fast-Food	0.68
Retail – 3-Story Large	0.88
Retail – Single-Story Large	0.88
Retail – Small	0.88
Storage Conditioned	0.84
Storage Unconditioned	0.84
Warehouse	0.84

Table 5: Annual Operating Hours from DEER

DEER Market Sector	CFL Annual Operating Hours	Other Lighting Annual Operating Hours
Education – Primary School	1,440	1,440
Education – Secondary School	2,305	2,305
Education – Community College	3,792	3,792
Education – University	3,073	3,073
Grocery	5,824	5,824
Medical – Hospital	8,736	8,736
Medical – Clinic*	4,212	4,212
Lodging Hotel	8,736	8,736
Lodging Motel	8,736	8,736
Lodging – Guest Rooms	1,145	NA
Manufacturing – Light Industrial*	4,290	4,290
Office – Large	2,739	2,808
Office – Small	2,492	2,808
Restaurant – Sit-Down	3,444	4,368
Restaurant – Fast-Food	6,188	6,188
Retail – 3-Story Large	4,259	4,259
Retail – Single-Story Large	4,368	4,368
Retail – Small	3,724	4,004
Storage Conditioned*	2,860	4,859
Storage Unconditioned*	2,860	4,859
Warehouse*	2,600	4,859

* Not from DEER

Industrial-operating hours are assumed based on the following sources:

- DEER estimates hours to be 2,860.
- Efficiency Vermont Technical Reference User Manual's (No. 2004-29) estimates 5,913 hours.
- The 2004-2005 PG&E work papers assumed 6,650 hours for process industrial and 4,400 for assembly industrial.

DEER's estimated hours are far lower than figures other sources have provided and so we have increased the DEER values by 50% or to 4,290 hours. This value is reasonable and on the conservative side of the averages. We will use this conservative value until more data is available for AEP Ohio or other MidWestern utility territory.



Similarly, we believe that the DEER storage and warehouse operating hours are low as well. Using data from other programs in the region, KEMA has seen average operating hours that are significantly higher and is using a higher value of 4,859 as a better estimate of deemed operating hours for this region.

DEER has set Medical-Hospital operating hours at 8,736. We have lowered this value for the purposes of calculating our average by using operating hours that are 50% above that of offices or 4,212 hours (Medical-Clinic operating hours). This reduction accounts for areas in medical facilities that behave more like offices and do not operate around the clock. The value used in our calculations is the average of the DEER Hospital and the revised clinic operating hours.

Hotel/Motel operating hours are the average of guest room hours and either hotel or motel operating hours since a facility can only be one or the other.

Incremental costs are taken from a number of sources. The AEP Ohio 2009-2028 Energy Efficiency/Peak Demand Reduction Potential Study conducted in August of 2009 provides costs for some measures. Since this study was prepared specifically for AEP, the utility's costs are used whenever applicable. Because some measures listed in the study do not match with that of the program, costs are derived from other sources as well including DEER, KEMA, and the Commonwealth Edison Company's 2008-10 Energy Efficiency and Demand Response Plan prepared by ICF International. The ICF document is referenced as the ICF Portfolio Plan.

This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

12/28/2010 12:31:22 PM

in

Case No(s). 10-1835-EL-EEC

Summary: Application of Pickaway Manor Care Ctr and Columbus Southern Power Company for approval of a special arrangement agreement with a mercantile customer electronically filed by Mr. Matthew J Satterwhite on behalf of Columbus Southern Power Company