Ohio | Public Utilities Commission

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

Case No.: 18 -1054 - EL-EEC

Mercantile Customer: **Bethesda Hospital**

Electric Utility: **Duke Energy**

Program Title or Description: **Building Automation System (BAS)**

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 in accordance with the Commission's pilot program established in Case No. 10-834-EL-POR

Completed applications requesting the cash rebate reasonable arrangement option (Option 1) in lieu of an exemption from the electric utility's energy efficiency and demand reduction (EEDR) 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 EEDR rider (Option 2) will also qualify for the 60-day automatic approval so long as the exemption period does not exceed 24 months. Rider exemptions for periods of more than 24 months will be reviewed by the Commission Staff and are only approved up the issuance of a Commission order.

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.

Any confidential or trade secret information may be submitted to Staff on disc or via email at ee-pdr@puc.state.oh.us.

Section 1: Mercantile Customer Information

Name: **Bethesda Hospital**

Principal address: **4310 Cooper Rd BLDG: 4360**
Cincinnati, OH 45242

Address of facility for which this energy efficiency program applies:

4310 Cooper Rd BLDG: 4360
Cincinnati, OH 45242

Name and telephone number for responses to questions:

Andrew Taylor, (317) 838-2096

Electricity use by the customer (check the box(es) that apply):

✓ The customer uses more than seven hundred thousand kilowatt hours per year at the above facility. (**Refer to Appendix A for documentation**.)

□ The customer is part of a national account involving multiple facilities in one or more states. (Please attach documentation.)

Section 2: Application Information

A) The customer is filing this application (choose which applies):

□ Individually, without electric utility participation.

✓ **Jointly with the electric utility.**

B) The electric utility is: **Duke Energy**

C) The customer is offering to commit (check any that apply):

□ Energy savings from the customer's energy efficiency program. (Complete Sections 3, 5, 6, and 7.)

□ Capacity savings from the customer's demand response/demand reduction program. (Complete Sections 4, 5, 6, and 7.)

✓ **Both the energy savings and the capacity savings from the customer's energy efficiency program. (Complete all sections of the Application.)**

Section 3: Energy Efficiency Programs

A) The customer's energy efficiency program involves (check those that apply):

✓ Early replacement of fully functioning equipment with new equipment. (Provide the date on which the customer replaced fully functioning equipment, and the date on which the customer would have replaced such equipment if it had not been replaced early. Please include a brief explanation for how the customer determined this future replacement date (or, if not known, please explain why this is not known)).

Installed new Building Automation System (BAS) controlling lighting and HVAC systems in December 2016.

□ Installation of new equipment to replace equipment that needed to be replaced The customer installed new equipment on the following date(s): ________________.

□ Installation of new equipment for new construction or facility expansion. The customer installed new equipment on the following date(s): ________________.

□ Behavioral or operational improvement.

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

1) If you checked the box indicating that the 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:

Annual savings: 220,294 kWh
Refer to Appendix B for calculations and supporting documents

2) If you checked the box indicating that the customer 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 any less efficient new equipment that was rejected in favor of the more efficient new equipment.

3) If you checked the box indicating that the 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 was rejected in favor of the more efficient new equipment.

4) If you checked the box indicating that the project involves behavioral or operational improvements, provide a description of how the annual savings were determined.

Annual savings: ______kWh

Section 4: Demand Reduction/Demand Response Programs

A) The customer's program involves (check the one that applies):

✓ **Coincident peak-demand savings from the customer's energy efficiency program.**

□ Actual peak-demand reduction. (Attach a description and documentation of the peak-demand reduction.)

□ Potential peak-demand reduction (check the one that applies):

□ The customer's 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.

□ The customer's 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) On what date did the customer initiate its demand reduction program?

The BAS was installed in December, 2016.

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

0.0 kW
Refer to Appendix B for calculations and supporting documentation.

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) The customer is applying for:

✓ **Option 1: A cash rebate reasonable arrangement.**

OR

□ Option 2: An exemption from the energy efficiency cost recovery mechanism implemented by the electric utility.

OR

□ Commitment payment

B) The value of the option that the customer is seeking is:

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

✓ A cash rebate of **$7,160. Refer to Appendix C for documentation.** (Rebate shall not exceed 50% project cost.

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

□ A commitment payment valued at no more than $________________. (Attach documentation and calculations showing how this payment amount 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 the customer's ongoing efficiency program. (Attach documentation that establishes the ongoing nature of the program.) In order to continue the exemption beyond the initial 24 month period, the customer 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 **5.13** (Skip to Subsection 2.) **Refer to Appendix D for calculations and supporting documents.**

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

The TRC value of the program is calculated by dividing the value of our avoided supply costs (generation capacity, energy, and any transmission or distribution) by the sum of our program overhead and installation costs and any incremental measure costs paid by either the customer or the electric utility.

The electric utility's avoided supply costs were _______.

Our program costs were _______.

The incremental measure 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 **$68,026.**

The utility's program costs were **$6,104.**

The utility's incentive costs/rebate costs were **$7,160.**

Refer to Appendix D for calculations and supporting documents.

Section 7: Additional Information

Please attach the following supporting documentation to this application:

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

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

1) any confidentiality requirements associated with the agreement;
2) a description of any consequences of noncompliance with the terms of the commitment;
3) a description of coordination requirements between the customer and the electric utility with regard to peak demand reduction;
4) permission by the customer 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,
5) a commitment by the customer to provide an annual report on your energy savings and electric utility peak-demand reductions achieved.

Refer to Offer Letter following this application

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.

44602055 01		
BETHESDA HOSPITAL		
4310 COOPER RDBLDG: 4360		
CINCINNATI, OH 45242		
Date	Days	Actual KWH
05/26/2017	29	41,623
04/27/2017	30	46,067
03/28/2017	31	54,569
02/27/2017	29	57,479
01/27/2017	30	62,179
12/28/2016	35	70,126
11/23/2016	29	40,360
10/25/2016	31	44,129
09/26/2016	30	64,029
08/25/2016	29	72,807
07/27/2016	32	84,984
06/27/2016	30	80,360
Total		**718,712**

Appendix B - Bethesda Hospital Energy Savings Achieved

	Baseline Used			Post Project Actual				Savings	
	Description	**Annual kWh**	**Summer Coincident kW**	**Description**	**Annual kWh**	**Summer Coincident kW**	**Hours of Operation**	**Annual kWh**	**Summer Coincident kW**
ECM - 1	Standard/Manual HVAC and Lighting controls	838,745	215	New Building Automation System (BAS) controlling HVAC and Lighting	618,451	215	8,760	220,294	0.0
Notes:	Energy consumption baseline, demand baseline and post project energy consumption basis are outlined in the following pages.								
	After consideration of line losses, total energy savings are **236,155 kWh** and **0.0 summer coincident kW**. These values may also reflect minor DSMore modeling software rounding error.								

Appendix C -Cash Rebate Calculation

Bethesda Hospital New HVAC/Lighting BAS

Measure	Quantity	Cash Rebate Rate	Cash Rebate
New Building Automation System (BAS) controlling HVAC and Lighting	1	50% of incentive that would be offered by the Smart $aver Custom program	**$7,160**
			$7,160

Appendix D -UCT Value

Bethesda Hospital New HVAC/Lighting BAS

Measure	Total Avoided Cost	Program Cost	Incentive	Quantity	Measure UCT
New Building Automation System (BAS) controlling HVAC and Lighting	$68,026	$6,104	$7,160	1	**5.13**
Totals	**$68,026**	**$6,104**	**$7,160**	**1**	

Total Avoided Supply Costs	$68,026	***Aggregate Application UCT***	***5.13***
Total Program Costs	$6,104		
Total Incentive	$7,160		

Smart $aver® Incentive Program
phone: 866.380.9580
fax: 980.373.9755
customprocessing@duke-energy-energyefficiency.com

4/5/2018

Diane Mattson
BETHESDA HOSPITAL ATTN: R BRADY 40 A - 4460205501
4310 COOPER RD BLDG 4360
CINCINNATI OH 45242-5613

Subject: Your Application for a Duke Energy Mercantile Self-Direct Rebate CMO17-0000129053

Dear Diane Mattson,

Thank you for your Duke Energy Mercantile Self Direct rebate application. As noted in the Energy Conservation Measure (ECM) chart on page 2, a total rebate of $7,160.00 has been proposed for your project completed in the 2016 calendar years. **All Self Direct Rebates are contingent upon approval by the Public Utilities Commission of Ohio (PUCO).**

At your earliest convenience, please indicate if you accept this rebate by:

- providing your signature on Page 2
- completing the PUCO-required affidavit on Page 3

Please return the documents to my attention via fax at 513.629.5572 or email to customprocessing@duke-energy-energyefficiency.com. Upon receipt, Duke Energy will submit the necessary documentation to PUCO. **Following PUCO's approval, Duke Energy will remit payment.**

We value your business and look forward to working with you on this and future energy efficiency projects. We hope you will consider our Smart $aver® incentives, when applicable. Please contact me if you have any questions.

Sincerely,

Andrew Taylor
Program Manager
Custom Incentives

cc: Mike Heath
Dave Behne

DUKE ENERGY.

Please indicate your response to this rebate offer within 30 days of receipt.

☑ Rebate is accepted. ☐ Rebate is declined.

By accepting this rebate, BETHESDA HOSPITAL ATTN: R BRADY 40 A - 4460205501 affirms its intention to commit and integrate the energy efficiency projects listed on the following pages into Duke Energy's peak demand reduction, demand response and/or energy efficiency programs.

Additionally, BETHESDA HOSPITAL ATTN: R BRADY 40 A - 4460205501 also agrees to serve as joint applicant in any future filings necessary to secure approval of this arrangement as required by PUCO and to comply with any information and reporting requirements imposed by rule or as part of that approval.

Finally, BETHESDA HOSPITAL ATTN: R BRADY 40 A - 4460205501 affirms that all application information submitted to Duke Energy pursuant to this rebate offer is true and accurate. Information in question would include, but not be limited to, project scope, equipment specifications, equipment operational details, project costs, project completion dates, and the quantity of energy conservation measures installed.

If rebate is accepted, will you use the monies to fund future energy efficiency and/or demand reduction projects? ☐ Yes ☐ No unsure

[signature] SANDRA LOBERT 5/8/18

Customer Signature Printed Name Date

Proposed Rebate Amounts

Measure ID	Energy Conservation Measure	Proposed Rebate Amount
ECM-1	Installation of New BAS for Lighting and HVAC System	$7,160.00 per project X 1
	Total	**$7,160.00**

Ohio | Public Utilities Commission

(Mercantile Customers Only)

Application to Commit
Energy Efficiency/Peak Demand Reduction Programs

Case No.: 18 - 1054 -EL-EEC

State of Ohio :

SANDRA LOBERT, **Affiant, being duly sworn according to law, deposes and says that:**

1. I am the duly authorized representative of:

Bethesda Hospital DBA Hospice of Cincinnati
[INSERT CUSTOMER OR EDU COMPANY NAME AND ANY APPLICABLE NAME(S) DOING BUSINESS AS]

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 offines 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.

Sandra Lobert
SIGNATURE OF AFFIANT & TITLE

Sworn and subscribed before me this 8th (DAY) day of May (MONTH), 2018 (YEAR)

Doris S. Fow
SIGNATURE OF OFFICIAL ADMINISTERING OATH

Doris S. Fow
PRINT NAME AND TITLE

My commission expires on 09-26-2020
DATE

Doris S. Fow
Notary Public, State of Ohio
My Commission Expires 09-26-2020

TriHealth   CUSHMAN & WAKEFIELD   CELEBRATING 100 YEARS

To: Duke Energy Smart $aver Custom Incentive Program

Subject: Authorization for Duke Energy Smart $aver Custom Application Number CM017-0000129053

Date: 9/05/2017

Authorization is granted for a period of two years from date noted above.

Hospice of Cincinnati, Inc. has a facility located in your utility territory. Cushman & Wakefield U.S., Inc. (fka Cassidy Turley Commercial Real Estate Services, Inc.) is an authorized representative working on behalf of Hospice of Cincinnati, Inc.

This transmittal authorizes Cushman & Wakefield U.S., Inc. (fka Cassidy Turley Commercial Real Estate Services, Inc.) to perform the activities associated with securing incentives and/or evaluating the potential of incentives from your utility or agency for energy conservation projects. Cushman & Wakefield U.S., Inc. (fka Cassidy Turley Commercial Real Estate Services, Inc.) may act on our behalf to:

- receive rebate or incentive checks at their company address, made payable to "~~our name~~" HOSPICE OF CINCINNATI SL
- transmit and receive utility incentive program correspondence, authorizations and approvals
- sign grant and/or incentive applications
- obtain past utility consumption history, Utility energy studies, analysis and reports
- obtain other Utility account information applicable to evaluating incentive program participation

In the event that your utility or agency cannot fulfill the scope of this authorization, we request to be notified immediately in writing of the limitation of this authorization as detailed above, and that a copy of this written notification be sent to Cushman & Wakefield U.S., Inc. (fka Cassidy Turley Commercial Real Estate Services, Inc.) at 10495 Montgomery Road, Cincinnati, Ohio 45242.

In the event there are questions concerning the validity of this authorization, please contact me. Both Hospice of Cincinnati, Inc. and Cushman & Wakefield U.S., Inc. (fka Cassidy Turley Commercial Real Estate Services, Inc.) look forward to working together to implement energy-saving projects in your territory and assist you in meeting your energy efficiency conservation goals.

Thank you for your assistance.

Sincerely,

Sandra Lobert

Sandra Lobert

President and CEO, Hospice of Cincinnati, Inc.

Mercantile Self Direct
Nonresidential Custom Rebate Application
PART 1

DUKE ENERGY.

Ohio Mercantile Self Direct Program

Application Guide and Cover Sheet

Questions? Call 866.380.9580 or visit duke-energy.com.

Email this form along with completed Mercantile Self Direct Prescriptive or Custom applications, proof of payment, energy savings calculations and spec sheets to SelfDirect@Duke-Energy.com. You may also fax to 513.629.5572.

Mercantile customers, defined as using at least 700,000 kilowatt-hours (kWh) annually or having an account in multiple locations are eligible for the Mercantile Self Direct program. Indicate which applies:

☒ a single Duke Energy Ohio account with 700,000 kWh annual usage
☐ an account with multiple locations

Please list Duke Energy account numbers below (attach listing of multiple accounts and/or billing history for other utilities as required):

Account Number	Annual Usage	Account Number	Annual Usage
44602055016	850,000		

Self Direct rebates are available for completed Custom projects that have not previously received a Duke Energy Smart $aver® Custom Incentive. Self Direct rebates are applicable to Prescriptive measures that were installed more than 90 days prior to submission to Duke Energy and have not previously received a Duke Energy Prescriptive rebate.

Self Direct program rules allow for, though do not require, certain projects that are Prescriptive in nature under the Smart $aver program to be evaluated using the Custom process in the Self Direct program. Use the list on page two as a guide to determine which Self Direct program best fits your project(s). Apply for Self Direct projects using the appropriate application forms in conjunction with this cover sheet.

Self Direct program rules also allow for behaviorally based and/or no cost and low cost projects to receive rebates.

Please check each box to indicate completion/inclusion of the following program requirements:

☑ All sections of appropriate application(s) are completed	☑ Proof of payment.*	☑ Manufacturer's Spec sheets	☑ Energy model/calculations and detailed inputs for Custom applications

*If a single payment record is intended to demonstrate the costs of both Prescriptive and Custom projects, please include an additional document with an estimated breakout of costs for each Prescriptive and Custom energy conservation measure.

Mercantile Self Direct
Nonresidential Custom Rebate Application
PART 1

**Behavioral energy efficiency and demand reduction projects must be both measurable and verifiable. Provide justification with your application. Rebates for such projects may be small in magnitude.

Application Type	Prescriptive Measures with Optional Custom Processing	
Heating and Cooling and Window Films, Programmable Thermostats, and Guest Room Energy Management Systems	☐ ENERGY STAR® Window/Sleeve/Room AC ☑ Central Air Unit	☐ Air Source Heat Pump Water Heater
	☐ Setback/Programmable Thermostat ☑ Guestroom Energy Management Control	☐ Window Film
Chillers	☐ Air Cooled Chiller	☐ Water Cooled Chiller
Motors, Pumps and Variable Frequency Drives (VFDs)	☐ VFD – applied to Process Pump ☐ VFD – applied to HVAC Pump	☐ VFD – applied to HVAC Fan
Food Service	☐ ENERGY STAR Hot Food Holding Cabinet ☐ Night Covers for Display ☐ ECM Cooler, Freezer, and Display Case Motors ☐ ENERGY STAR Solid or Glass Door Reach-in Freezer or Refrigerator	☐ Anti-Sweat Heater Control ☐ Cooking Equipment ☐ ENERGY STAR Ice Machine
Process Equipment	☐ Engineered Nozzle – Compressed Air ☐ Air Compressor Equipped with VFD	☐ Pellet Dryer Duct Insulation
Chiller Tune-ups	☐ Air Cooled Chiller tune-up	☐ Water Cooled Chiller tune-up

Please indicate above any Prescriptive energy conservation measures to be evaluated through the Custom process. Only Prescriptive measures listed above are eligible for this option. To receive a Self Direct Custom rebate, a detailed analysis of pre-project and post-project energy usage and project costs must be included in the application.

Although some Self Direct Prescriptive measures are eligible for evaluation through Custom processes, such an approach may not be most effective for certain measures.

Mercantile Self Direct
Nonresidential Custom Rebate Application
PART 1

DUKE ENERGY.

Proposed energy efficiency measures may be eligible for Self Direct Custom rebates if they clearly reduce electrical consumption and/or demand as compared to the appropriate baseline.

Before you complete this application, please note the following important criteria:

- Submitting this application does not guarantee a rebate will be approved.
- Rebates are based on electricity conservation only.
- Electric demand and/or energy reductions must be well documented with auditable calculations.
- Incomplete applications cannot be reviewed; all fields are required.

Refer to the complete list of Instructions and Disclaimers, beginning on page 6.

Notes on the Application Process
If you have any questions concerning how to complete any portion of the application or what supplementary information is required, please contact your Duke Energy Ohio, Inc. account manager or the Duke Energy Self Direct team at 866.380.9580.

Every application must include calculations of the baseline electrical usage and the electrical usage of the proposed high-efficiency equipment/system. These calculations are performed and submitted by the Duke Energy Ohio customer, or your designated equipment vendor / engineer. Application Part 2 worksheets and page 6 of this application contain additional guidance on acceptable calculations. *Complex or unique projects may require the use, at the applicant's expense, of modeling software*. Please contact the Duke Energy Self Direct team with questions about these requirements.

If you do not receive an acknowledgement email within 1 day of submitting an application via online, email, or fax, please call 866.380.9580. The acknowledgement email will provide with an estimated response time based on an initial assessment of your application. The application review may include some communication to resolve any questions about the project or to request additional information. Applications that are received complete without missing information have a faster review time.

There are two ways to submit your completed application form and excel worksheets.

Email: Complete, sign, scan and send this application form and attachments to:
SelfDirect@duke-energy.com (note attachment size limit is applicable)

Fax: 513.629.5572

Mercantile Self Direct
Nonresidential Custom Rebate Application
PART 1

1. Contact Information (Required)

Duke Energy Customer Contact Information[1]					
Company Name (as it appears on your bill)	Bethesda Hospital				
Address	4360 Cooper Road				
City	Cincinnati	State	Ohio	ZIP Code	45242
Project Contact	Diane Mattson				
Office Phone	513-865-5267	Mobile Phone	513-518-9811		
Email Address	diane.mattson@cushwake.com				

Equipment Vendor / Contractor / Architect / Engineer Contact Information					
Company Name	DeBra-Kuempel				
Address	3976 Southern Ave				
City	Cincinnati	State	Ohio	ZIP Code	45227
Project Contact	Dave Behne, M.S.,P.E.				
Office Phone	513-527-8124	Mobile Phone			
Email Address	dbehne@debra-kuempel.com				

Who is the primary point of contact for technical questions?[2]	Dave Behne, M.S.,P.E.

Payment Information

If an incentive is awarded, who should receive payment?[3]

☒ Customer ☐ Vendor* (customer or customer's agent[4] must sign below)

*If the payee is the vendor, they must issue a credit in the amount of the incentive to the customer on the invoice and include it with the payment request.

Tax ID Number for Payee (provide W-9)	31-0917155				
Mailing Address for Payee (if different from above)					
Street					
City		State		ZIP Code	

[1] Provided customer information should match the Duke Energy customer of record and W-9 form provided with this application. If the customer entity is a business affiliate of the Duke Energy customer of record, documentation must be provided that demonstrates the business affiliation.

[2] Note that if the vendor is the primary point of contact, the customer will still be copied on all application correspondence. If the customer does not wish to be copied, the customer must provide a signed letter of authorization on customer letterhead indicating an entity is acting as an agent for the customer. Duke Energy does not act as an agent.

[3] If payment is to be made to an entity other than the Duke Energy account holder or the vendor, a payment waiver is required and will be provided for customer signature.

[4] If an outside agent is acting on behalf of the Duke Energy customer of record, a letter of authorization on customer letterhead and signed by an authorized employee of the customer must be provided.

2. Project Information (Required)

A. Please indicate project type:

☐ New construction
☐ Expansion at an existing facility (existing Duke Energy account number)
☐ Replacing equipment due to equipment failure
☒ Replacing equipment that is estimated to have remaining useful life of two years or less
☐ Replacing equipment that is estimated to have remaining useful life of more than two years
☒ Behavioral, operational and/or procedural programs/projects

B. Please describe your project, or attach a detailed project description that describes the project.
See attached detailed Summary: Replaced 45 Fan Powered Boxes with new using ECmotors, scr electric reheat and Automated Logic Control System.

C. When did you start and complete implementation?
Start date 05/2016 (mm/yyyy) End date 12/2016 (mm/yyyy)

D. Are you also applying for Self Direct Prescriptive rebates and, if so, which one(s)[5]?
No

E. Please indicate which worksheet(s) you are submitting for this application (check all that apply):

☐ Lighting
☐ Variable Frequency Drive (VFD)
☐ Compressed Air
☐ Energy Management System (EMS)
☒ General (for projects not easily submitted using one of the above worksheets)

F. List all assumptions about the baseline and proposed equipment energy use and operation schedule, or attach a document listing that information. Attach specification sheets for all proposed new equipment. See Attached

G. Attach a supplier or contractor invoice(s) and/or other equivalent information documenting the Implementation Cost for each project listed in your application.
Does the Implementation Cost include any internal labor[6]? No

[5] If your project involves some equipment that is eligible for prescriptive rebates and some equipment that is likely eligible for custom rebates, and if it is feasible to separate the equipment for the energy analysis, then the equipment will be evaluated separately. If it is not feasible to separate the equipment for analysis, then the equipment will be evaluated together in the custom application.

If yes, please specify which costs are internal labor.

3. Attestation, Terms and Conditions, and Signature (Required)

Attestation

By signing below, I agree to the following:

I, (INSERT NAME) Sandra Loberti CEO, do hereby consent to Duke Energy Ohio, Inc. disclosing my Duke Energy Ohio, Inc. Account Number and Federal Tax ID Number to its subcontractors solely for the purpose of administering Duke Energy Ohio's Mercantile Self Direct Program. I understand that such subcontractors are contractually bound to otherwise maintain my Duke Energy Ohio Inc. Account Number and Federal Tax ID Number in the strictest of confidence.

I have read and agree to the below Terms and Conditions of the Duke Energy Ohio's Mercantile Self Direct Program.

I certify that I meet the eligibility requirements of the Duke Energy Ohio's Mercantile Self Direct Program, as applicable, and that all information provided within my application is correct to the best of my knowledge.

I certify that the taxpayer identification number provided in my application is current and correct. I am not subject to backup withholding because: (a) I am exempt from backup withholding; or (b) I have not been notified by the IRS that I am subject to backup withholding as a result of a failure to report all interest or dividends; or (c) the IRS has notified me that I am no longer subject to backup withholding. I am a U.S. citizen (includes a U.S. resident alien).

Instructions/Terms/Conditions

Note: Please keep for your records

1. Energy service companies or contractors may assist in preparing the application, but an authorized representative of the customer must sign this application to be eligible to participate in the Mercantile Self Direct Program. Completion of this application does not guarantee the approval of a Self Direct Custom Rebate.
2. Once all documentation requested in this application is received by *Duke Energy Ohio, Inc.*, and any follow-up information requested by *Duke Energy* is received, the rebate amount for each Energy Conservation Measure (ECM) will be communicated to the customer. The rebate amount will be based on ECM energy savings and ECM incremental installation cost.
3. All rebates require approval by the Public Utilities Commission of Ohio (PUCO). *Duke Energy Ohio, Inc.* will submit an application for rebate on the customer's behalf upon customer attestation to program terms, conditions and requirements as outlined in the

[6] Internal labor costs cannot be counted in the Incremental Project Cost for purposes of analysis.

rebate offer letter and upon customer completion of attestation documents required by the Public Utilities Commission of Ohio.

4. *Duke Energy Ohio, Inc.* will issue a Self Direct Custom Rebate check, based on the approved rebate amount for each ECM, upon receiving approval from the PUCO. *Duke Energy* Ohio, Inc. does not guarantee PUCO approval.

5. With the application, the customer must provide a list of all sites where the ECMs were installed. *Duke Energy Ohio, Inc.* requests that sites of similar size, hours of operation and energy consuming characteristics be grouped together in one application for the determination of the rebate amount. The application should identify the site where each unique ECM was installed.

6. Based on the information submitted with the application and the information gathered both before and after the initial installation of the ECM, *Duke Energy Ohio, Inc.* will calculate the rebate amount for each ECM.

7. *Duke Energy Ohio, Inc.* may conduct random site inspections of a sample of the locations where the ECMs are installed to verify installation and operability of the ECMs and to obtain information needed to calculate the Approved Rebate Amount.

8. Customers are encouraged to retain copies of all forms, invoices and supporting documentation for their records.

9. Approved rebates are valid for six months from the date communicated to the customer by *Duke Energy Ohio, Inc.*, subject to the expiration of measure eligibility based on project completion dates and application submission deadlines as defined by PUCO. Customers are encouraged to execute their rebate offer contracts and PUCO-required affidavits promptly to ensure eligibility is not forfeited.

10. *Duke Energy Ohio, Inc.* reserves the right to recover all unrecoverable costs associated with the project approval if the customer decides not to execute the rebate contract, after the project is approved by *Duke Energy Ohio, Inc.*

11. Projects financially supported by other funding sources will be evaluated on a case-by-case basis for potential partial funding from *Duke Energy Ohio, Inc.*

12. Participants must be *Duke Energy Ohio, Inc.* nonresidential, mercantile customers with the project sites in the *Duke Energy Ohio, Inc.* service territory.

13. Customers or trade allies may not use any *Duke Energy* logo without prior written permission.

14. Only trade allies registered with *Duke Energy* are eligible to participate.

15. All equipment must be new. Used or rebuilt equipment is not eligible for rebates. All old existing equipment must be removed on retrofit projects.

16. Disclaimers: *Duke Energy Ohio, Inc.*
    a. does not endorse any particular manufacturer, product or system design within the program;
    b. will not be responsible for any tax liability imposed on the customer as a result of the payment of rebates;
    c. does not expressly or implicitly warrant the performance of installed equipment (contact your contractor for details regarding equipment warranties);
    d. is not responsible for the proper disposal/recycling of any waste generated or obsolete or old equipment as a result of this project;
    e. is not liable for any damage caused by the installation of the equipment nor for any damage caused by the malfunction of the installed equipment; and
    f. reserves the right to change or discontinue this program at any time. The acceptance of program applications is determined solely by *Duke Energy Ohio, Inc.*

CUSTOMER SIGNATURE REQUIRED

By signing below, I certify that I have read and agree to the above Mercantile Self Direct Attestation and Terms and Conditions.

Customer Signature	[signature], CEO		
Print Name	SANDRA LOBERT	Date	7/14/17

TRADE ALLY SIGNATURE (REQUIRED ONLY IF TRADE ALLY IS PAYEE)

By signing below, I certify that I have read and agree to the above Mercantile Self Direct Attestation and Terms and Conditions.

Trade Ally Signature	[signature]		
Print Name	TIM YOUNG	Date	7-31-17

CUSTOMER – AUTHORIZATION TO DESIGNATE TRADE ALLY AS PAYEE

If an incentive is awarded and the customer would like to authorize payment to the trade ally, the customer must sign below to allow release of their incentive to the trade ally.

Required: Final invoice from trade ally to customer must show the incentive credited to the customer. If the itemized invoice does not reflect a deduction of the incentive amount, the payee will be changed to the customer.

Customer Signature			
Print Name		Date	

App No.	CMO17-0000129053
Rev.	1

List of Sites (Required)

Provide a list of sites addressed by this custom incentive application

Site ID (see note 1)	**Duke Energy Electric Account Number(s)** (see note 2)	**Facility Address**	**List of Proposed Projects at each site**	**Annual Hours of Operation**	**Gross Square Footage**	**Conditioned Square Footage**	**Facility Age (years)**
225	*12345678 01*	*Example: 123 Main Street, Anywhere USA 12345*	*Project Name(s)*	*5,840*	*42,000*	*38,000*	*12*
	44602055016	4360 Copper Rd, Blue Ash, Ohio 45242	New HVAC controls	8,760	35,163	35,163	
			New VAV fan motor to ECM				
			New time scheduling of building lights				
			New time scheduling of building HVAC				

DUKE ENERGY.

For each project, answer the following questions (use one worksheet per project)

App No.	CMO17-0000129053
Rev.	1

Project Name: Tri-Health 4360 Copper Rd, Blue Ash, Ohio 45242

How would you classify this project? (Place an x in all boxes that apply.)

Lighting		**Heating/Cooling**	X	**Air Compressor**		**Energy Management System**	X
VFD		**Motors/Pumps**		**Process Equipment**		**Other, describe below:**	X
						VAV Box and VAV fan motor to ECM	

Brief Project Description

Describe the Baseline Equipment/System (see note 3)	Describe the Proposed High Efficiency Project
The current building design was 7 days a week / 24 hours per day with NO controls on the HVAC systems. The system is a large AHU with electric reheat in the AHU and electric reheat in all the VAV box that have a fan in them and the motors for the fan are	The new building design was 5 days a week / 11 hours per day with NO weekend but system can be used in an manual override based on 2 hours per after hours request. All new bulding controls on the HVAC systems. The HVAC upgrade included new Building automation controls, lighting controls, and new VAV fan motor changes to ECM type.

If Existing Equipment is the Baseline, how many years of useful life remain or how many years until replacement?

Detailed Project Description Attached? Yes (Required)

Operating Hours (see note 4)

24 x 7	Weekday Start Hour	Weekday End Hour	Saturday Start Hour	Saturday End Hour	Sunday Start Hour	Sunday End Hour	Weeks of Use in Year (see note below)	Total Annual Hours of Use
Yes	*12:00 AM*	*12:00 AM*	*12:00 AM*	*12:00 AM*	*12:00 AM*	*12:00 AM*	*52*	*8,760*

If the equipment is not in use 52 weeks during the year (for example, during holiday or summer break), provide an explanation of when usage is not expected and why: Equipment never turned off unless power fauilure

Energy Savings	Baseline (see note 3)	Proposed	Savings	Describe how energy numbers were calculated
Annual Electric Energy	950,000 kWh	430,000 kWh	520,000 kWh	Use Trane 700 energy software. Demand will not change due to using the same weather conditions with the same building conditions. Only the time of usage and upgrade of controls alls for the kWh savings. See the attached energy software and summary sheets.
Electric Demand	226 kW	226 kW	0 kW	
Calculations attached	Yes	Yes	(Required)	

Simple Payback

Average electric rate ($/kWh) on the applicable accounts (see note 5)	$0.10
Estimated annual electric savings	$52,000
Other annual savings in addition to electric savings, such as operations, maintenance, other fuels	$35,000.00
Incremental cost to implement the project (equipment & installation) (see note 6)	$247,792.00
Copy of vendor proposal is attached (see note 7)	Yes

Simple Electric Payback in years (see note 8)	4.765230769	**Total Payback in years**	2.848183908

DeBra-Kuempel
Mechanical-Electrical
An EMCOR Company

DeBra-Kuempel Inc.
3976 Southern Avenue
Cincinnati, OH 45227
Phone: 513.271.6500
Fax: 513.271.4676
www.debra-kuempel.com

Equal Opportunity Employer

January 11, 2018

Tri-Health
4360 Copper Rd.
Cincinnati, Ohio 45242

RE: Engineering Analysis Report for Design Comparison

The purpose of this letter is to define the engineering analysis report and input parameters. The base design is for 7 days a week -24 hours/day, NO controls on existing system. The alternate design was new VAV control boxes, new control lighting and new HVAC controls along with total commissioning of the alternate with operating hours of Monday-Friday 7am-6pm, NO Weekends. The design is to maintain 75F in the summer and 70F in the winter, with dead band high limit at 85F and the low limit at 65F.

The report are based on use Trane 700 engineering software to simulate Cincinnati, Ohio weather with the building model as 3 floor and 44 zone (approx. 15 per floor), 35,163 sqft for the total building.

The report data attached to this letter is in the following format: Must read report in a landscape mode, in the upper right corner will be the title for that section of the report.

Section 1	Title	Title page	1 page
Section 2	Report A	System Psychrometric State Points	8 pages
Section 3	Report B	System Summary – Design Airflow Quantities	1 page
Section 4	Report C	System Summary – Design Cooling Capacity	1 page
Section 5	Report D	System Summary – Design Heating Capacity	2 pages
Section 6	Report E	System Load Profile	8 pages
Section 7	Report F	Building Cool Heat Demand	12 pages
Section 8	Report G	Building Temperature Profile	16 pages
Section 9	Report H	Monthly Energy Consumption	1 page
Section 10	Report I	Equipment Energy Consumption	4 pages
Section 11	Report J	Electrical Peak Checksums	1 page
Section 12	Report K	Energy Consumption Summary (7-24-365)	1 page
Section 13	Report L	Energy Consumption Summary (Designed)	1 page

Yearly Energy Design Summary:

Section 12	Report K	Base Design 7 days a week-24 hrs/day	946,419 kWh
Section 13	Report M	Modified M-F 7am-6pm – No Weekends	429,117 kWh
		Net Savings	**517,302 kWh**
			55% Savings

Dayton
1948 West Dorothy Lane • Dayton, OH 45439
P: 937.531.5455 • F: 937.531.5456

Louisville
10304 Bluegrass Parkway
Louisville, KY 40299
P: 502.368.0454 • F: 502-384-8140

Maysville
702 Parker Drive• Maysville, KY 41056
P: 606.563.8605 • F: 606.563.8750

DeBra-Kuempel Inc.
3976 Southern Avenue
Cincinnati, OH 45227
Phone: 513.271.6500
Fax: 513.271.4676
www.debra-kuempel.com

The Trane Tracer 700 program modeled showed an energy saving of 517,302 kWh which is similar the energy saving shown on the Duke Energy bills from 2016 thru 2017.

Should you have any questions, please feel free to contact me by email at dbehne@debra-kuempel.com or call me at 513-678-3011.

Sincerely,

DEBRA-KUEMPEL

David M. Behne P.E.

David M. Behne, P.E.
Project Engineer

Report A

SYSTEM PSYCHROMETRIC STATE POINTS

By Trial

System per Floor – 1 | **Series Fan-Powered VAV**

	Dry Bulb °F	Wet Bulb °F	Relative Humidity %	Humidity Ratio gr/lb	Enthalpy Btu/lb	Temperature Difference °F
Space	75.0	62.2	49.2	65.8	28.3	
Main System						
Return Fan						0.5
Return Air	76.5	62.7	46.9	65.8	28.6	
Return Air Heat Pickup						0.9
Outdoor Air	84.8	67.2	40.6	74.9	32.1	
Entering OA preconditioning	84.8	67.2	40.6	74.9	32.1	
Leaving OA preconditioning	84.8	67.2	40.6	74.9	32.1	
Return/Outdoor Air Mix	77.2	63.1	46.4	66.6	28.9	
Blow Through Fan						0.0
Entering Coil	77.2	63.1	46.4	66.6	28.9	
Leaving Coil	59.9	56.5	81.8	65.0	24.5	
Draw Through Fan						0.4
Fan Frictional Heat						0.7
Supply Duct Heat Gain						0.0
Reheat Device						0.0
Cold Deck Supply Air	61.0	57.0	78.7	65.0	24.7	
Supply Air	61.0	57.0	78.7	65.0	24.7	

Percent Outside Air	8.31	%
Sensible Heat Ratio (SHR)	0.95	
Coil Airflow	20,730	cfm

SYSTEM PSYCHROMETRIC STATE POINTS

By Trial

System per Floor -- 2 **Series Fan-Powered VAV**

	Dry Bulb °F	Wet Bulb °F	Relative Humidity %	Humidity Ratio gr/lb	Enthalpy Btu/lb	Temperature Difference °F
Space	75.0	62.4	49.9	66.7	28.4	
Main System						
Return Fan						0.5
Return Air	76.5	62.9	47.4	66.7	28.8	
Return Air Heat Pickup						1.0
Outdoor Air	88.4	66.7	32.2	66.5	31.7	
Entering OA preconditioning	88.4	66.7	32.2	66.5	31.7	
Leaving OA preconditioning	88.4	66.7	32.2	66.5	31.7	
Return/Outdoor Air Mix	77.5	63.2	45.8	66.6	29.0	
Blow Through Fan						0.0
Entering Coil	77.5	63.2	45.8	66.6	29.0	
Leaving Coil	60.9	57.1	80.0	65.8	24.8	
Draw Through Fan						0.4
Fan Frictional Heat						0.7
Supply Duct Heat Gain						0.0
Reheat Device						0.0
Cold Deck Supply Air	62.0	57.5	77.0	65.8	25.1	
Supply Air	62.0	57.5	77.0	65.8	25.1	

Percent Outside Air	8.51	%
Sensible Heat Ratio (SHR)	0.94	
Coil Airflow	18,763	cfm

SYSTEM PSYCHROMETRIC STATE POINTS

By Trial

System per Floor -- 3 | **Series Fan-Powered VAV**

	Dry Bulb °F	Wet Bulb °F	Relative Humidity %	Humidity Ratio gr/lb	Enthalpy Btu/lb	Temperature Difference °F
Space	75.0	62.4	49.8	66.6	28.4	
Main System						
Return Fan						0.5
Return Air	83.1	65.1	38.2	66.6	30.4	
Return Air Heat Pickup						7.5
Outdoor Air	88.4	66.7	32.2	66.5	31.7	
Entering OA preconditioning	88.4	66.7	32.2	66.5	31.7	
Leaving OA preconditioning	88.4	66.7	32.2	66.5	31.7	
Return/Outdoor Air Mix	83.5	65.2	37.7	66.6	30.5	
Blow Through Fan						0.0
Entering Coil	83.5	65.2	37.7	66.6	30.5	
Leaving Coil	61.0	57.2	79.7	65.9	24.9	
Draw Through Fan						0.4
Fan Frictional Heat						0.7
Supply Duct Heat Gain						0.0
Reheat Device						0.0
Cold Deck Supply Air	62.1	57.6	76.7	65.9	25.2	
Supply Air	62.1	57.6	76.7	65.9	25.2	

Percent Outside Air	7.69	%
Sensible Heat Ratio (SHR)	0.95	
Coil Airflow	20,774	cfm

SYSTEM PSYCHROMETRIC STATE POINTS

By Trial

System per Floor -- 1 | **Series Fan-Powered VAV**

	Dry Bulb °F	Wet Bulb °F	Relative Humidity %	Humidity Ratio gr/lb	Enthalpy Btu/lb	Temperature Difference °F
Space	75.0	62.2	49.2	65.8	28.3	
Main System						
Return Fan						0.5
Return Air	76.5	62.7	46.9	65.8	28.6	
Return Air Heat Pickup						0.9
Outdoor Air	84.8	67.2	40.6	74.9	32.1	
Entering OA preconditioning	84.8	67.2	40.6	74.9	32.1	
Leaving OA preconditioning	84.8	67.2	40.6	74.9	32.1	
Return/Outdoor Air Mix	77.2	63.1	46.4	66.6	28.9	
Blow Through Fan						0.0
Entering Coil	77.2	63.1	46.4	66.6	28.9	
Leaving Coil	59.9	56.5	81.8	65.0	24.5	
Draw Through Fan						0.4
Fan Frictional Heat						0.7
Supply Duct Heat Gain						0.0
Reheat Device						0.0
Cold Deck Supply Air	61.0	57.0	78.7	65.0	24.7	
Supply Air	61.0	57.0	78.7	65.0	24.7	

Percent Outside Air	8.33	%
Sensible Heat Ratio (SHR)	0.95	
Coil Airflow	20,681	cfm

SYSTEM PSYCHROMETRIC STATE POINTS

By Trial

System per Floor – 2 **Series Fan-Powered VAV**

	Dry Bulb °F	Wet Bulb °F	Relative Humidity %	Humidity Ratio gr/lb	Enthalpy Btu/lb	Temperature Difference °F
Space	75.0	62.4	49.9	66.7	28.4	
Main System						
Return Fan						0.5
Return Air	76.5	62.9	47.4	66.7	28.8	
Return Air Heat Pickup						1.0
Outdoor Air	88.4	66.7	32.2	66.5	31.7	
Entering OA preconditioning	88.4	66.7	32.2	66.5	31.7	
Leaving OA preconditioning	88.4	66.7	32.2	66.5	31.7	
Return/Outdoor Air Mix	77.5	63.2	45.8	66.6	29.0	
Blow Through Fan						0.0
Entering Coil	77.5	63.2	45.8	66.6	29.0	
Leaving Coil	60.9	57.1	80.0	65.8	24.8	
Draw Through Fan						0.4
Fan Frictional Heat						0.7
Supply Duct Heat Gain						0.0
Reheat Device						0.0
Cold Deck Supply Air	62.0	57.5	77.0	65.8	25.1	
Supply Air	62.0	57.5	77.0	65.8	25.1	

Percent Outside Air	8.51	%
Sensible Heat Ratio (SHR)	0.94	
Coil Airflow	18,763	cfm

SYSTEM PSYCHROMETRIC STATE POINTS

By Trial

System per Floor -- 3 **Series Fan-Powered VAV**

	Dry Bulb °F	Wet Bulb °F	Relative Humidity %	Humidity Ratio gr/lb	Enthalpy Btu/lb	Temperature Difference °F
Space	75.0	62.4	49.8	66.6	28.4	
Main System						
Return Fan						0.5
Return Air	83.1	65.1	38.2	66.6	30.4	
Return Air Heat Pickup						7.5
Outdoor Air	88.4	66.7	32.2	66.5	31.7	
Entering OA preconditioning	88.4	66.7	32.2	66.5	31.7	
Leaving OA preconditioning	88.4	66.7	32.2	66.5	31.7	
Return/Outdoor Air Mix	83.5	65.2	37.7	66.6	30.5	
Blow Through Fan						0.0
Entering Coil	83.5	65.2	37.7	66.6	30.5	
Leaving Coil	61.0	57.2	79.7	65.9	24.9	
Draw Through Fan						0.4
Fan Frictional Heat						0.7
Supply Duct Heat Gain						0.0
Reheat Device						0.0
Cold Deck Supply Air	62.1	57.6	76.7	65.9	25.2	
Supply Air	62.1	57.6	76.7	65.9	25.2	

Percent Outside Air	7.69 %
Sensible Heat Ratio (SHR)	0.95
Coil Airflow	20,774 cfm

Report B

SYSTEM SUMMARY

DESIGN AIRFLOW QUANTITIES

By Trial

		MAIN SYSTEM						
System Description	System Type	Outside Airflow cfm	Cooling Airflow cfm	Heating Airflow cfm	Return Airflow cfm	Exhaust Airflow cfm	Auxiliary System Supply Airflow cfm	Room Exhaust Airflow cfm
Alternative 1								
System per Floor -- 1	Series Fan-Powered VAV	1,723	20,730	20,730	20,730	1,723	0	0
System per Floor -- 2	Series Fan-Powered VAV	1,597	18,763	22,099	22,099	1,597	0	0
System per Floor -- 3	Series Fan-Powered VAV	1,597	20,774	23,754	23,754	1,597	0	0
Totals		**4,918**	**60,267**	**66,583**	**66,583**	**4,918**	**0**	**0**
Alternative 2								
System per Floor -- 1	Series Fan-Powered VAV	1,723	20,681	20,681	20,681	1,723	0	0
System per Floor -- 2	Series Fan-Powered VAV	1,597	18,763	22,094	22,094	1,597	0	0
System per Floor -- 3	Series Fan-Powered VAV	1,597	20,774	23,754	23,754	1,597	0	0
Totals		**4,918**	**60,218**	**66,529**	**66,529**	**4,918**	**0**	**0**

Note: Airflows on this report are not additive because they are each taken at the time of their respective peaks. To view the balanced system design airflows, see the appropriate Checksums report (Airflows section).

Report C

SYSTEM SUMMARY
DESIGN COOLING CAPACITIES
By Trial

Alternative 1

Building Airside Systems and Plant Capacities

Plant	System	Peak Plant Loads: Main Coil ton	Aux Coil ton	Opt Vent Coil ton	Misc Load ton	Stg 1 Desic Cond ton	Stg 2 Desic Cond ton	Base Utility ton	Peak Total ton	Block Plant Loads: Time Of Peak mo/hr	Main Coil ton	Aux Coil ton	Opt Vent Coil ton	Misc Load ton	Stg 1 Desic Cond ton	Stg 2 Desic Cond ton	Base Utility ton	Block Total ton
Building Main AHU		100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	6/16	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	System per Floor -- 1	31.6	0.0	0.0	0.0	0.0	0.0	0.0	31.6	6/16	31.6	0.0	0.0	0.0	0.0	0.0	0.0	31.6
	System per Floor -- 2	27.7	0.0	0.0	0.0	0.0	0.0	0.0	27.7	6/16	27.7	0.0	0.0	0.0	0.0	0.0	0.0	27.7
	System per Floor -- 3	40.7	0.0	0.0	0.0	0.0	0.0	0.0	40.7	6/16	40.7	0.0	0.0	0.0	0.0	0.0	0.0	40.7
Building totals		100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0		100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0

Building peak load is 100.0 tons.

Building maximum block load of 100.0 tons occurs in June at hour 16 based on system simulation.

Alternative 2

Building Airside Systems and Plant Capacities

Plant	System	Peak Plant Loads: Main Coil ton	Aux Coil ton	Opt Vent Coil ton	Misc Load ton	Stg 1 Desic Cond ton	Stg 2 Desic Cond ton	Base Utility ton	Peak Total ton	Block Plant Loads: Time Of Peak mo/hr	Main Coil ton	Aux Coil ton	Opt Vent Coil ton	Misc Load ton	Stg 1 Desic Cond ton	Stg 2 Desic Cond ton	Base Utility ton	Block Total ton
Building Main AHU		100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	5/16	100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
	System per Floor -- 1	31.6	0.0	0.0	0.0	0.0	0.0	0.0	31.6	5/16	31.6	0.0	0.0	0.0	0.0	0.0	0.0	31.6
	System per Floor -- 2	27.7	0.0	0.0	0.0	0.0	0.0	0.0	27.7	5/16	27.7	0.0	0.0	0.0	0.0	0.0	0.0	27.7
	System per Floor -- 3	40.7	0.0	0.0	0.0	0.0	0.0	0.0	40.7	5/16	40.7	0.0	0.0	0.0	0.0	0.0	0.0	40.7
Building totals		100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0		100.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0

Building peak load is 100.0 tons.

Building maximum block load of 100.0 tons occurs in May at hour 16 based on system simulation.

Report D

SYSTEM SUMMARY
DESIGN HEATING CAPACITIES
By Trial

Alternative 1

System Coil Capacities

System Description	System Type	Main System Btu/h	Aux System Btu/h	Preheat Btu/h	Reheat Btu/h	Humid. Btu/h	Optional Vent Btu/h	Stg 1 Desic Regen Btu/h	Stg 2 Desic Regen Btu/h	Stg 1 Frost Prevention Btu/h	Stg 2 Frost Prevention Btu/h	Heating Totals Btu/h
System per Floor -- 1	Series Fan-Powered VAV	-183,500	0	-100,634	-70,098	0	0	0	0	0	0	-284,134
System per Floor -- 2	Series Fan-Powered VAV	-102,926	0	-94,923	-67,978	0	0	0	0	0	0	-197,849
System per Floor -- 3	Series Fan-Powered VAV	-203,338	0	-95,189	-71,841	0	0	0	0	0	0	-298,527
Totals		**-489,764**	**0**	**-290,747**	**-209,917**	**0**	**0**	**0**	**0**	**0**	**0**	**-780,511**

Building Plant Capacities

Plant System	Peak Loads: Main Coil MBh	Preheat Coil MBh	Reheat Coil MBh	Humid. Coil MBh	Aux Coil MBh	Opt Vent Coil MBh	Misc Load MBh	Stg 1 Desic. Regen. MBh	Stg 2 Desic. Regen. MBh	Stg 1 Frost Prev. MBh	Stg 2 Frost Prev. MBh	Base Utility MBh	Absorption Load MBh
Building Main AHU - Reheat	428	254	0	0	0	0	0	0	0	0	0	0	0
System per Floor -- 1	160	88	0	0	0	0	0	0	0	0	0	0	0
System per Floor -- 2	90	83	0	0	0	0	0	0	0	0	0	0	0
System per Floor -- 3	178	83	0	0	0	0	0	0	0	0	0	0	0

Building peak load is 682.6 MBh.

Alternative 2

System Coil Capacities

System Description	System Type	Main System Btu/h	Aux System Btu/h	Preheat Btu/h	Reheat Btu/h	Humid. Btu/h	Optional Vent Btu/h	Stg 1 Desic Regen Btu/h	Stg 2 Desic Regen Btu/h	Stg 1 Frost Prevention Btu/h	Stg 2 Frost Prevention Btu/h	Heating Totals Btu/h
System per Floor -- 1	Series Fan-Powered VAV	-132,436	0	-100,634	0	0	0	0	0	0	0	-233,070
System per Floor -- 2	Series Fan-Powered VAV	-97,193	0	-94,923	0	0	0	0	0	0	0	-192,117
System per Floor -- 3	Series Fan-Powered VAV	-239,472	0	-95,189	0	0	0	0	0	0	0	-334,661
Totals		**-469,101**	**0**	**-290,747**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-759,848**

Building Plant Capacities

Plant	System	Peak Loads Main Coil MBh	Preheat Coil MBh	Reheat Coil MBh	Humid. Coil MBh	Aux Coil MBh	Opt Vent Coil MBh	Misc Load MBh	Stg 1 Desic. Regen. MBh	Stg 2 Desic. Regen. MBh	Stg 1 Frost Prev. MBh	Stg 2 Frost Prev. MBh	Base Utility MBh	Absorption Load MBh
Building	Main AHU - Reheat	421	261	0	0	0	0	0	0	0	0	0	0	0
	System per Floor -- 1	119	90	0	0	0	0	0	0	0	0	0	0	0
	System per Floor -- 2	87	85	0	0	0	0	0	0	0	0	0	0	0
	System per Floor -- 3	215	86	0	0	0	0	0	0	0	0	0	0	0

Building peak load is 682.6 MBh.

Report E

SYSTEM LOAD PROFILES

By Trial

This is for 7-24 operation
System per Floor -- 1

Percent Design Load	---- Cooling Load ---- Cap. (Tons)	Hours (%)	Hours	---- Heating Load ---- Cap. (Btuh)	Hours (%)	Hours	---- Cooling Airflow ---- Cap. (Cfm)	Hours (%)	Hours	---- Heating Airflow---- Cap. (Cfm)	Hours (%)	Hours
0 - 5	1.6	4	308	-12,424.6	47	1,159	1,036.5	0	0	1,036.5	0	0
5 - 10	3.2	11	737	-24,849.1	15	360	2,073.0	0	0	2,073.0	0	0
10 - 15	4.7	8	543	-37,273.7	6	157	3,109.6	9	807	3,109.6	0	0
15 - 20	6.3	7	520	-49,698.3	8	204	4,146.1	12	1,023	4,146.1	0	0
20 - 25	7.9	7	456	-62,122.8	9	221	5,182.6	9	760	5,182.6	0	0
25 - 30	9.5	5	380	-74,547.4	15	372	6,219.1	12	1,009	6,219.1	0	0
30 - 35	11.1	8	582	-86,972.0	0	0	7,255.6	17	1,500	7,255.6	0	21
35 - 40	12.7	8	532	-99,396.5	0	0	8,292.2	8	734	8,292.2	3	251
40 - 45	14.2	6	399	-111,821.1	0	0	9,328.7	5	395	9,328.7	3	286
45 - 50	15.8	5	374	-124,245.6	0	0	10,365.2	6	512	10,365.2	6	503
50 - 55	17.4	5	357	-136,670.2	0	0	11,401.7	7	601	11,401.7	9	798
55 - 60	19.0	5	337	-149,094.8	0	0	12,438.2	7	632	12,438.2	1	55
60 - 65	20.6	4	293	-161,519.3	0	0	13,474.7	4	340	13,474.7	6	512
65 - 70	22.1	5	377	-173,943.9	0	0	14,511.3	2	176	14,511.3	2	178
70 - 75	23.7	3	232	-186,368.5	0	0	15,547.8	2	164	15,547.8	5	414
75 - 80	25.3	3	214	-198,793.0	0	0	16,584.3	1	107	16,584.3	7	636
80 - 85	26.9	3	186	-211,217.6	0	0	17,620.8	0	0	17,620.8	17	1,483
85 - 90	28.5	1	45	-223,642.1	0	0	18,657.3	0	0	18,657.3	2	156
90 - 95	30.0	2	108	-236,066.7	0	0	19,693.9	0	0	19,693.9	2	202
95 - 100	31.6	0	0	-248,491.3	0	0	20,730.4	0	0	20,730.4	37	3,265
Hours Off	0.0	0	1,780	0.0	0	6,287	0.0	0	0	0.0	0	0

SYSTEM LOAD PROFILES

By Trial

This is for 7-24 operation
System per Floor -- 2

Percent Design Load	---- Cooling Load ---- Cap. (Tons)	Hours (%)	Hours	---- Heating Load ---- Cap. (Btuh)	Hours (%)	Hours	---- Cooling Airflow ---- Cap. (Cfm)	Hours (%)	Hours	---- Heating Airflow---- Cap. (Cfm)	Hours (%)	Hours
0 - 5	1.4	6	403	-8,651.5	47	1,011	938.1	0	0	1,104.9	0	0
5 - 10	2.8	8	569	-17,303.0	9	201	1,876.3	0	0	2,209.9	0	0
10 - 15	4.2	8	545	-25,954.5	6	137	2,814.4	3	279	3,314.8	0	0
15 - 20	5.5	8	562	-34,606.0	10	204	3,752.5	9	807	4,419.8	0	0
20 - 25	6.9	6	455	-43,257.5	6	131	4,690.7	11	937	5,524.7	0	0
25 - 30	8.3	8	552	-51,909.0	13	276	5,628.8	8	712	6,629.6	0	0
30 - 35	9.7	5	366	-60,560.5	9	186	6,567.0	12	1,053	7,734.6	0	0
35 - 40	11.1	7	530	-69,212.0	0	0	7,505.1	16	1,363	8,839.5	0	42
40 - 45	12.5	7	483	-77,863.5	0	0	8,443.2	8	701	9,944.5	2	140
45 - 50	13.9	6	451	-86,515.0	0	0	9,381.4	5	417	11,049.4	5	407
50 - 55	15.2	4	287	-95,166.4	0	0	10,319.5	6	549	12,154.3	8	729
55 - 60	16.6	5	391	-103,817.9	0	0	11,257.6	7	581	13,259.3	6	482
60 - 65	18.0	4	270	-112,469.4	0	0	12,195.8	6	568	14,364.2	2	152
65 - 70	19.4	4	308	-121,120.9	0	0	13,133.9	4	353	15,469.1	6	510
70 - 75	20.8	4	290	-129,772.4	0	0	14,072.0	2	164	16,574.1	1	128
75 - 80	22.2	3	253	-138,423.9	0	0	15,010.2	1	102	17,679.0	3	222
80 - 85	23.6	2	148	-147,075.4	0	0	15,948.3	2	152	18,784.0	28	2,490
85 - 90	24.9	2	138	-155,726.9	0	0	16,886.4	0	22	19,888.9	0	42
90 - 95	26.3	2	109	-164,378.4	0	0	17,824.6	0	0	20,993.8	0	0
95 - 100	27.7	2	147	-173,029.9	0	0	18,762.7	0	0	22,098.8	39	3,416
Hours Off	0.0	0	1,503	0.0	0	6,614	0.0	0	0	0.0	0	0

SYSTEM LOAD PROFILES

By Trial

This is for 7-24 operation
System per Floor -- 3

Percent Design Load	---- Cooling Load ----			---- Heating Load ----			---- Cooling Airflow ----			---- Heating Airflow----		
	Cap. (Tons)	Hours (%)	Hours	Cap. (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	2.0	7	394	-13,053.9	8	283	1,038.7	24	2,097	1,187.7	0	0
5 - 10	4.1	9	486	-26,107.9	60	2,089	2,077.4	8	676	2,375.4	1	72
10 - 15	6.1	8	412	-39,161.8	24	845	3,116.1	6	518	3,563.0	2	174
15 - 20	8.1	11	573	-52,215.8	6	198	4,154.7	6	494	4,750.7	8	678
20 - 25	10.2	9	493	-65,269.7	2	59	5,193.4	7	583	5,938.4	5	428
25 - 30	12.2	6	297	-78,323.7	0	17	6,232.1	8	738	7,126.1	4	311
30 - 35	14.2	6	289	-91,377.6	0	7	7,270.8	7	646	8,313.8	4	364
35 - 40	16.3	7	347	-104,431.5	0	0	8,309.5	5	412	9,501.4	2	182
40 - 45	18.3	5	267	-117,485.5	0	0	9,348.2	4	351	10,689.1	4	312
45 - 50	20.3	7	352	-130,539.4	0	0	10,386.9	3	300	11,876.8	3	265
50 - 55	22.4	4	206	-143,593.3	0	0	11,425.5	4	348	13,064.5	1	97
55 - 60	24.4	4	222	-156,647.3	0	0	12,464.2	4	365	14,252.2	4	317
60 - 65	26.4	4	190	-169,701.2	0	0	13,502.9	4	358	15,439.8	1	116
65 - 70	28.5	4	209	-182,755.2	0	0	14,541.6	4	326	16,627.5	5	415
70 - 75	30.5	3	160	-195,809.1	0	0	15,580.3	2	207	17,815.2	0	20
75 - 80	32.6	2	131	-208,863.1	0	0	16,619.0	2	133	19,002.9	1	72
80 - 85	34.6	2	81	-221,917.0	0	0	17,657.7	1	87	20,190.6	32	2,813
85 - 90	36.6	2	111	-234,970.9	0	0	18,696.4	1	65	21,378.2	0	0
90 - 95	38.7	1	29	-248,024.9	0	0	19,735.0	0	0	22,565.9	0	0
95 - 100	40.7	0	5	-261,078.8	0	0	20,773.7	0	0	23,753.6	24	2,124
Hours Off	0.0	0	3,506	0.0	0	5,262	0.0	0	56	0.0	0	0

SYSTEM LOAD PROFILES

By Trial

This is for 7-24 operation
System Totals

Percent Design Load	---- Cooling Load ---- Cap. (Tons)	Hours (%)	Hours	---- Heating Load ---- Cap. (Btuh)	Hours (%)	Hours	---- Cooling Airflow ---- Cap. (Cfm)	Hours (%)	Hours	---- Heating Airflow---- Cap. (Cfm)	Hours (%)	Hours
0 - 5	5.0	13	963	-34,130.0	50	1,765	3,013.3	0	0	3,329.1	0	0
5 - 10	10.0	11	828	-68,260.0	21	744	6,026.7	5	479	6,658.3	0	0
10 - 15	15.0	9	685	-102,390.0	9	299	9,040.0	14	1,208	9,987.4	0	0
15 - 20	20.0	6	422	-136,520.0	9	320	12,053.4	10	834	13,316.6	0	0
20 - 25	25.0	6	401	-170,650.0	10	363	15,066.7	8	744	16,645.7	0	0
25 - 30	30.0	7	526	-204,780.0	0	7	18,080.0	9	832	19,974.8	0	21
30 - 35	35.0	7	479	-238,910.0	0	0	21,093.4	13	1,167	23,304.0	2	205
35 - 40	40.0	6	410	-273,040.0	0	0	24,106.7	7	586	26,633.1	5	478
40 - 45	45.0	5	344	-307,170.0	0	0	27,120.1	5	427	29,962.2	9	760
45 - 50	50.0	4	294	-341,300.0	0	0	30,133.4	5	435	33,291.4	5	444
50 - 55	55.0	5	357	-375,430.0	0	0	33,146.7	5	432	36,620.5	4	352
55 - 60	60.0	4	286	-409,560.0	0	0	36,160.1	6	526	39,949.6	1	122
60 - 65	65.0	4	306	-443,690.0	0	0	39,173.4	5	457	43,278.8	4	358
65 - 70	70.0	4	254	-477,820.0	0	0	42,186.8	3	233	46,607.9	4	362
70 - 75	75.0	2	169	-511,950.0	0	0	45,200.1	2	158	49,937.1	3	277
75 - 80	80.0	3	182	-546,080.0	0	0	48,213.4	2	177	53,266.2	4	323
80 - 85	85.0	2	147	-580,210.0	0	0	51,226.8	1	65	56,595.3	19	1,697
85 - 90	90.0	2	114	-614,339.9	0	0	54,240.1	0	0	59,924.5	1	103
90 - 95	95.0	1	90	-648,470.0	0	0	57,253.5	0	0	63,253.6	13	1,134
95 - 100	100.0	0	0	-682,600.0	0	0	60,266.8	0	0	66,582.7	24	2,124
Hours Off	0.0	0	1,503	0.0	0	5,262	0.0	0	0	0.0	0	0

SYSTEM LOAD PROFILES

By Trial

5 DAYS A WEEK 7AM-6PM Schedule
System per Floor – 1

Percent Design Load	---- Cooling Load ---- Cap. (Tons)	Hours (%)	Hours	---- Heating Load ---- Cap. (Btuh)	Hours (%)	Hours	---- Cooling Airflow ---- Cap. (Cfm)	Hours (%)	Hours	---- Heating Airflow---- Cap. (Cfm)	Hours (%)	Hours
0 - 5	1.6	36	1,934	-10,468.8	49	999	1,034.1	32	1,770	1,034.1	8	494
5 - 10	3.2	9	498	-20,937.5	16	330	2,068.1	6	312	2,068.1	5	297
10 - 15	4.7	9	452	-31,406.3	9	180	3,102.2	6	313	3,102.2	4	235
15 - 20	6.3	6	341	-41,875.1	8	161	4,136.2	5	283	4,136.2	26	1,618
20 - 25	7.9	3	151	-52,343.9	8	167	5,170.3	5	297	5,170.3	4	226
25 - 30	9.5	4	193	-62,812.6	3	53	6,204.4	6	310	6,204.4	2	97
30 - 35	11.1	3	151	-73,281.4	2	42	7,238.4	5	272	7,238.4	1	42
35 - 40	12.6	4	191	-83,750.2	1	16	8,272.5	6	318	8,272.5	3	202
40 - 45	14.2	2	81	-94,218.9	2	33	9,306.5	4	198	9,306.5	0	26
45 - 50	15.8	1	71	-104,687.7	0	3	10,340.6	3	166	10,340.6	2	107
50 - 55	17.4	3	140	-115,156.5	0	0	11,374.6	2	95	11,374.6	2	122
55 - 60	19.0	2	91	-125,625.3	0	7	12,408.7	8	462	12,408.7	5	321
60 - 65	20.6	2	110	-136,094.0	2	37	13,442.8	7	370	13,442.8	2	100
65 - 70	22.1	4	203	-146,562.8	0	0	14,476.8	2	111	14,476.8	2	111
70 - 75	23.7	3	152	-157,031.6	0	0	15,510.9	2	127	15,510.9	4	229
75 - 80	25.3	4	219	-167,500.3	0	0	16,544.9	2	88	16,544.9	6	389
80 - 85	26.9	2	128	-177,969.1	0	0	17,579.0	0	15	17,579.0	4	237
85 - 90	28.5	1	75	-188,437.9	0	0	18,613.1	0	5	18,613.1	3	163
90 - 95	30.0	2	115	-198,906.7	0	0	19,647.1	0	0	19,647.1	2	114
95 - 100	31.6	0	20	-209,375.4	0	0	20,681.2	0	0	20,681.2	19	1,209
Hours Off	0.0	0	3,444	0.0	0	6,732	0.0	0	3,248	0.0	0	2,421

SYSTEM LOAD PROFILES

By Trial

5 DAYS A WEEK   7AM-6PM Schedule
System per Floor -- 2

Percent Design Load	---- Cooling Load ---- Cap. (Tons)	Hours (%)	Hours	---- Heating Load ---- Cap. (Btuh)	Hours (%)	Hours	---- Cooling Airflow ---- Cap. (Cfm)	Hours (%)	Hours	---- Heating Airflow---- Cap. (Cfm)	Hours (%)	Hours
0 - 5	1.4	35	1,868	-8,629.3	46	791	938.1	29	1,593	1,104.7	7	452
5 - 10	2.8	8	429	-17,258.6	16	268	1,876.3	8	448	2,209.4	4	275
10 - 15	4.2	10	531	-25,887.8	9	150	2,814.4	5	293	3,314.1	0	22
15 - 20	5.5	5	263	-34,517.1	12	207	3,752.6	5	291	4,418.8	30	1,841
20 - 25	6.9	4	224	-43,146.4	6	96	4,690.7	3	171	5,523.5	2	123
25 - 30	8.3	3	157	-51,775.7	3	57	5,628.8	4	208	6,628.2	1	60
30 - 35	9.7	3	144	-60,405.0	1	24	6,567.0	6	308	7,732.9	4	240
35 - 40	11.1	3	183	-69,034.3	4	62	7,505.1	3	192	8,837.6	2	105
40 - 45	12.5	3	164	-77,663.5	0	7	8,443.3	6	307	9,942.3	1	50
45 - 50	13.9	1	73	-86,292.8	0	4	9,381.4	4	195	11,047.0	1	87
50 - 55	15.2	1	50	-94,922.1	0	0	10,319.5	4	197	12,151.7	1	71
55 - 60	16.6	2	128	-103,551.4	0	3	11,257.7	2	119	13,256.4	2	98
60 - 65	18.0	2	125	-112,180.7	2	41	12,195.8	6	345	14,361.1	6	373
65 - 70	19.4	2	107	-120,809.9	0	0	13,134.0	8	418	15,465.8	1	83
70 - 75	20.8	4	200	-129,439.2	0	0	14,072.1	3	143	16,570.5	1	73
75 - 80	22.2	2	125	-138,068.5	0	0	15,010.2	2	89	17,675.2	6	372
80 - 85	23.6	4	191	-146,697.8	0	0	15,948.4	2	91	18,779.8	9	559
85 - 90	24.9	2	125	-155,327.1	0	0	16,886.5	1	65	19,884.5	0	4
90 - 95	26.3	2	83	-163,956.3	0	0	17,824.7	1	34	20,989.2	1	38
95 - 100	27.7	3	173	-172,585.6	0	0	18,762.8	0	5	22,093.9	21	1,313
Hours Off	0.0	0	3,417	0.0	0	7,050	0.0	0	3,248	0.0	0	2,521

SYSTEM LOAD PROFILES

By Trial

5 DAYS A WEEK 7AM-6PM Schedule
System per Floor -- 3

Percent Design Load	---- Cooling Load ---- Cap. (Tons)	Hours (%)	Hours	---- Heating Load ---- Cap. (Btuh)	Hours (%)	Hours	---- Cooling Airflow ---- Cap. (Cfm)	Hours (%)	Hours	---- Heating Airflow---- Cap. (Cfm)	Hours (%)	Hours
0 - 5	2.0	21	566	-15,032.0	25	452	1,038.7	26	921	1,187.7	11	490
5 - 10	4.1	6	177	-30,063.9	24	436	2,077.4	5	180	2,375.4	6	265
10 - 15	6.1	8	216	-45,095.8	17	309	3,116.1	11	385	3,563.0	6	281
15 - 20	8.1	7	183	-60,127.8	9	157	4,154.7	5	177	4,750.7	12	581
20 - 25	10.2	4	99	-75,159.7	5	90	5,193.4	4	136	5,938.4	2	107
25 - 30	12.2	4	104	-90,191.7	7	125	6,232.1	3	102	7,126.1	4	190
30 - 35	14.2	5	125	-105,223.6	8	144	7,270.8	4	132	8,313.8	3	147
35 - 40	16.3	3	94	-120,255.6	0	7	8,309.5	3	114	9,501.4	4	206
40 - 45	18.3	4	102	-135,287.5	3	49	9,348.2	2	64	10,689.1	2	96
45 - 50	20.3	3	95	-150,319.5	0	7	10,386.9	3	116	11,876.8	1	58
50 - 55	22.4	3	81	-165,351.4	0	5	11,425.5	2	83	13,064.5	2	96
55 - 60	24.4	5	141	-180,383.4	1	25	12,464.2	2	66	14,252.2	3	136
60 - 65	26.5	7	203	-195,415.3	1	11	13,502.9	4	137	15,439.8	2	75
65 - 70	28.5	1	26	-210,447.3	0	8	14,541.6	8	306	16,627.5	1	53
70 - 75	30.5	5	132	-225,479.2	1	17	15,580.3	8	304	17,815.2	0	22
75 - 80	32.6	5	125	-240,511.2	0	0	16,619.0	2	83	19,002.9	5	213
80 - 85	34.6	2	45	-255,543.1	0	0	17,657.7	3	106	20,190.6	7	348
85 - 90	36.6	3	88	-270,575.1	0	0	18,696.4	3	106	21,378.2	1	25
90 - 95	38.7	2	53	-285,607.0	0	0	19,735.0	0	18	22,565.9	2	74
95 - 100	40.7	3	83	-300,638.9	0	0	20,773.7	2	65	23,753.6	26	1,189
Hours Off	0.0	0	6,022	0.0	0	6,918	0.0	0	5,159	0.0	0	4,108

SYSTEM LOAD PROFILES

By Trial

5 DAYS A WEEK 7AM-6PM Schedule
System Totals

Percent Design Load	---- Cooling Load ---- Cap. (Tons)	Hours (%)	Hours	---- Heating Load ---- Cap. (Btuh)	Hours (%)	Hours	---- Cooling Airflow ---- Cap. (Cfm)	Hours (%)	Hours	---- Heating Airflow---- Cap. (Cfm)	Hours (%)	Hours
0 - 5	5.0	42	2,238	-34,130.0	46	1,015	3,010.9	35	1,941	3,326.4	8	489
5 - 10	10.0	11	611	-68,260.0	18	405	6,021.8	7	363	6,652.9	7	435
10 - 15	15.0	7	388	-102,390.0	11	235	9,032.7	6	330	9,979.3	23	1,468
15 - 20	20.0	4	215	-136,520.0	7	161	12,043.5	6	339	13,305.7	8	512
20 - 25	25.0	3	174	-170,650.0	4	87	15,054.4	6	331	16,632.2	2	120
25 - 30	30.0	2	128	-204,780.0	8	181	18,065.3	3	192	19,958.6	1	92
30 - 35	35.0	2	121	-238,910.0	0	0	21,076.2	3	182	23,285.0	1	90
35 - 40	40.0	3	170	-273,040.0	0	3	24,087.1	4	210	26,611.5	2	103
40 - 45	45.0	1	53	-307,170.0	0	9	27,098.0	4	199	29,937.9	1	90
45 - 50	50.0	1	59	-341,300.0	1	26	30,108.8	2	87	33,264.4	5	304
50 - 55	55.0	3	167	-375,430.0	2	52	33,119.7	2	121	36,590.8	2	133
55 - 60	60.0	1	42	-409,560.0	0	10	36,130.6	2	109	39,917.2	2	133
60 - 65	65.0	3	161	-443,690.0	0	0	39,141.5	7	398	43,243.7	2	142
65 - 70	70.0	4	194	-477,820.0	0	7	42,152.4	6	346	46,570.1	3	184
70 - 75	75.0	2	82	-511,950.0	0	0	45,163.3	2	84	49,896.5	3	163
75 - 80	80.0	3	183	-546,080.0	0	0	48,174.2	2	105	53,223.0	3	219
80 - 85	85.0	2	84	-580,210.0	0	0	51,185.0	2	114	56,549.4	5	322
85 - 90	90.0	2	82	-614,340.0	0	0	54,195.9	1	41	59,875.8	1	75
90 - 95	95.0	3	151	-648,470.0	0	0	57,206.8	0	20	63,202.3	1	93
95 - 100	100.0	1	40	-682,600.0	0	0	60,217.7	0	0	66,528.7	19	1,176
Hours Off	0.0	0	3,417	0.0	0	6,569	0.0	0	3,248	0.0	0	2,417

Report F

BUILDING COOL HEAT DEMAND

By Trial

January	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	20.5	18.6	-42,736	0.0	-122,351	0.0	-140,790	0.0	-140,790	0.0	-140,790	0.0
2	20.1	18.5	-86,314	0.0	-140,459	0.0	-159,937	0.0	-160,373	0.0	-153,992	0.0
3	20.3	18.6	-142,704	0.0	-144,286	0.0	-153,637	0.0	-162,000	0.0	-157,868	0.0
4	20.9	19.2	-161,467	0.0	-150,149	0.0	-171,303	0.0	-161,942	0.0	-161,916	0.0
5	21.9	20.3	-147,665	0.0	-141,038	0.0	-158,318	0.0	-167,609	0.0	-167,609	0.0
6	23.2	21.7	-153,835	0.0	-146,823	0.0	-162,142	0.0	-156,098	0.0	-155,959	0.0
7	24.7	23.2	-143,336	0.0	-142,070	0.0	-148,433	0.0	-159,146	0.0	-159,409	0.0
8	26.5	25.0	-142,145	0.0	-131,943	0.0	-143,656	0.0	-135,912	0.0	-66,389	12.7
9	28.3	26.9	-73,112	0.0	-74,041	5.8	-112,601	0.0	-122,374	0.0	-99,611	5.4
10	30.1	28.6	-20,433	0.6	-63,155	0.0	-86,327	0.0	-84,243	0.0	-100,168	0.0
11	31.9	30.2	-16,452	8.0	-30,878	1.6	-32,929	0.1	-33,272	0.1	-29,837	1.6
12	33.5	31.3	-20,459	13.4	-21,838	4.6	-27,106	2.4	-25,710	2.4	-36,368	4.6
13	34.8	32.1	-3,359	17.6	-27,427	6.3	-18,603	4.1	-18,603	4.1	-19,512	6.3
14	35.8	32.7	0	20.9	-50,601	7.2	-46,083	4.8	-46,083	4.8	-50,601	7.2
15	36.4	32.9	0	24.3	-28,475	7.9	-35,157	4.8	-35,157	4.8	-26,408	7.9
16	36.6	32.9	0	30.5	-21,236	9.6	-36,707	5.6	-36,707	5.6	-21,236	9.6
17	36.2	32.5	0	38.2	-22,072	11.5	-40,566	6.8	-40,566	6.8	-22,072	11.5
18	35.0	31.4	0	18.7	-35,625	4.1	-35,625	4.1	-35,625	4.1	-35,625	4.1
19	33.2	30.0	0	6.6	-34,405	0.4	-34,405	0.4	-30,487	1.2	-34,405	0.4
20	30.9	27.9	-32,774	0.0	-58,796	0.0	-58,796	0.0	-58,796	0.0	-58,796	0.0
21	28.3	25.7	-62,446	0.0	-76,786	0.0	-76,786	0.0	-76,786	0.0	-76,786	0.0
22	25.8	23.2	-57,167	0.0	-90,728	0.0	-90,728	0.0	-90,728	0.0	-90,728	0.0
23	23.5	21.1	-61,005	0.0	-111,561	0.0	-111,561	0.0	-111,561	0.0	-111,561	0.0
24	21.6	19.3	-67,925	0.0	-132,480	0.0	-132,480	0.0	-132,480	0.0	-132,480	0.0

February	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	31.3	28.6	-60,035	0.0	-50,883	0.0	-53,295	0.0	-53,295	0.0	-53,295	0.0
2	29.6	27.0	-63,348	0.0	-66,490	0.0	-74,542	0.0	-74,542	0.0	-74,542	0.0
3	28.1	26.0	-70,149	0.0	-83,755	0.0	-90,200	0.0	-90,200	0.0	-90,200	0.0
4	27.0	24.9	-67,551	0.0	-96,637	0.0	-100,984	0.0	-100,984	0.0	-100,984	0.0
5	26.3	24.1	-73,188	0.0	-103,857	0.0	-105,488	0.0	-105,488	0.0	-105,488	0.0
6	26.1	23.9	-74,844	0.0	-105,282	0.0	-105,499	0.0	-105,499	0.0	-105,499	0.0
7	26.4	24.5	-66,669	0.0	-105,965	0.0	-107,006	0.0	-107,006	0.0	-107,006	0.0
8	27.4	25.6	-60,350	0.0	-38,031	1.7	-101,267	0.0	-101,267	0.0	-41,357	12.9
9	28.9	27.0	-49,329	11.1	-67,772	7.0	-84,805	0.0	-84,805	0.0	-74,088	7.0
10	30.8	28.8	-17,816	10.4	-36,680	0.5	-41,962	0.0	-41,962	0.0	-27,071	0.5
11	33.1	30.8	-16,200	15.9	-21,521	5.4	-29,347	3.3	-29,347	3.3	-30,573	5.4
12	35.4	32.6	0	22.5	-26,749	7.4	-25,479	5.0	-25,479	5.0	-26,749	7.4
13	37.7	34.5	0	26.8	-41,276	8.4	-43,729	6.0	-43,729	6.0	-41,276	8.5
14	39.6	36.2	0	28.8	-20,558	9.2	-27,876	6.5	-27,876	6.5	-21,460	9.2
15	41.1	37.2	0	34.7	-7,640	11.1	-20,137	7.8	-20,137	9.4	-7,640	11.1
16	42.1	37.9	0	48.0	0	14.0	-17,734	9.2	-17,734	12.1	0	14.0
17	42.4	38.1	0	55.0	0	18.4	-20,216	12.3	-20,216	16.1	0	18.4
18	42.2	37.9	0	37.7	-12,960	12.1	-12,960	12.1	-12,960	15.9	-12,960	12.1
19	41.5	37.5	0	25.3	0	8.0	0	9.7	0	11.1	0	8.3
20	40.4	36.8	0	11.7	-18,891	3.4	-18,891	5.1	-18,891	5.1	-18,891	3.4
21	38.9	35.8	0	2.4	-32,360	0.9	-32,360	0.9	-32,360	0.9	-32,360	0.9
22	37.2	34.2	-25,545	0.5	-29,452	0.3	-26,715	0.6	-26,715	0.6	-29,452	0.3
23	35.2	32.4	-43,351	0.1	-34,327	0.0	-34,327	0.0	-34,327	0.0	-34,327	0.0
24	33.3	30.5	-33,940	0.0	-43,412	0.0	-43,412	0.0	-43,412	0.0	-43,412	0.0

BUILDING COOL HEAT DEMAND

By Trial

March	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	38.7	34.6	-22,470	1.8	-23,842	0.6	-23,842	0.6	-23,842	0.6	-23,842	0.6
2	37.1	33.4	-23,009	1.5	-24,559	0.3	-24,559	0.3	-21,470	1.0	-21,470	1.0
3	35.7	32.4	-20,349	1.2	-28,106	0.0	-28,106	0.0	-28,106	0.0	-28,106	0.0
4	34.5	31.2	-25,250	1.0	-33,364	0.0	-35,111	0.0	-35,111	0.0	-35,111	0.0
5	33.7	30.7	-22,474	0.9	-41,591	0.0	-49,049	0.0	-49,049	0.0	-49,049	0.0
6	33.1	30.2	-28,435	1.0	-53,456	0.0	-53,343	0.0	-53,343	0.0	-53,343	0.0
7	32.9	30.2	-24,532	1.3	-54,780	0.0	-60,887	0.0	-60,887	0.0	-60,887	0.0
8	33.3	30.5	-20,109	7.4	-30,351	14.2	-48,098	0.0	-48,098	0.0	-56,023	14.9
9	34.3	31.5	-18,172	19.8	-11,763	10.5	-33,135	0.0	-33,135	0.0	-11,764	10.8
10	36.0	32.6	-9,474	17.9	-40,858	6.4	-21,946	4.2	-21,946	4.8	-29,557	6.3
11	38.0	33.6	0	25.3	-25,397	9.4	-19,405	6.9	-19,405	8.2	-25,397	9.4
12	40.3	35.3	0	30.3	-18,895	12.0	-26,055	9.3	-26,055	10.8	-19,919	12.0
13	42.6	36.8	0	36.0	0	14.4	-2,528	10.9	-2,528	12.6	0	14.4
14	44.6	38.4	0	41.8	0	16.8	0	12.4	0	14.4	0	16.8
15	46.3	39.6	0	50.4	0	19.3	0	13.7	0	16.2	0	19.3
16	47.3	40.3	0	60.6	0	24.2	0	17.1	0	20.4	0	24.2
17	47.7	40.7	0	67.7	0	30.3	0	23.5	0	25.8	0	30.3
18	47.5	40.6	0	51.4	0	22.9	0	27.3	0	27.3	0	22.9
19	46.9	40.3	0	38.5	0	17.7	0	21.3	0	21.4	0	17.7
20	46.1	40.2	0	22.9	0	10.7	0	13.1	0	13.1	0	10.7
21	44.9	39.7	0	12.0	-1,415	5.7	-1,415	7.0	-1,415	7.1	-1,415	5.7
22	43.5	38.7	0	6.7	-18,739	3.8	-18,739	4.8	-18,739	4.8	-18,739	3.8
23	41.9	37.4	-8,476	3.5	-28,365	3.0	-28,365	4.0	-28,365	4.0	-28,365	3.0
24	40.3	36.0	-23,336	2.9	-28,619	1.5	-28,619	2.5	-28,619	2.4	-28,619	1.5

April	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	48.3	42.3	0	8.8	0	7.8	0	7.8	0	9.0	0	9.0
2	46.6	41.0	0	7.6	-8,389	6.4	-8,389	6.4	-8,389	7.6	-8,389	7.6
3	45.1	40.3	-1,524	6.7	-17,134	4.6	-17,134	4.6	-17,134	5.7	-17,134	5.7
4	43.9	39.3	-6,758	6.4	-24,104	4.8	-24,104	4.0	-24,104	5.1	-24,104	5.1
5	43.0	38.6	-10,200	6.3	-27,591	4.5	-27,591	3.5	-27,591	4.6	-27,591	4.6
6	42.5	38.3	-11,629	6.4	-23,911	4.2	-23,911	3.2	-23,911	4.2	-23,911	4.2
7	42.3	38.3	-9,632	7.5	-21,459	4.5	-21,459	3.4	-21,459	4.5	-21,459	4.5
8	43.0	39.0	0	22.1	0	24.2	-20,667	5.1	-20,667	6.3	0	29.1
9	45.1	40.1	0	41.4	0	23.6	-24,970	8.6	-24,970	9.9	0	24.2
10	48.3	41.8	0	35.9	0	18.9	0	12.2	0	13.8	0	20.1
11	52.1	44.2	0	41.6	0	22.5	0	18.6	0	20.4	0	23.2
12	55.8	46.4	0	48.5	0	29.2	0	24.6	0	26.7	0	29.2
13	59.0	48.7	0	53.7	0	35.1	0	29.9	0	32.3	0	35.1
14	61.2	49.8	0	58.7	0	39.6	0	35.8	0	36.1	0	39.6
15	61.9	49.5	0	67.2	0	47.3	0	44.1	0	42.8	0	47.3
16	61.7	49.3	0	77.1	0	51.7	0	46.7	0	46.4	0	51.7
17	61.2	48.4	0	82.9	0	53.4	0	47.6	0	50.4	0	53.4
18	60.2	47.3	0	67.9	0	40.3	0	45.8	0	49.0	0	40.3
19	59.0	46.4	0	59.2	0	35.7	0	40.5	0	42.9	0	35.7
20	57.5	46.1	0	42.7	0	27.2	0	30.6	0	32.0	0	27.2
21	55.8	46.4	0	28.4	0	19.6	0	21.7	0	22.3	0	19.6
22	54.0	45.8	0	19.9	0	15.0	0	16.3	0	16.4	0	15.0
23	52.1	44.6	0	15.7	0	12.3	0	13.6	0	13.6	0	12.3
24	50.2	43.5	0	12.9	0	9.9	0	11.2	0	11.2	0	9.9

BUILDING COOL HEAT DEMAND

By Trial

May	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	64.7	61.3	0	26.3	0	31.4	0	30.5	0	32.8	0	32.8
2	62.6	60.0	0	24.6	0	29.1	0	27.4	0	29.6	0	29.6
3	60.7	58.1	0	23.7	0	26.0	0	24.2	0	26.3	0	26.3
4	59.2	56.9	0	23.2	0	23.3	0	21.6	0	23.5	0	23.5
5	58.1	56.0	0	22.7	0	21.4	0	19.7	0	21.5	0	21.5
6	57.4	55.2	0	22.8	0	19.8	0	18.1	0	19.9	0	19.9
7	57.1	55.1	0	27.4	0	21.2	0	19.4	0	21.2	0	21.2
8	57.8	55.1	0	64.7	0	60.2	0	26.4	0	24.6	0	52.3
9	59.7	55.3	0	68.5	0	48.2	0	31.1	0	29.0	0	46.4
10	62.6	56.2	0	66.6	0	43.2	0	36.8	0	35.6	0	43.3
11	66.2	58.4	0	65.1	0	46.7	0	43.4	0	43.0	0	47.4
12	70.0	60.7	0	71.5	0	51.9	0	49.2	0	49.7	0	51.9
13	73.5	63.2	0	77.2	0	57.9	0	54.4	0	55.5	0	57.9
14	76.4	65.6	0	83.4	0	65.1	0	60.7	0	62.5	0	65.1
15	78.3	66.7	0	92.4	0	74.4	0	68.8	0	71.3	0	74.4
16	79.0	66.9	0	99.2	0	80.2	0	73.6	0	76.8	0	80.2
17	78.8	66.6	0	99.6	0	82.4	0	82.1	0	78.7	0	82.4
18	78.1	66.3	0	92.6	0	67.2	0	79.0	0	77.3	0	67.2
19	76.9	65.7	0	82.2	0	63.9	0	73.2	0	73.2	0	63.9
20	75.4	66.3	0	68.0	0	56.0	0	63.1	0	63.0	0	56.0
21	73.5	67.0	0	50.5	0	48.4	0	53.0	0	53.0	0	48.4
22	71.4	66.4	0	42.5	0	42.7	0	45.6	0	45.6	0	42.7
23	69.2	65.0	0	37.4	0	38.5	0	41.2	0	41.2	0	38.5
24	66.9	63.1	0	33.5	0	34.3	0	36.8	0	36.8	0	34.3

June	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	66.7	62.9	0	35.4	0	35.1	0	33.7	0	36.4	0	36.4
2	64.9	61.5	0	32.6	0	32.3	0	30.5	0	33.0	0	33.0
3	63.4	60.0	0	30.5	0	29.6	0	27.7	0	30.0	0	30.0
4	62.3	59.4	0	29.5	0	27.6	0	25.7	0	27.9	0	27.9
5	61.6	59.0	0	28.9	0	26.2	0	27.9	0	26.5	0	26.5
6	61.4	58.7	0	32.0	0	25.3	0	26.8	0	25.5	0	25.5
7	62.0	59.1	0	38.3	0	28.1	0	29.2	0	28.3	0	28.3
8	63.8	59.9	0	76.8	0	70.0	0	34.0	0	33.4	0	60.8
9	66.7	61.0	0	72.2	0	59.6	0	39.2	0	39.1	0	56.7
10	70.1	63.2	0	70.4	0	55.4	0	46.9	0	47.3	0	55.4
11	73.8	65.4	0	71.5	0	60.7	0	55.0	0	55.9	0	60.6
12	77.2	67.4	0	78.3	0	65.5	0	61.8	0	63.3	0	65.7
13	80.0	69.1	0	83.6	0	71.1	0	66.6	0	68.4	0	71.1
14	81.8	70.2	0	88.8	0	76.4	0	69.0	0	71.2	0	76.4
15	82.5	70.3	0	97.2	0	83.6	0	75.8	0	78.7	0	83.6
16	82.2	70.0	0	100.0	0	89.8	0	89.5	0	85.0	0	89.8
17	81.6	69.7	0	100.0	0	91.9	0	88.6	0	86.9	0	91.9
18	80.5	69.0	0	96.4	0	75.1	0	85.0	0	85.2	0	75.0
19	79.0	68.2	0	91.8	0	71.1	0	80.5	0	80.5	0	71.1
20	77.2	67.6	0	80.2	0	63.8	0	71.5	0	71.5	0	63.8
21	75.2	68.0	0	65.7	0	55.2	0	60.5	0	60.5	0	55.2
22	73.0	67.4	0	52.6	0	47.4	0	51.3	0	51.3	0	47.4
23	70.8	65.8	0	43.9	0	41.4	0	44.8	0	44.8	0	41.4
24	68.7	64.5	0	39.9	0	37.3	0	41.5	0	41.6	0	37.3

BUILDING COOL HEAT DEMAND

By Trial

July	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	71.5	68.0	0	39.1	0	44.8	0	42.6	0	46.2	0	46.2
2	69.4	66.2	0	36.5	0	41.2	0	39.7	0	42.3	0	42.3
3	67.6	64.8	0	34.9	0	37.9	0	39.5	0	39.7	0	39.7
4	66.0	63.4	0	37.3	0	34.9	0	36.9	0	36.7	0	36.7
5	64.9	62.4	0	36.7	0	32.6	0	34.2	0	33.4	0	33.4
6	64.2	61.8	0	36.2	0	30.9	0	32.0	0	31.5	0	31.5
7	63.9	61.6	0	40.4	0	32.1	0	32.9	0	32.7	0	32.7
8	64.4	61.2	0	78.3	0	72.3	0	35.7	0	35.7	0	62.7
9	65.8	61.4	0	77.7	0	60.9	0	39.5	0	39.8	0	57.6
10	67.9	62.0	0	73.1	0	53.9	0	45.2	0	45.8	0	53.9
11	70.6	63.4	0	75.9	0	57.8	0	51.7	0	52.7	0	57.4
12	73.6	65.5	0	82.0	0	61.7	0	58.1	0	59.5	0	61.9
13	76.6	67.4	0	87.2	0	67.2	0	63.0	0	64.7	0	67.2
14	79.3	69.4	0	92.3	0	73.3	0	68.5	0	70.6	0	73.4
15	81.5	70.5	0	98.9	0	82.2	0	74.0	0	76.7	0	82.2
16	82.9	71.8	0	100.0	0	91.3	0	91.7	0	84.4	0	91.4
17	83.3	71.8	0	99.5	0	94.3	0	89.8	0	88.2	0	94.3
18	83.1	71.8	0	95.5	0	79.9	0	87.4	0	87.8	0	79.9
19	82.4	72.1	0	91.5	0	75.7	0	85.3	0	85.2	0	75.7
20	81.2	72.2	0	83.9	0	69.4	0	78.2	0	78.3	0	69.4
21	79.7	73.2	0	68.6	0	60.5	0	67.3	0	67.2	0	60.5
22	77.8	72.9	0	55.2	0	54.9	0	59.2	0	59.2	0	54.9
23	75.8	71.7	0	48.5	0	50.6	0	54.0	0	54.0	0	50.6
24	73.6	69.9	0	46.2	0	46.5	0	50.1	0	50.1	0	46.5

August	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	71.0	65.5	0	39.7	0	41.1	0	41.0	0	43.5	0	43.5
2	68.7	63.8	0	34.3	0	38.0	0	36.2	0	40.2	0	40.2
3	66.6	62.0	0	34.5	0	34.4	0	32.5	0	35.3	0	35.3
4	64.9	60.7	0	34.3	0	31.3	0	29.5	0	32.0	0	32.0
5	63.7	59.3	0	32.7	0	28.8	0	27.1	0	29.4	0	29.4
6	62.9	59.0	0	32.6	0	27.3	0	29.4	0	27.7	0	27.7
7	62.6	58.9	0	34.7	0	27.1	0	28.8	0	27.4	0	27.4
8	63.4	58.9	0	73.3	0	66.4	0	31.3	0	30.4	0	57.6
9	65.5	59.3	0	71.6	0	55.8	0	36.0	0	35.4	0	53.1
10	68.7	60.2	0	69.3	0	50.6	0	42.5	0	42.5	0	50.5
11	72.6	61.8	0	73.1	0	55.2	0	50.1	0	50.7	0	55.2
12	76.8	64.1	0	79.7	0	61.0	0	57.7	0	58.8	0	61.2
13	80.7	67.0	0	86.2	0	68.4	0	64.2	0	65.8	0	68.4
14	83.9	68.8	0	91.7	0	75.3	0	69.9	0	71.9	0	75.3
15	86.0	69.8	0	98.6	0	84.2	0	76.0	0	78.8	0	84.2
16	86.7	69.8	0	100.0	0	89.5	0	87.3	0	84.6	0	89.5
17	86.5	69.5	0	100.0	0	92.1	0	89.3	0	87.1	0	92.1
18	85.7	69.4	0	94.9	0	76.3	0	86.0	0	86.0	0	76.3
19	84.4	69.2	0	91.5	0	72.0	0	81.4	0	81.4	0	72.0
20	82.8	70.8	0	74.6	0	62.8	0	69.8	0	69.8	0	62.8
21	80.7	72.9	0	58.8	0	56.7	0	62.2	0	62.2	0	56.7
22	78.4	71.8	0	48.6	0	52.4	0	56.0	0	56.0	0	52.4
23	76.0	69.4	0	45.6	0	47.9	0	51.4	0	51.4	0	47.9
24	73.4	67.3	0	41.7	0	44.8	0	46.8	0	46.8	0	44.8

BUILDING COOL HEAT DEMAND

By Trial

September	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	59.0	55.1	0	23.0	0	19.4	0	20.3	0	22.3	0	22.2
2	57.0	53.2	0	19.6	0	17.1	0	17.5	0	19.2	0	19.2
3	55.3	51.6	0	18.2	0	14.8	0	14.9	0	16.6	0	16.5
4	54.0	50.7	0	17.2	0	13.1	0	13.1	0	14.7	0	14.7
5	52.9	49.8	0	16.6	0	11.6	0	11.6	0	13.0	0	13.0
6	52.3	49.3	0	16.5	0	10.6	0	10.6	0	12.0	0	12.0
7	52.1	48.8	0	18.7	0	10.0	0	10.0	0	11.3	0	11.3
8	52.9	49.5	0	55.8	0	43.3	0	12.0	0	13.5	0	39.5
9	55.3	51.2	0	56.4	0	41.8	0	17.0	0	18.6	0	35.9
10	59.0	53.2	0	52.4	0	33.8	0	23.1	0	25.2	0	32.7
11	63.2	55.9	0	55.9	0	36.9	0	31.4	0	33.7	0	37.8
12	67.5	58.6	0	63.5	0	45.9	0	40.0	0	42.6	0	45.5
13	71.1	60.9	0	69.1	0	53.1	0	52.6	0	49.5	0	52.9
14	73.6	62.2	0	74.9	0	59.0	0	58.8	0	57.2	0	58.9
15	74.4	62.8	0	83.7	0	63.6	0	60.8	0	62.9	0	63.5
16	74.2	62.2	0	92.5	0	66.8	0	61.9	0	65.0	0	66.7
17	73.6	61.5	0	94.6	0	67.9	0	61.9	0	65.0	0	67.8
18	72.5	60.7	0	74.9	0	53.0	0	58.7	0	61.5	0	53.0
19	71.1	60.4	0	59.3	0	44.9	0	49.1	0	51.2	0	44.9
20	69.4	61.4	0	43.9	0	37.9	0	43.2	0	42.1	0	37.9
21	67.5	61.9	0	34.5	0	33.9	0	37.3	0	36.3	0	33.9
22	65.4	60.3	0	29.2	0	30.4	0	33.2	0	32.7	0	30.4
23	63.2	58.8	0	25.4	0	27.0	0	29.4	0	29.1	0	27.0
24	61.1	57.2	0	22.8	0	23.7	0	26.0	0	25.8	0	23.7

October	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	51.3	47.4	0	13.5	0	10.9	0	10.9	0	12.2	0	12.2
2	49.3	45.8	0	12.1	0	8.8	0	8.8	0	10.0	0	10.0
3	47.6	44.6	0	11.0	-2,846	7.1	-2,846	7.1	-2,846	8.3	-2,846	8.3
4	46.3	43.5	0	10.1	-12,397	6.1	-12,397	6.1	-12,397	7.3	-12,397	7.3
5	45.5	42.8	0	9.5	-18,950	4.8	-18,950	4.8	-18,950	5.9	-18,950	5.9
6	45.2	42.6	0	9.5	-23,131	4.6	-23,131	4.6	-23,131	5.7	-23,131	5.7
7	45.7	43.1	0	10.0	-23,250	4.7	-23,250	4.7	-23,250	5.8	-23,250	5.8
8	47.3	44.7	0	36.4	-20,066	26.2	-20,066	6.0	-20,066	7.1	0	35.9
9	49.6	46.2	0	41.1	0	30.3	-7,687	9.3	-7,687	10.7	0	26.8
10	52.6	47.8	0	38.6	0	21.5	0	15.0	0	16.6	0	23.1
11	56.0	49.7	0	44.2	0	24.1	0	20.4	0	22.1	0	25.2
12	59.3	51.0	0	51.4	0	30.8	0	26.4	0	28.3	0	30.6
13	62.3	53.0	0	56.5	0	35.0	0	30.1	0	32.2	0	34.7
14	64.6	54.4	0	62.3	0	38.6	0	32.8	0	35.4	0	38.5
15	66.2	55.4	0	70.7	0	45.8	0	38.1	0	41.6	0	45.7
16	66.7	55.3	0	78.7	0	50.5	0	50.7	0	45.6	0	50.5
17	66.4	55.0	0	80.4	0	52.5	0	50.2	0	47.1	0	52.5
18	65.6	55.2	0	54.8	0	37.3	0	42.4	0	41.7	0	37.3
19	64.3	55.6	0	40.3	0	30.3	0	33.7	0	33.4	0	30.3
20	62.6	56.0	0	29.4	0	25.1	0	27.1	0	27.0	0	25.1
21	60.6	55.3	0	23.7	0	22.0	0	23.6	0	23.6	0	22.0
22	58.3	53.6	0	20.0	0	19.0	0	20.6	0	20.6	0	19.0
23	56.0	52.0	0	17.2	0	16.1	0	17.7	0	17.7	0	16.1
24	53.6	49.7	0	15.1	0	13.3	0	14.7	0	14.7	0	13.3

BUILDING COOL HEAT DEMAND

By Trial

November	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	34.3	31.6	-29,098	3.4	-35,951	0.0	-35,946	0.0	-35,946	0.0	-35,946	0.0
2	33.9	31.7	-24,440	2.9	-36,161	0.0	-36,161	0.0	-36,161	0.0	-36,161	0.0
3	34.1	31.8	-20,692	2.5	-33,789	0.0	-38,107	0.0	-38,107	0.0	-38,107	0.0
4	34.8	32.5	-18,253	1.5	-30,495	0.0	-42,439	0.0	-42,439	0.0	-42,439	0.0
5	35.8	33.6	-17,049	1.4	-35,177	0.0	-36,074	0.0	-36,074	0.0	-36,074	0.0
6	37.3	35.0	-15,798	1.5	-24,529	0.2	-35,343	0.2	-35,343	0.2	-35,343	0.2
7	39.0	36.7	-14,448	1.8	-23,967	0.5	-24,595	0.5	-24,595	0.5	-24,595	0.5
8	40.9	38.8	-12,989	9.7	-26,799	6.0	-26,767	1.4	-26,767	2.3	-26,767	20.8
9	42.9	40.3	-4,866	19.5	-24,162	14.0	-18,143	2.7	-18,143	3.7	-8,503	15.1
10	45.0	41.8	-13,633	16.1	-17,121	9.2	-13,926	6.6	-13,926	7.8	-23,957	9.0
11	46.9	43.0	0	24.4	-17,315	13.3	-12,318	10.9	-12,318	12.2	-17,278	13.3
12	48.6	43.6	0	30.8	-1,093	14.9	-6,428	12.3	-6,428	13.8	-1,093	14.9
13	50.0	44.1	0	35.6	0	17.4	0	14.0	0	15.5	0	17.4
14	51.1	44.3	0	42.4	0	18.8	0	14.7	0	16.5	0	18.8
15	51.8	44.7	0	50.1	0	21.6	0	16.3	0	18.7	0	21.6
16	52.0	44.6	0	57.3	0	26.3	0	19.5	0	22.7	0	26.3
17	51.6	44.4	0	55.4	0	27.6	0	20.3	0	23.8	0	27.6
18	50.3	44.1	0	32.2	0	16.1	0	16.2	0	18.8	0	16.1
19	48.3	43.5	0	20.6	0	10.3	0	10.3	0	12.0	0	10.3
20	45.7	41.3	0	13.1	-1,317	6.1	-1,317	7.1	-1,317	7.3	-1,317	6.1
21	42.9	38.9	0	9.4	-17,707	3.8	-17,707	4.8	-17,707	4.8	-17,707	3.8
22	40.1	36.5	0	6.3	-30,678	2.4	-30,678	3.4	-30,678	3.4	-30,678	2.4
23	37.6	34.2	-13,004	4.4	-31,638	0.5	-31,638	0.5	-31,638	0.5	-31,638	0.5
24	35.6	32.5	-22,777	3.8	-30,984	0.0	-25,281	0.5	-25,281	0.5	-30,984	0.0

December	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	22.0	19.6	-68,089	0.0	-113,673	0.0	-128,711	0.0	-128,833	0.0	-128,833	0.0
2	20.5	18.3	-74,581	0.0	-129,667	0.0	-133,784	0.0	-133,717	0.0	-133,717	0.0
3	19.6	17.7	-88,235	0.0	-132,507	0.0	-146,409	0.0	-146,409	0.0	-154,623	0.0
4	19.3	17.5	-100,631	0.0	-153,738	0.0	-154,625	0.0	-162,247	0.0	-154,625	0.0
5	19.6	17.9	-97,077	0.0	-149,656	0.0	-164,287	0.0	-164,287	0.0	-174,682	0.0
6	20.5	18.8	-99,912	0.0	-162,653	0.0	-157,223	0.0	-167,190	0.0	-157,223	0.0
7	22.0	20.4	-99,977	0.0	-149,722	0.0	-154,307	0.0	-154,006	0.0	-164,284	0.0
8	23.9	22.6	-92,699	0.0	-147,108	0.0	-151,853	0.0	-163,512	0.0	-72,627	12.0
9	26.1	24.5	-51,016	7.7	-87,786	3.3	-134,931	0.0	-126,722	0.0	-102,112	4.6
10	28.4	26.5	-24,276	3.3	-73,837	0.0	-93,527	0.0	-98,928	0.0	-109,161	0.0
11	30.8	28.2	-11,415	11.5	-31,481	1.7	-44,274	0.2	-35,430	0.2	-41,841	1.7
12	33.0	29.5	-13,312	15.1	-29,854	4.7	-28,618	2.5	-28,618	2.5	-30,260	4.6
13	34.9	30.6	-319	18.7	-24,997	6.7	-24,603	4.5	-24,603	4.5	-24,909	6.7
14	36.4	31.5	0	21.6	-41,240	7.8	-41,568	5.2	-41,568	5.2	-42,323	7.8
15	37.3	32.0	0	25.3	-20,025	8.6	-31,399	5.3	-31,399	5.3	-21,450	8.6
16	37.6	32.2	0	30.9	-16,597	10.5	-33,194	6.3	-33,194	6.3	-16,597	10.5
17	37.3	31.8	0	34.9	-20,836	11.5	-39,305	7.0	-39,305	7.0	-20,836	11.5
18	36.4	31.5	0	15.1	-33,241	3.7	-33,241	3.7	-33,241	3.7	-33,241	3.7
19	34.9	31.0	0	4.1	-29,773	0.5	-29,773	0.5	-29,773	0.5	-29,773	0.5
20	33.0	29.7	-36,668	0.0	-44,834	0.0	-44,834	0.0	-44,834	0.0	-44,834	0.0
21	30.8	27.8	-57,191	0.0	-56,205	0.0	-56,205	0.0	-56,205	0.0	-56,205	0.0
22	28.4	25.9	-57,188	0.0	-72,053	0.0	-72,053	0.0	-72,053	0.0	-72,053	0.0
23	26.1	23.7	-62,091	0.0	-91,176	0.0	-91,176	0.0	-91,176	0.0	-91,176	0.0
24	23.9	21.6	-70,863	0.0	-114,348	0.0	-114,348	0.0	-114,348	0.0	-114,348	0.0

BUILDING COOL HEAT DEMAND

By Trial

January	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	20.5	18.6	-344,264	0.0	0	0.0	-7,024	0.0	-148,728	0.0	-173,775	0.0
2	20.1	18.5	-344,264	0.0	0	0.0	-28,742	0.0	-161,579	0.0	-182,285	0.0
3	20.3	18.6	-236,755	0.0	0	0.0	-43,406	0.0	-173,510	0.0	-187,632	0.0
4	20.9	19.2	-254,098	0.0	0	0.0	-52,373	0.0	-179,774	0.0	-193,649	0.0
5	21.9	20.3	-238,955	0.0	0	0.0	-78,676	0.0	-182,503	0.0	-196,113	0.0
6	23.2	21.7	-279,566	0.0	0	0.0	-89,098	0.0	-180,946	0.0	-193,233	0.0
7	24.7	23.2	-232,318	0.0	-3,267	0.0	-100,099	0.0	-178,497	0.0	-188,391	0.0
8	26.5	25.0	-163,390	1.4	-356,014	0.0	-106,266	0.0	-172,277	0.0	-343,637	6.9
9	28.3	26.9	-172,084	2.7	-185,138	2.9	-95,260	0.0	-154,081	0.0	-376,013	1.1
10	30.1	28.6	-99,991	5.8	-171,838	0.0	-74,941	0.0	-122,399	0.0	-445,137	0.0
11	31.9	30.2	-109,170	12.4	-56,191	0.0	-70,577	0.0	-103,710	0.0	-317,088	0.0
12	33.5	31.3	-34,595	17.3	-27,909	4.3	-61,581	0.0	-89,141	0.0	-167,835	0.0
13	34.8	32.1	-1,672	21.0	-20,349	5.7	-51,900	0.0	-75,316	0.0	-107,585	0.9
14	35.8	32.7	0	25.1	-37,330	5.8	-38,887	0.0	-55,799	0.0	-105,907	1.0
15	36.4	32.9	0	31.1	-39,072	6.8	-15,743	0.0	-29,484	0.0	-111,301	2.2
16	36.6	32.9	0	39.2	-32,242	9.6	-10,596	0.0	-22,378	0.0	-116,022	7.1
17	36.2	32.5	0	42.1	-33,668	11.6	-12,795	0.0	-22,465	0.0	-93,856	9.6
18	35.0	31.4	0	20.9	-11,162	4.2	-14,766	0.0	-25,405	0.0	-45,621	2.3
19	33.2	30.0	-344,264	0.0	0	0.0	-17,226	0.0	-29,805	6.9	0	0.0
20	30.9	27.9	-344,264	0.0	0	0.0	-19,748	0.0	-34,750	1.6	0	0.0
21	28.3	25.7	-326,335	0.0	0	0.0	-33,862	0.0	-51,477	0.0	0	0.0
22	25.8	23.2	-317,713	0.0	0	0.0	-71,695	0.0	-100,314	0.0	0	0.0
23	23.5	21.1	-305,452	0.0	0	0.0	-96,383	0.0	-128,298	0.0	0	0.0
24	21.6	19.3	-299,811	0.0	-2,254	0.0	-134,219	0.0	-158,058	0.0	-2,254	0.0

February	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	31.3	28.6	-344,264	0.0	0	0.0	0	0.0	-21,471	0.0	-41,845	0.0
2	29.6	27.0	-344,264	0.0	0	0.0	-1,534	0.0	-47,681	0.0	-70,090	0.0
3	28.1	26.0	-344,264	0.0	0	0.0	-5,298	0.0	-93,672	0.0	-118,644	0.0
4	27.0	24.9	-344,264	0.0	0	0.0	-11,975	0.0	-102,069	0.0	-131,720	0.0
5	26.3	24.1	-344,264	0.0	0	0.0	-26,566	0.0	-109,153	0.0	-138,742	0.0
6	26.1	23.9	-342,833	0.0	0	0.0	-35,716	0.0	-118,427	0.0	-144,016	0.0
7	26.4	24.5	-336,944	0.0	0	0.0	-42,258	0.0	-122,698	0.0	-148,941	0.0
8	27.4	25.6	-105,352	8.1	-147,698	0.0	-54,922	0.0	-127,718	0.0	-336,287	13.0
9	28.9	27.0	-125,000	14.1	-125,684	4.0	-54,342	0.0	-111,756	0.0	-373,872	1.4
10	30.8	28.8	-102,624	13.3	-88,690	0.0	-42,245	0.0	-103,857	0.0	-394,098	0.0
11	33.1	30.8	-61,481	18.4	-25,564	1.9	-35,408	0.0	-85,996	0.0	-259,146	0.0
12	35.4	32.6	-52,713	24.5	-13,278	5.9	-32,371	0.0	-70,546	0.0	-150,674	0.3
13	37.7	34.5	-34,459	29.5	-38,207	7.0	-27,232	0.0	-54,848	0.0	-97,940	1.9
14	39.6	36.2	-23,175	32.7	-29,029	7.4	-18,287	0.0	-35,181	0.0	-106,145	2.5
15	41.1	37.2	0	41.7	-16,032	10.1	-1,958	0.0	-13,459	7.5	-108,986	6.1
16	42.1	37.9	0	50.7	0	13.7	-1,739	0.0	-9,557	3.8	-94,033	11.1
17	42.4	38.1	0	56.9	0	18.2	-1,848	0.0	-8,080	4.8	-46,567	15.6
18	42.2	37.9	0	39.5	-16,954	12.2	-2,245	0.0	-9,030	5.1	-56,544	10.1
19	41.5	37.5	-332,014	0.0	0	0.0	-6,512	6.3	-12,161	3.8	0	0.0
20	40.4	36.8	-285,112	1.4	0	0.0	-9,450	2.9	-16,303	2.6	0	0.0
21	38.9	35.8	-266,283	0.0	0	0.0	-11,027	1.6	-20,584	1.5	0	0.0
22	37.2	34.2	-266,253	0.0	0	0.0	-12,475	1.5	-24,834	1.5	0	0.0
23	35.2	32.4	-267,350	0.0	0	0.0	-14,019	1.5	-30,019	1.5	0	0.0
24	33.3	30.5	-264,024	0.0	0	0.0	-15,615	1.5	-33,839	1.5	0	0.0

BUILDING COOL HEAT DEMAND

By Trial

March	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	38.7	34.6	-344,264	0.0	0	0.0	0	0.0	-3,873	1.6	-12,640	1.6
2	37.1	33.4	-344,264	0.0	0	0.0	0	0.0	-4,294	1.6	-15,365	1.6
3	35.7	32.4	-344,264	0.0	0	0.0	0	0.0	-4,707	1.5	-16,965	1.5
4	34.5	31.2	-344,264	0.0	0	0.0	0	0.0	-9,234	1.5	-18,418	1.5
5	33.7	30.7	-344,264	0.0	0	0.0	-1,304	0.0	-10,358	1.5	-19,711	1.5
6	33.1	30.2	-331,768	0.0	0	0.0	-9,265	0.0	-28,597	1.5	-50,170	1.5
7	32.9	30.2	-316,034	0.0	0	0.0	-16,376	0.0	-57,970	1.5	-91,898	1.5
8	33.3	30.5	-56,415	40.1	-98,030	16.8	-14,366	0.0	-57,962	1.5	-365,374	12.1
9	34.3	31.5	-65,747	22.5	-34,993	7.1	-11,432	0.0	-55,623	1.7	-335,112	3.3
10	36.0	32.6	-38,824	20.1	-41,785	2.6	-12,776	0.0	-46,746	1.9	-358,230	0.0
11	38.0	33.6	-34,459	27.4	-25,408	7.3	-9,209	0.0	-35,334	2.1	-178,631	0.1
12	40.3	35.3	-10,583	33.0	-15,333	9.5	-5,191	0.0	-21,637	2.3	-126,493	3.6
13	42.6	36.8	0	39.6	0	12.9	-1,184	0.0	-7,437	2.5	-98,615	5.0
14	44.6	38.4	0	44.0	0	16.7	0	0.0	0	2.9	-72,595	8.1
15	46.3	39.6	0	51.3	0	19.0	0	0.0	0	3.6	-56,174	12.5
16	47.3	40.3	0	60.8	0	24.5	0	0.0	0	4.6	-34,459	16.9
17	47.7	40.7	0	67.9	0	30.5	0	7.4	0	5.6	-23,083	22.0
18	47.5	40.6	0	51.5	0	22.9	0	5.7	0	6.0	0	16.4
19	46.9	40.3	-307,546	0.0	0	0.0	0	4.7	-1,577	5.0	0	0.0
20	46.1	40.2	-215,052	4.3	0	0.0	0	3.2	-2,370	3.5	0	0.0
21	44.9	39.7	-211,642	0.0	0	0.0	-2,344	1.9	-4,586	2.1	0	0.0
22	43.5	38.7	-226,579	0.0	0	0.0	-2,711	1.6	-5,255	1.7	0	0.0
23	41.9	37.4	-231,306	0.0	0	0.0	-3,071	1.7	-8,271	1.7	0	0.0
24	40.3	36.0	-234,475	0.0	0	0.0	-3,467	1.6	-10,228	1.7	0	0.0

April	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	48.3	42.3	-344,264	0.0	0	0.0	0	0.0	0	1.6	0	1.6
2	46.6	41.0	-344,264	0.0	0	0.0	0	0.0	0	1.6	0	1.6
3	45.1	40.3	-344,264	0.0	0	0.0	0	0.0	0	1.5	0	1.5
4	43.9	39.3	-339,138	0.0	0	1.4	0	0.0	0	1.5	0	1.5
5	43.0	38.6	-322,249	0.0	0	1.5	0	0.0	0	1.5	0	1.5
6	42.5	38.3	-297,939	0.0	0	1.5	0	0.0	0	1.5	0	1.4
7	42.3	38.3	-262,845	0.0	0	1.5	0	0.0	0	1.5	0	1.5
8	43.0	39.0	-34,459	78.3	-16,772	39.3	0	0.0	0	1.6	-274,992	19.2
9	45.1	40.1	-15,505	48.8	-1,463	26.5	0	0.0	0	1.8	-96,887	8.7
10	48.3	41.8	0	38.2	0	22.3	0	0.0	0	2.0	-62,946	4.7
11	52.1	44.2	0	44.1	0	23.1	0	0.0	0	2.4	-48,551	8.8
12	55.8	46.4	0	49.8	0	29.2	0	0.0	0	2.7	-1,509	17.6
13	59.0	48.7	0	54.2	0	34.0	0	0.9	0	6.1	0	22.9
14	61.2	49.8	0	59.1	0	39.8	0	7.8	0	6.8	0	29.3
15	61.9	49.5	0	67.4	0	47.7	0	7.3	0	6.2	0	39.3
16	61.7	49.3	0	77.3	0	51.9	0	6.5	0	6.5	0	49.4
17	61.2	48.4	0	83.0	0	53.6	0	7.5	0	14.1	0	51.6
18	60.2	47.3	0	68.1	0	40.5	0	7.2	0	10.1	0	39.7
19	59.0	46.4	-272,296	2.3	0	0.0	0	8.4	0	12.1	0	0.0
20	57.5	46.1	-183,821	14.2	0	0.0	0	6.4	0	8.6	0	0.0
21	55.8	46.4	-142,441	4.4	0	0.0	0	3.2	0	4.0	0	0.0
22	54.0	45.8	-156,752	0.0	0	0.0	0	1.7	0	1.7	0	0.0
23	52.1	44.6	-175,616	0.0	0	0.0	0	1.7	0	1.7	0	0.0
24	50.2	43.5	-174,480	0.0	0	0.0	0	1.7	0	1.6	0	0.0

BUILDING COOL HEAT DEMAND

By Trial

May	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	64.7	61.3	-344,264	0.0	0	2.1	0	0.0	0	2.5	0	2.5
2	62.6	60.0	-338,124	0.0	0	2.0	0	0.0	0	2.4	0	2.4
3	60.7	58.1	-297,958	0.0	0	2.0	0	0.0	0	2.2	0	2.3
4	59.2	56.9	-230,798	0.0	0	1.9	0	0.0	0	1.9	0	2.0
5	58.1	56.0	-195,791	0.0	0	1.9	0	0.0	0	1.9	0	1.9
6	57.4	55.2	-181,341	0.0	0	1.9	0	0.0	0	1.9	0	1.9
7	57.1	55.1	-141,791	1.3	0	2.0	0	0.0	0	2.0	0	2.0
8	57.8	55.1	0	99.6	0	85.8	0	6.4	0	2.1	0	71.6
9	59.7	55.3	0	86.6	0	64.0	0	3.1	0	2.6	0	51.4
10	62.6	56.2	0	80.1	0	53.1	0	3.2	0	3.2	0	50.2
11	66.2	58.4	0	71.0	0	53.5	0	5.6	0	8.3	0	50.1
12	70.0	60.7	0	76.0	0	56.9	0	9.4	0	10.5	0	52.5
13	73.5	63.2	0	80.1	0	61.4	0	7.5	0	11.5	0	58.3
14	76.4	65.6	0	85.4	0	67.6	0	7.7	0	10.8	0	65.3
15	78.3	66.7	0	94.1	0	76.4	0	8.9	0	13.0	0	74.5
16	79.0	66.9	0	100.0	0	81.7	0	12.3	0	19.5	0	80.2
17	78.8	66.6	0	100.0	0	83.1	0	28.1	0	29.6	0	82.4
18	78.1	66.3	0	93.2	0	68.0	0	30.4	0	34.0	0	67.2
19	76.9	65.7	-245,633	5.5	0	0.0	0	30.2	0	31.2	0	0.0
20	75.4	66.3	-135,013	21.4	0	2.1	0	21.6	0	21.9	0	2.1
21	73.5	67.0	-93,419	11.9	0	1.9	0	11.1	0	11.6	0	1.9
22	71.4	66.4	-75,441	6.3	0	0.0	0	4.5	0	5.1	0	0.0
23	69.2	65.0	-45,531	2.8	0	0.0	0	2.8	0	2.9	0	0.0
24	66.9	63.1	-50,855	2.2	0	0.0	0	2.7	0	2.7	0	0.0

June	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	66.7	62.9	-314,921	0.0	0	2.1	0	0.0	0	2.7	0	2.7
2	64.9	61.5	-232,961	0.0	0	2.1	0	0.0	0	2.5	0	2.5
3	63.4	60.0	-173,245	0.0	0	2.0	0	0.0	0	2.4	0	2.4
4	62.3	59.4	-156,204	0.0	0	2.0	0	0.0	0	2.3	0	2.3
5	61.6	59.0	-148,960	0.0	0	2.0	0	4.3	0	2.0	0	2.0
6	61.4	58.7	-142,836	4.5	0	2.0	0	2.6	0	2.0	0	2.0
7	62.0	59.1	-105,239	4.4	0	2.1	0	2.6	0	2.1	0	2.1
8	63.8	59.9	0	100.0	0	92.3	0	2.7	0	2.5	0	89.8
9	66.7	61.0	0	98.8	0	79.6	0	2.9	0	3.0	0	68.2
10	70.1	63.2	0	82.7	0	65.4	0	3.7	0	5.8	0	65.4
11	73.8	65.4	0	81.0	0	68.2	0	8.7	0	10.6	0	66.1
12	77.2	67.4	0	84.3	0	70.6	0	10.1	0	12.3	0	70.0
13	80.0	69.1	0	87.0	0	75.1	0	9.0	0	12.4	0	73.9
14	81.8	70.2	0	90.8	0	79.2	0	9.3	0	12.5	0	78.6
15	82.5	70.3	0	98.0	0	85.8	0	11.6	0	17.7	0	85.2
16	82.2	70.0	0	100.0	0	91.7	0	29.5	0	30.1	0	91.2
17	81.6	69.7	0	99.4	0	93.8	0	35.4	0	38.9	0	93.4
18	80.5	69.0	0	95.6	0	77.0	0	36.8	0	38.5	0	76.3
19	79.0	68.2	-230,288	10.3	0	0.0	0	33.3	0	35.2	0	0.0
20	77.2	67.6	-119,039	26.3	0	3.1	0	26.4	0	28.6	0	3.1
21	75.2	68.0	-67,177	21.4	0	3.1	0	17.0	0	18.6	0	3.1
22	73.0	67.4	-21,991	14.5	0	1.3	0	8.5	0	9.4	0	1.3
23	70.8	65.8	-9,676	7.6	0	0.0	0	3.3	0	3.0	0	0.0
24	68.7	64.5	-680	2.9	0	0.0	0	2.8	0	2.8	0	0.0

BUILDING COOL HEAT DEMAND

By Trial

July	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	71.5	68.0	-276,517	0.0	0	2.2	0	0.0	0	3.2	0	3.5
2	69.4	66.2	-183,806	0.0	0	2.2	0	0.0	0	3.0	0	3.1
3	67.6	64.8	-149,748	0.0	0	2.1	0	3.9	0	2.9	0	2.9
4	66.0	63.4	-132,580	3.5	0	2.1	0	3.2	0	2.5	0	2.7
5	64.9	62.4	-128,864	2.4	0	2.1	0	2.5	0	2.4	0	2.5
6	64.2	61.8	-116,284	2.7	0	2.1	0	2.5	0	2.4	0	2.4
7	63.9	61.6	-84,160	4.2	0	2.1	0	2.5	0	2.4	0	2.4
8	64.4	61.2	0	100.0	0	96.8	0	2.7	0	2.6	0	96.9
9	65.8	61.4	0	99.3	0	86.7	0	2.9	0	3.0	0	73.7
10	67.9	62.0	0	90.6	0	64.3	0	4.0	0	7.0	0	64.6
11	70.6	63.4	0	86.8	0	65.9	0	9.8	0	11.0	0	63.9
12	73.6	65.5	0	87.3	0	67.3	0	10.1	0	13.1	0	66.7
13	76.6	67.4	0	91.0	0	71.6	0	9.9	0	13.4	0	70.8
14	79.3	69.4	0	95.1	0	76.6	0	9.2	0	13.3	0	75.8
15	81.5	70.5	0	99.2	0	84.5	0	12.1	0	17.7	0	84.0
16	82.9	71.8	0	100.0	0	93.1	0	30.6	0	32.2	0	92.7
17	83.3	71.8	0	99.9	0	95.7	0	35.8	0	39.0	0	95.4
18	83.1	71.8	0	96.7	0	81.9	0	37.7	0	39.3	0	81.2
19	82.4	72.1	-230,602	11.7	0	0.0	0	35.4	0	36.9	0	0.0
20	81.2	72.2	-115,954	25.7	0	3.5	0	27.7	0	29.5	0	3.5
21	79.7	73.2	-46,262	20.4	0	3.3	0	18.0	0	20.0	0	3.3
22	77.8	72.9	-13,308	14.3	0	1.8	0	11.0	0	12.3	0	1.8
23	75.8	71.7	-5,669	8.6	0	0.0	0	7.0	0	7.4	0	0.0
24	73.6	69.9	-683	4.1	0	0.0	0	3.7	0	4.1	0	0.0

August	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	71.0	65.5	-264,453	0.0	0	2.3	0	0.0	0	3.1	0	3.1
2	68.7	63.8	-175,076	0.0	0	2.3	0	0.0	0	2.9	0	2.9
3	66.6	62.0	-151,540	2.2	0	2.2	0	0.0	0	2.7	0	2.7
4	64.9	60.7	-138,105	2.5	0	2.2	0	0.0	0	2.5	0	2.5
5	63.7	59.3	-135,155	2.6	0	2.2	0	0.0	0	2.4	0	2.4
6	62.9	59.0	-122,933	2.6	0	2.1	0	5.2	0	2.3	0	2.3
7	62.6	58.9	-101,691	2.7	0	2.1	0	2.8	0	2.3	0	2.3
8	63.4	58.9	0	100.0	0	94.3	0	2.7	0	2.4	0	94.1
9	65.5	59.3	0	98.6	0	78.0	0	2.8	0	2.8	0	66.5
10	68.7	60.2	0	86.1	0	62.0	0	3.2	0	6.0	0	60.3
11	72.6	61.8	0	83.6	0	62.7	0	9.0	0	11.1	0	60.9
12	76.8	64.1	0	85.4	0	66.5	0	11.5	0	14.6	0	65.3
13	80.7	67.0	0	89.1	0	72.6	0	11.2	0	15.6	0	71.0
14	83.9	68.8	0	94.0	0	77.9	0	11.9	0	15.2	0	77.1
15	86.0	69.8	0	99.3	0	86.3	0	14.4	0	20.7	0	85.4
16	86.7	69.8	0	100.0	0	91.5	0	29.0	0	32.0	0	90.3
17	86.5	69.5	0	99.9	0	93.7	0	36.4	0	39.5	0	92.6
18	85.7	69.4	0	96.1	0	77.7	0	38.9	0	39.3	0	76.7
19	84.4	69.2	-232,511	10.0	0	0.0	0	34.4	0	34.7	0	0.0
20	82.8	70.8	-123,767	21.6	0	2.7	0	24.1	0	24.3	0	2.7
21	80.7	72.9	-67,748	13.7	0	2.0	0	15.0	0	15.1	0	2.0
22	78.4	71.8	-34,570	8.5	0	1.0	0	9.8	0	9.9	0	1.0
23	76.0	69.4	-12,863	5.6	0	0.0	0	7.5	0	7.6	0	0.0
24	73.4	67.3	-5,402	2.7	0	0.0	0	3.2	0	4.3	0	0.0

BUILDING COOL HEAT DEMAND

By Trial

September	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	59.0	55.1	-318,523	0.0	0	0.0	0	0.0	0	2.2	0	1.9
2	57.0	53.2	-275,815	0.0	0	0.0	0	0.0	0	1.9	0	1.9
3	55.3	51.6	-215,217	0.0	0	0.0	0	0.0	0	1.8	0	1.9
4	54.0	50.7	-201,008	0.0	0	0.0	0	0.0	0	1.8	0	1.8
5	52.9	49.8	-193,175	0.0	0	0.0	0	0.0	0	1.8	0	1.8
6	52.3	49.3	-189,393	0.0	0	0.0	0	0.0	0	1.8	0	1.8
7	52.1	48.8	-178,473	5.3	0	0.0	0	0.0	0	1.7	0	1.8
8	52.9	49.5	0	100.0	0	61.1	0	0.0	0	1.8	-21,650	24.1
9	55.3	51.2	0	82.9	0	55.9	0	0.0	0	2.0	0	21.0
10	59.0	53.2	0	65.5	0	41.3	0	0.0	0	2.3	0	22.0
11	63.2	55.9	0	62.6	0	41.6	0	0.0	0	2.6	0	31.5
12	67.5	58.6	0	68.5	0	49.8	0	3.2	0	8.7	0	42.3
13	71.1	60.9	0	73.0	0	54.9	0	9.9	0	9.0	0	50.9
14	73.6	62.2	0	77.5	0	60.2	0	11.1	0	14.1	0	57.9
15	74.4	62.8	0	85.8	0	63.9	0	9.7	0	14.7	0	64.5
16	74.2	62.2	0	94.2	0	67.0	0	9.8	0	13.0	0	66.8
17	73.6	61.5	0	95.6	0	68.0	0	9.4	0	13.3	0	67.8
18	72.5	60.7	0	75.9	0	53.1	0	13.2	0	20.6	0	53.0
19	71.1	60.4	-299,648	0.0	0	0.0	0	11.2	0	15.1	0	0.0
20	69.4	61.4	-163,190	6.4	0	0.0	0	9.8	0	8.2	0	0.0
21	67.5	61.9	-122,087	1.1	0	0.0	0	3.1	0	2.8	0	0.0
22	65.4	60.3	-113,586	0.0	0	0.0	0	2.8	0	2.3	0	0.0
23	63.2	58.8	-120,525	0.0	0	0.0	0	2.6	0	2.4	0	0.0
24	61.1	57.2	-119,078	0.0	0	0.0	0	2.4	0	2.3	0	0.0

October	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	51.3	47.4	-344,264	0.0	0	0.0	0	0.0	0	1.8	0	1.8
2	49.3	45.8	-344,264	0.0	0	0.0	0	0.0	0	1.7	0	1.7
3	47.6	44.6	-327,670	0.0	0	0.0	0	0.0	0	1.7	0	1.7
4	46.3	43.5	-301,025	0.0	0	0.0	0	0.0	0	1.6	0	1.6
5	45.5	42.8	-259,607	0.0	0	0.0	0	0.0	0	1.6	0	1.6
6	45.2	42.6	-237,287	0.0	0	0.0	0	0.0	0	1.6	0	1.6
7	45.7	43.1	-217,221	0.0	0	0.0	0	0.0	0	1.6	0	1.6
8	47.3	44.7	0	90.2	-9,524	33.8	0	0.0	0	1.6	-292,216	24.1
9	49.6	46.2	0	69.1	-256	36.4	0	0.0	0	1.8	-131,149	11.7
10	52.6	47.8	0	49.9	0	23.7	0	0.0	0	2.0	-57,758	9.4
11	56.0	49.7	0	50.6	0	24.3	0	0.0	0	2.3	-56,415	10.2
12	59.3	51.0	0	54.3	0	29.2	0	0.0	0	2.6	-7,237	18.0
13	62.3	53.0	0	58.5	0	33.1	0	1.9	0	7.7	0	24.4
14	64.6	54.4	0	63.5	0	39.9	0	2.4	0	7.8	0	29.4
15	66.2	55.4	0	71.4	0	46.3	0	1.4	0	8.2	0	37.0
16	66.7	55.3	0	79.0	0	50.7	0	10.9	0	7.9	0	47.0
17	66.4	55.0	0	80.6	0	52.6	0	7.9	0	7.8	0	51.4
18	65.6	55.2	0	55.0	0	37.5	0	6.0	0	5.9	0	36.4
19	64.3	55.6	-334,980	0.0	0	0.0	0	4.0	0	4.0	0	0.0
20	62.6	56.0	-254,109	1.2	0	0.0	0	2.4	0	2.3	0	0.0
21	60.6	55.3	-174,272	0.0	0	0.0	0	2.0	0	2.0	0	0.0
22	58.3	53.6	-175,130	0.0	0	0.0	0	1.9	0	1.9	0	0.0
23	56.0	52.0	-183,814	0.0	0	0.0	0	1.9	0	1.9	0	0.0
24	53.6	49.7	-183,121	0.0	0	0.0	0	1.8	0	1.8	0	0.0

BUILDING COOL HEAT DEMAND

By Trial

November	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	34.3	31.6	-344,264	0.0	0	0.0	0	0.0	-4,829	1.5	-17,181	1.5
2	33.9	31.7	-344,264	0.0	0	0.0	0	0.0	-6,477	1.5	-25,821	1.5
3	34.1	31.8	-344,264	0.0	0	0.0	0	0.0	-34,578	1.5	-69,657	1.5
4	34.8	32.5	-340,202	0.0	0	0.0	0	0.0	-44,017	1.5	-73,577	1.5
5	35.8	33.6	-327,134	0.0	0	0.0	-6,278	0.0	-57,417	1.6	-78,109	1.6
6	37.3	35.0	-310,884	0.0	0	0.0	-19,247	0.0	-67,290	1.6	-91,548	1.6
7	39.0	36.7	-294,131	0.0	0	0.0	-20,386	0.0	-69,477	1.6	-90,099	1.6
8	40.9	38.8	0	66.2	-84,603	6.0	-20,911	0.0	-64,440	1.7	-336,287	16.3
9	42.9	40.3	-6,741	31.6	-48,757	10.5	-12,932	0.0	-45,628	1.8	-331,126	6.4
10	45.0	41.8	-3,760	21.5	-7,729	6.1	-9,195	0.0	-33,627	2.0	-311,969	0.0
11	46.9	43.0	-624	28.3	-10,292	11.0	-5,190	0.0	-22,073	2.1	-157,031	4.0
12	48.6	43.6	0	34.8	-11,827	12.7	-3,661	0.0	-12,177	2.3	-97,919	6.6
13	50.0	44.1	0	39.3	0	16.2	-1	0.0	-3,969	2.3	-87,818	6.7
14	51.1	44.3	0	44.5	0	18.2	0	0.0	0	2.7	-64,415	11.0
15	51.8	44.7	0	51.5	0	20.7	0	0.0	0	3.5	-45,518	15.3
16	52.0	44.6	0	57.5	0	26.3	0	0.0	0	4.4	-34,459	19.8
17	51.6	44.4	0	55.6	0	28.4	0	0.0	0	4.7	-23,646	20.0
18	50.3	44.1	0	32.4	0	16.2	0	0.0	0	3.8	-4,931	10.5
19	48.3	43.5	-344,264	0.0	0	0.0	0	0.0	0	2.6	0	0.0
20	45.7	41.3	-333,088	0.0	0	0.0	-1,459	6.9	-3,096	1.8	0	0.0
21	42.9	38.9	-302,770	0.0	0	0.0	-2,290	2.4	-5,625	1.8	0	0.0
22	40.1	36.5	-270,302	0.0	0	0.0	-2,972	2.0	-9,861	1.7	0	0.0
23	37.6	34.2	-254,901	0.0	0	0.0	-3,661	1.7	-12,610	1.6	0	0.0
24	35.6	32.5	-244,758	0.0	0	0.0	-4,297	1.6	-15,050	1.6	0	0.0

December	Typical Weather (°F)		Design		Weekday		Saturday		Sunday		Monday	
Hour	OADB	OAWB	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)	Htg (Btuh)	Clg (Tons)
1	22.0	19.6	-344,264	0.0	0	0.0	-5,542	0.0	-132,483	0.0	-157,411	0.0
2	20.5	18.3	-344,264	0.0	0	0.0	-14,595	0.0	-151,626	0.0	-169,699	0.0
3	19.6	17.7	-344,264	0.0	0	0.0	-37,383	0.0	-164,892	0.0	-178,665	0.0
4	19.3	17.5	-344,264	0.0	0	0.0	-46,843	0.0	-171,366	0.0	-185,219	0.0
5	19.6	17.9	-344,264	0.0	0	0.0	-68,139	0.0	-179,149	0.0	-193,044	0.0
6	20.5	18.8	-342,833	0.0	0	0.0	-85,346	0.0	-183,338	0.0	-197,064	0.0
7	22.0	20.4	-336,944	0.0	-2,526	0.0	-98,362	0.0	-183,217	0.0	-194,731	0.0
8	23.9	22.6	-85,973	9.6	-369,244	0.0	-107,075	0.0	-179,900	0.0	-342,458	5.7
9	26.1	24.5	-130,546	10.7	-193,525	0.2	-100,680	0.0	-162,189	0.0	-377,520	0.5
10	28.4	26.5	-104,270	6.2	-186,069	0.0	-75,984	0.0	-128,330	0.0	-451,693	0.0
11	30.8	28.2	-102,448	12.7	-62,430	0.0	-71,247	0.0	-108,029	0.0	-327,903	0.0
12	33.0	29.5	-58,713	16.7	-35,220	4.4	-63,531	0.0	-91,979	0.0	-166,724	0.0
13	34.9	30.6	-36,420	20.9	-22,750	5.9	-52,129	0.0	-77,538	0.0	-109,080	1.2
14	36.4	31.5	-15,619	25.0	-36,185	6.2	-34,697	0.0	-55,824	0.0	-106,280	1.4
15	37.3	32.0	0	32.4	-32,684	7.6	-12,656	0.0	-26,260	0.0	-112,377	2.4
16	37.6	32.2	0	38.5	-28,678	10.5	-9,927	0.0	-21,329	0.0	-116,120	8.3
17	37.3	31.8	0	36.8	-32,826	11.6	-12,103	0.0	-21,497	0.0	-94,733	9.6
18	36.4	31.5	0	16.0	-9,793	3.8	-13,889	0.0	-24,187	0.0	-44,729	1.9
19	34.9	31.0	-344,264	0.0	0	0.0	-15,937	0.0	-28,051	0.0	0	0.0
20	33.0	29.7	-344,264	0.0	0	0.0	-18,592	0.0	-32,884	0.0	0	0.0
21	30.8	27.8	-335,112	0.0	0	0.0	-33,337	0.0	-49,927	0.0	0	0.0
22	28.4	25.9	-323,199	0.0	0	0.0	-63,560	0.0	-83,423	0.0	0	0.0
23	26.1	23.7	-313,460	0.0	0	0.0	-81,703	0.0	-111,151	0.0	0	0.0
24	23.9	21.6	-300,371	0.0	0	0.0	-109,229	0.0	-132,749	0.0	0	0.0

Report G

BUILDING TEMPERATURE PROFILES

By Trial

All hours - Alternative 1

System/Room Description	Unmet Clg Load Hours	Max Temp	Max Mo	Max Hr	Max Day	>100°	100-95	95-90	90-85	85-80	80-75	75-70	70-65	65-60	60-55	55-50	< 50°	Min Temp	Min Mo	Min Hr	Min Day	Unmet Htg Load Hours
System per Floor -- 1																						
Zone - A	0	79	7	19	Dsgn	0	0	0	0	0	65	8,312	383	0	0	0	0	69	1	2	Dsgn	0
Zone - B	0	95	1	19	Sun	0	0	3,215	1,098	885	1,203	2,359	0	0	0	0	0	71	1	9	Mon	0
Zone - C	0	76	7	20	Dsgn	0	0	0	0	0	344	8,416	0	0	0	0	0	70	1	1	Dsgn	0
Zone - D	0	75	10	14	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - E	0	77	7	20	Sat	0	0	0	0	0	420	8,340	0	0	0	0	0	71	1	1	Dsgn	0
Zone - F	0	75	10	11	Dsgn	0	0	0	0	0	0	7,991	769	0	0	0	0	69	1	1	Dsgn	0
Zone - G	0	78	7	20	Sat	0	0	0	0	0	654	8,106	0	0	0	0	0	71	1	1	Dsgn	0
Zone - H	0	79	7	19	Dsgn	0	0	0	0	0	76	8,684	0	0	0	0	0	70	1	1	Dsgn	0
Zone - I	0	79	7	19	Dsgn	0	0	0	0	0	76	8,684	0	0	0	0	0	70	1	1	Dsgn	0
Zone - J	0	79	7	24	Sat	0	0	0	0	0	8,760	0	0	0	0	0	0	73	1	1	Dsgn	0
Zone - K	0	79	7	24	Sat	0	0	0	0	0	8,760	0	0	0	0	0	0	73	1	1	Dsgn	0
Zone - L	0	79	7	24	Sat	0	0	0	0	0	8,760	0	0	0	0	0	0	73	1	1	Dsgn	0
Zone - M	0	79	7	24	Sat	0	0	0	0	0	8,760	0	0	0	0	0	0	73	1	1	Dsgn	0
Zone - N	0	79	7	19	Dsgn	0	0	0	0	0	49	6,995	1,716	0	0	0	0	69	1	1	Dsgn	0
Zone - O	0	76	5	9	Dsgn	0	0	0	0	0	0	6,337	2,423	0	0	0	0	69	1	1	Dsgn	0
Zone - P	0	78	7	19	Dsgn	0	0	0	0	0	448	8,312	0	0	0	0	0	70	1	1	Dsgn	0
System per Floor -- 2																						
Zone - A2	0	78	7	18	Dsgn	0	0	0	0	0	0	8,408	352	0	0	0	0	69	1	8	Dsgn	0
Zone - B2	0	95	1	19	Sun	0	0	3,215	1,098	831	1,257	2,359	0	0	0	0	0	71	1	10	Dsgn	0
Zone - C2	0	76	7	19	Dsgn	0	0	0	0	0	55	8,705	0	0	0	0	0	70	1	1	Dsgn	0
Zone - D2	0	76	7	16	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - E2	0	76	7	19	Dsgn	0	0	0	0	0	99	8,661	0	0	0	0	0	71	1	1	Dsgn	0
Zone - F2	0	76	6	17	Dsgn	0	0	0	0	0	0	8,038	722	0	0	0	0	69	1	1	Dsgn	0
Zone - G2	0	77	7	19	Dsgn	0	0	0	0	0	99	8,661	0	0	0	0	0	71	1	1	Dsgn	0
Zone - H2	0	78	7	18	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - I2	0	78	7	18	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - J2	0	78	7	24	Sat	0	0	0	0	0	1,745	7,015	0	0	0	0	0	73	1	1	Dsgn	0
Zone - K2	0	78	7	24	Sat	0	0	0	0	0	1,745	7,015	0	0	0	0	0	73	1	1	Dsgn	0
Zone - L2	0	78	7	24	Sat	0	0	0	0	0	1,745	7,015	0	0	0	0	0	73	1	1	Dsgn	0
Zone - M2	0	78	7	24	Sat	0	0	0	0	0	1,745	7,015	0	0	0	0	0	73	1	1	Dsgn	0
Zone - N2	0	78	7	18	Dsgn	0	0	0	0	0	0	7,088	1,672	0	0	0	0	69	1	1	Dsgn	0
System per Floor -- 3																						
Zone - A3	0	76	7	17	Dsgn	0	0	0	0	0	0	7,999	761	0	0	0	0	69	1	10	Dsgn	0
Zone - B3	0	95	4	17	Sun	0	0	1,685	505	1,020	1,502	3,474	500	74	0	0	0	64	1	12	Sun	0
Zone - C3	0	75	7	17	Dsgn	0	0	0	0	0	0	8,652	108	0	0	0	0	70	1	3	Dsgn	0
Zone - D3	0	75	7	17	Dsgn	0	0	0	0	0	0	8,715	45	0	0	0	0	70	1	9	Dsgn	0
Zone - E3	0	75	7	17	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	69	1	8	Dsgn	0
Zone - F3	0	75	7	17	Dsgn	0	0	0	0	0	0	7,983	777	0	0	0	0	69	1	9	Dsgn	0
Zone - G3	0	75	7	17	Dsgn	0	0	0	0	0	0	8,549	211	0	0	0	0	69	1	7	Dsgn	0
Zone - H3	0	76	7	17	Dsgn	0	0	0	0	0	0	8,318	442	0	0	0	0	69	1	3	Dsgn	0
Zone - I3	0	76	7	17	Dsgn	0	0	0	0	0	0	8,318	442	0	0	0	0	69	1	3	Dsgn	0
Zone - J3	0	76	7	18	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - K3	0	76	7	18	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - L3	0	76	7	18	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - M3	0	76	7	18	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0

BUILDING TEMPERATURE PROFILES

By Trial

All hours - Alternative 1

System/Room Description	Unmet Clg Load Hours	---- Maximum---- Temp	Mo	Hr	Day	--- Number of Hours at each Temp Range (°F) --- >100°	100-95	95-90	90-85	85-80	80-75	75-70	70-65	65-60	60-55	55-50	< 50°	---- Minimum---- Temp	Mo	Hr	Day	Unmet Htg Load Hours
Zone - N3	0	76	7	17	Dsgn	0	0	0	0	0	0	6,904	1,856	0	0	0	0	69	1	12	Dsgn	0

BUILDING TEMPERATURE PROFILES

By Trial

Occupied hours only - Alternative 1

System/Room Description	Unmet Clg Load Hours	Maximum Temp	Mo	Hr	Day	>100°	100-95	95-90	90-85	85-80	80-75	75-70	70-65	65-60	60-55	55-50	< 50°	Minimum Temp	Mo	Hr	Day	Unmet Htg Load Hours
System per Floor -- 1																						
Zone - A	0	79	7	19	Dsgn	0	0	0	0	0	65	8,312	383	0	0	0	0	69	1	2	Dsgn	0
Zone - B	0	95	1	19	Sun	0	0	3,215	1,098	885	1,203	2,359	0	0	0	0	0	71	1	9	Mon	0
Zone - C	0	76	7	20	Dsgn	0	0	0	0	0	344	8,416	0	0	0	0	0	70	1	1	Dsgn	0
Zone - D	0	75	10	14	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - E	0	77	7	20	Sat	0	0	0	0	0	420	8,340	0	0	0	0	0	71	1	1	Dsgn	0
Zone - F	0	75	10	11	Dsgn	0	0	0	0	0	0	7,991	769	0	0	0	0	69	1	1	Dsgn	0
Zone - G	0	78	7	20	Sat	0	0	0	0	0	654	8,106	0	0	0	0	0	71	1	1	Dsgn	0
Zone - H	0	79	7	19	Dsgn	0	0	0	0	0	76	8,684	0	0	0	0	0	70	1	1	Dsgn	0
Zone - I	0	79	7	19	Dsgn	0	0	0	0	0	76	8,684	0	0	0	0	0	70	1	1	Dsgn	0
Zone - J	0	79	7	24	Sat	0	0	0	0	0	8,760	0	0	0	0	0	0	73	1	1	Dsgn	0
Zone - K	0	79	7	24	Sat	0	0	0	0	0	8,760	0	0	0	0	0	0	73	1	1	Dsgn	0
Zone - L	0	79	7	24	Sat	0	0	0	0	0	8,760	0	0	0	0	0	0	73	1	1	Dsgn	0
Zone - M	0	79	7	24	Sat	0	0	0	0	0	8,760	0	0	0	0	0	0	73	1	1	Dsgn	0
Zone - N	0	79	7	19	Dsgn	0	0	0	0	0	49	6,995	1,716	0	0	0	0	69	1	1	Dsgn	0
Zone - O	0	76	5	9	Dsgn	0	0	0	0	0	0	6,337	2,423	0	0	0	0	69	1	1	Dsgn	0
Zone - P	0	78	7	19	Dsgn	0	0	0	0	0	448	8,312	0	0	0	0	0	70	1	1	Dsgn	0
System per Floor -- 2																						
Zone - A2	0	78	7	18	Dsgn	0	0	0	0	0	0	8,408	352	0	0	0	0	69	1	8	Dsgn	0
Zone - B2	0	95	1	19	Sun	0	0	3,215	1,098	831	1,257	2,359	0	0	0	0	0	71	1	10	Dsgn	0
Zone - C2	0	76	7	19	Dsgn	0	0	0	0	0	55	8,705	0	0	0	0	0	70	1	1	Dsgn	0
Zone - D2	0	76	7	16	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - E2	0	76	7	19	Dsgn	0	0	0	0	0	99	8,661	0	0	0	0	0	71	1	1	Dsgn	0
Zone - F2	0	76	6	17	Dsgn	0	0	0	0	0	0	8,038	722	0	0	0	0	69	1	1	Dsgn	0
Zone - G2	0	77	7	19	Dsgn	0	0	0	0	0	99	8,661	0	0	0	0	0	71	1	1	Dsgn	0
Zone - H2	0	78	7	18	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - I2	0	78	7	18	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - J2	0	78	7	24	Sat	0	0	0	0	0	1,745	7,015	0	0	0	0	0	73	1	1	Dsgn	0
Zone - K2	0	78	7	24	Sat	0	0	0	0	0	1,745	7,015	0	0	0	0	0	73	1	1	Dsgn	0
Zone - L2	0	78	7	24	Sat	0	0	0	0	0	1,745	7,015	0	0	0	0	0	73	1	1	Dsgn	0
Zone - M2	0	78	7	24	Sat	0	0	0	0	0	1,745	7,015	0	0	0	0	0	73	1	1	Dsgn	0
Zone - N2	0	78	7	18	Dsgn	0	0	0	0	0	0	7,088	1,672	0	0	0	0	69	1	1	Dsgn	0
System per Floor -- 3																						
Zone - A3	0	76	7	17	Dsgn	0	0	0	0	0	0	7,999	761	0	0	0	0	69	1	10	Dsgn	0
Zone - B3	0	95	4	17	Sun	0	0	1,685	505	1,020	1,502	3,474	500	74	0	0	0	64	1	12	Sun	0
Zone - C3	0	75	7	17	Dsgn	0	0	0	0	0	0	8,652	108	0	0	0	0	70	1	3	Dsgn	0
Zone - D3	0	75	7	17	Dsgn	0	0	0	0	0	0	8,715	45	0	0	0	0	70	1	9	Dsgn	0
Zone - E3	0	75	7	17	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	69	1	8	Dsgn	0
Zone - F3	0	75	7	17	Dsgn	0	0	0	0	0	0	7,983	777	0	0	0	0	69	1	9	Dsgn	0
Zone - G3	0	75	7	17	Dsgn	0	0	0	0	0	0	8,549	211	0	0	0	0	69	1	7	Dsgn	0
Zone - H3	0	76	7	17	Dsgn	0	0	0	0	0	0	8,318	442	0	0	0	0	69	1	3	Dsgn	0
Zone - I3	0	76	7	17	Dsgn	0	0	0	0	0	0	8,318	442	0	0	0	0	69	1	3	Dsgn	0
Zone - J3	0	76	7	18	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - K3	0	76	7	18	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - L3	0	76	7	18	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0
Zone - M3	0	76	7	18	Dsgn	0	0	0	0	0	0	8,760	0	0	0	0	0	70	1	1	Dsgn	0

BUILDING TEMPERATURE PROFILES

By Trial

Occupied hours only - Alternative 1

System/Room Description	Unmet Clg Load Hours	--- Maximum---- Temp	Mo	Hr	Day	--- Number of Hours at each Temp Range (°F) --- >100°	100-95	95-90	90-85	85-80	80-75	75-70	70-65	65-60	60-55	55-50	< 50°	--- Minimum--- Temp	Mo	Hr	Day	Unmet Htg Load Hours
Zone - N3	0	76	7	17	Dsgn	0	0	0	0	0	0	6,904	1,856	0	0	0	0	69	1	12	Dsgn	0

BUILDING TEMPERATURE PROFILES

By Trial

All hours - Alternative 2

System/Room Description	Unmet Clg Load Hours	Maximum Temp	Maximum Mo	Maximum Hr	Maximum Day	>100°	100-95	95-90	90-85	85-80	80-75	75-70	70-65	65-60	60-55	55-50	< 50°	Minimum Temp	Minimum Mo	Minimum Hr	Minimum Day	Unmet Htg Load Hours
System per Floor -- 1																						
Zone - A	0	85	4	20	Dsgn	0	0	0	0	1,741	1,279	3,339	871	494	366	670	0	55	1	3	Sat	70
Zone - B	0	95	1	19	Sun	0	0	3,215	1,098	885	1,203	2,359	0	0	0	0	0	71	1	9	Mon	0
Zone - C	0	84	5	24	Dsgn	0	0	0	0	1,397	2,813	2,989	661	458	351	91	0	55	1	21	Sun	120
Zone - D	0	85	5	18	Sat	0	0	0	0	1,662	1,536	4,016	780	337	279	150	0	55	1	6	Sat	28
Zone - E	0	85	6	7	Dsgn	0	0	0	0	1,686	2,456	3,038	568	398	307	307	0	55	1	6	Sun	64
Zone - F	0	85	9	13	Sat	0	0	0	10	1,403	1,426	3,738	850	625	286	422	0	55	1	2	Sat	78
Zone - G	0	85	6	21	Dsgn	0	0	0	0	1,216	2,344	3,012	672	425	234	857	0	55	1	11	Sat	72
Zone - H	0	85	4	19	Dsgn	0	0	0	0	1,849	1,276	3,459	778	357	449	592	0	55	1	4	Sat	70
Zone - I	0	85	4	19	Dsgn	0	0	0	0	1,849	1,276	3,459	778	357	449	592	0	55	1	4	Sat	70
Zone - J	0	84	1	24	Dsgn	0	0	0	0	1,923	6,837	0	0	0	0	0	0	71	1	1	Dsgn	0
Zone - K	0	84	1	24	Dsgn	0	0	0	0	1,923	6,837	0	0	0	0	0	0	71	1	1	Dsgn	0
Zone - L	0	84	1	24	Dsgn	0	0	0	0	1,923	6,837	0	0	0	0	0	0	71	1	1	Dsgn	0
Zone - M	0	84	1	24	Dsgn	0	0	0	0	1,923	6,837	0	0	0	0	0	0	71	1	1	Dsgn	0
Zone - N	0	85	9	19	Dsgn	0	0	0	0	1,716	1,221	2,941	1,130	588	446	718	0	55	1	2	Sat	175
Zone - O	0	85	5	7	Dsgn	0	0	0	0	999	1,412	2,817	1,303	596	481	1,152	0	55	1	7	Wkdy	222
Zone - P	0	85	6	20	Dsgn	0	0	0	0	982	1,892	3,153	824	551	289	1,069	0	55	1	4	Sat	156
System per Floor -- 2																						
Zone - A2	0	85	5	19	Dsgn	0	0	0	0	1,745	1,241	3,383	823	524	374	670	0	55	1	3	Sat	114
Zone - B2	5	95	1	19	Sun	0	0	3,215	1,098	853	1,235	2,359	0	0	0	0	0	71	2	15	Dsgn	0
Zone - C2	5	84	6	23	Dsgn	0	0	0	0	1,210	2,784	3,205	661	458	351	91	0	55	1	21	Sun	120
Zone - D2	0	85	5	18	Sat	0	0	0	0	1,548	1,535	3,981	886	381	279	150	0	55	1	6	Sat	66
Zone - E2	5	85	6	18	Sun	0	0	0	0	1,362	2,202	3,616	568	398	307	307	0	55	1	6	Sun	69
Zone - F2	0	85	8	11	Sat	0	0	0	4	1,359	1,442	3,688	894	590	361	422	0	55	1	2	Sat	116
Zone - G2	5	84	5	22	Dsgn	0	0	0	0	1,124	1,803	3,663	654	425	234	857	0	55	1	11	Sat	72
Zone - H2	0	85	4	20	Dsgn	0	0	0	0	1,825	1,249	3,439	807	395	453	592	0	55	1	4	Sat	80
Zone - I2	0	85	4	20	Dsgn	0	0	0	0	1,825	1,249	3,439	807	395	453	592	0	55	1	4	Sat	80
Zone - J2	5	81	7	24	Dsgn	0	0	0	0	398	8,362	0	0	0	0	0	0	70	1	1	Dsgn	0
Zone - K2	5	81	7	24	Dsgn	0	0	0	0	398	8,362	0	0	0	0	0	0	70	1	1	Dsgn	0
Zone - L2	5	81	7	24	Dsgn	0	0	0	0	398	8,362	0	0	0	0	0	0	70	1	1	Dsgn	0
Zone - M2	5	83	7	24	Dsgn	0	0	0	0	1,581	7,179	0	0	0	0	0	0	70	1	1	Dsgn	0
Zone - N2	0	85	2	20	Dsgn	0	0	0	0	1,789	1,250	2,888	1,142	593	393	705	0	55	1	2	Sat	165
System per Floor -- 3																						
Zone - A3	15	85	4	20	Dsgn	0	0	0	0	1,917	1,461	3,125	907	257	477	616	0	55	1	7	Sat	61
Zone - B3	79	95	4	17	Sun	0	0	1,685	542	983	1,502	3,474	500	74	0	0	0	64	1	12	Sun	7
Zone - C3	79	85	6	22	Dsgn	0	0	0	0	1,394	2,569	2,673	906	312	442	464	0	55	1	23	Sat	202
Zone - D3	61	85	5	21	Dsgn	0	0	0	0	1,634	1,681	3,743	510	364	588	240	0	55	1	11	Sat	68
Zone - E3	79	85	5	22	Dsgn	0	0	0	0	1,390	2,248	2,991	740	391	355	645	0	55	1	16	Sat	166
Zone - F3	0	85	5	21	Dsgn	0	0	0	0	1,609	1,596	3,529	808	441	415	362	0	55	1	6	Sat	46
Zone - G3	79	85	5	22	Dsgn	0	0	0	0	1,260	2,097	2,898	926	497	257	825	0	55	1	10	Sat	176
Zone - H3	52	85	4	20	Dsgn	0	0	0	0	1,893	1,479	3,436	631	250	452	619	0	55	1	8	Sat	64
Zone - I3	52	85	4	20	Dsgn	0	0	0	0	1,893	1,479	3,436	631	250	452	619	0	55	1	8	Sat	64
Zone - J3	79	85	5	23	Dsgn	0	0	0	0	1,248	2,895	2,652	706	366	435	458	0	54	12	10	Sun	195
Zone - K3	79	85	6	22	Dsgn	0	0	0	0	1,215	2,859	2,713	714	366	435	458	0	54	12	10	Sun	198
Zone - L3	79	85	6	22	Dsgn	0	0	0	0	1,215	2,859	2,713	714	366	435	458	0	54	12	10	Sun	198
Zone - M3	79	85	6	22	Dsgn	0	0	0	0	1,215	2,859	2,713	714	366	435	458	0	54	12	10	Sun	198

BUILDING TEMPERATURE PROFILES

By Trial

All hours - Alternative 2

System/Room Description	Unmet Clg Load Hours	Maximum Temp	Maximum Mo	Maximum Hr	Maximum Day	--- Number of Hours at each Temp Range (°F) --- >100°	100-95	95-90	90-85	85-80	80-75	75-70	70-65	65-60	60-55	55-50	< 50°	Minimum Temp	Minimum Mo	Minimum Hr	Minimum Day	Unmet Htg Load Hours
Zone - N3	0	85	3	20	Dsgn	0	0	0	0	1,830	1,396	2,905	1,149	390	427	663	0	55	1	4	Sat	43

BUILDING TEMPERATURE PROFILES

By Trial

Occupied hours only - Alternative 2

System/Room Description	Unmet Clg Load Hours	Maximum Temp	Maximum Mo	Maximum Hr	Maximum Day	>100°	100-95	95-90	90-85	85-80	80-75	75-70	70-65	65-60	60-55	55-50	< 50°	Minimum Temp	Minimum Mo	Minimum Hr	Minimum Day	Unmet Htg Load Hours
System per Floor -- 1																						
Zone - A	0	80	7	18	Dsgn	0	0	0	0	0	0	2,507	248	18	10	0	0	59	12	8	Mon	70
Zone - B	0	95	1	19	Sun	0	0	3,215	1,098	885	1,203	2,359	0	0	0	0	0	71	1	9	Mon	0
Zone - C	0	84	7	8	Dsgn	0	0	0	0	162	943	1,515	79	54	30	0	0	56	1	8	Mon	120
Zone - D	0	78	7	8	Dsgn	0	0	0	0	0	5	2,694	70	4	10	0	0	59	1	8	Mon	28
Zone - E	0	83	6	8	Dsgn	0	0	0	0	96	895	1,701	45	28	18	0	0	57	1	8	Mon	64
Zone - F	0	78	5	8	Dsgn	0	0	0	0	0	0	2,595	136	49	3	0	0	60	12	8	Mon	78
Zone - G	0	83	6	8	Dsgn	0	0	0	0	0	838	1,798	102	27	18	0	0	57	12	8	Mon	72
Zone - H	0	79	7	18	Dsgn	0	0	0	0	0	0	2,593	162	14	14	0	0	59	12	8	Mon	70
Zone - I	0	79	7	18	Dsgn	0	0	0	0	0	0	2,593	162	14	14	0	0	59	12	8	Mon	70
Zone - J	0	83	7	8	Dsgn	0	0	0	0	481	2,302	0	0	0	0	0	0	75	1	15	Mon	0
Zone - K	0	83	7	8	Dsgn	0	0	0	0	481	2,302	0	0	0	0	0	0	75	1	15	Mon	0
Zone - L	0	83	7	8	Dsgn	0	0	0	0	481	2,302	0	0	0	0	0	0	75	1	15	Mon	0
Zone - M	0	83	7	8	Dsgn	0	0	0	0	481	2,302	0	0	0	0	0	0	75	1	15	Mon	0
Zone - N	0	80	7	18	Dsgn	0	0	0	0	0	0	2,140	531	102	10	0	0	59	12	8	Mon	175
Zone - O	0	80	6	8	Dsgn	0	0	0	0	0	0	2,013	649	77	44	0	0	58	12	8	Wkdy	222
Zone - P	0	83	6	8	Dsgn	0	0	0	0	0	425	2,079	197	64	18	0	0	57	1	8	Mon	156
System per Floor -- 2																						
Zone - A2	0	78	8	18	Dsgn	0	0	0	0	0	0	2,507	210	48	18	0	0	58	12	8	Mon	114
Zone - B2	5	95	1	19	Sun	0	0	3,215	1,098	853	1,235	2,359	0	0	0	0	0	71	2	15	Dsgn	0
Zone - C2	5	83	7	8	Dsgn	0	0	0	0	131	774	1,715	79	54	30	0	0	56	1	8	Mon	120
Zone - D2	0	79	7	8	Dsgn	0	0	0	0	0	5	2,644	110	14	10	0	0	58	12	8	Mon	66
Zone - E2	5	84	6	8	Dsgn	0	0	0	0	61	470	2,161	45	28	18	0	0	57	1	8	Mon	69
Zone - F2	0	79	7	8	Dsgn	0	0	0	0	0	0	2,561	147	31	44	0	0	59	12	8	Mon	116
Zone - G2	5	83	6	8	Dsgn	0	0	0	0	0	261	2,375	102	27	18	0	0	57	1	8	Mon	72
Zone - H2	0	78	8	18	Dsgn	0	0	0	0	0	0	2,556	191	18	18	0	0	58	12	8	Mon	80
Zone - I2	0	78	8	18	Dsgn	0	0	0	0	0	0	2,556	191	18	18	0	0	58	12	8	Mon	80
Zone - J2	5	80	7	8	Wkdy	0	0	0	0	34	2,749	0	0	0	0	0	0	75	1	8	Dsgn	0
Zone - K2	5	80	7	8	Wkdy	0	0	0	0	34	2,749	0	0	0	0	0	0	75	1	8	Dsgn	0
Zone - L2	5	80	7	8	Wkdy	0	0	0	0	34	2,749	0	0	0	0	0	0	75	1	8	Dsgn	0
Zone - M2	5	82	7	8	Wkdy	0	0	0	0	139	2,644	0	0	0	0	0	0	75	1	8	Dsgn	0
Zone - N2	0	78	8	18	Dsgn	0	0	0	0	0	0	2,139	541	85	18	0	0	58	12	8	Mon	165
System per Floor -- 3																						
Zone - A3	15	79	7	8	Dsgn	0	0	0	0	0	70	2,278	389	28	18	0	0	57	1	8	Mon	61
Zone - B3	79	95	4	17	Sun	0	0	1,685	542	983	1,502	3,474	500	74	0	0	0	64	1	12	Sun	7
Zone - C3	79	83	7	8	Dsgn	0	0	0	0	135	830	1,537	138	68	75	0	0	55	1	8	Mon	202
Zone - D3	61	81	7	8	Dsgn	0	0	0	0	0	83	2,556	83	33	28	0	0	56	12	8	Mon	68
Zone - E3	79	83	7	8	Dsgn	0	0	0	0	61	639	1,829	134	59	61	0	0	55	12	8	Mon	166
Zone - F3	0	79	7	8	Dsgn	0	0	0	0	0	70	2,506	171	18	18	0	0	58	12	8	Mon	46
Zone - G3	79	83	7	8	Dsgn	0	0	0	0	34	459	1,863	302	72	53	0	0	55	1	8	Mon	176
Zone - H3	52	80	7	8	Dsgn	0	0	0	0	0	79	2,495	155	29	25	0	0	57	1	8	Mon	64
Zone - I3	52	80	7	8	Dsgn	0	0	0	0	0	79	2,495	155	29	25	0	0	57	1	8	Mon	64
Zone - J3	79	82	8	8	Dsgn	0	0	0	0	113	1,029	1,384	120	62	75	0	0	55	12	8	Mon	195
Zone - K3	79	82	7	8	Wkdy	0	0	0	0	113	979	1,426	128	62	75	0	0	55	12	8	Mon	198
Zone - L3	79	82	7	8	Wkdy	0	0	0	0	113	979	1,426	128	62	75	0	0	55	12	8	Mon	198
Zone - M3	79	82	7	8	Wkdy	0	0	0	0	113	979	1,426	128	62	75	0	0	55	12	8	Mon	198

BUILDING TEMPERATURE PROFILES

By Trial

Occupied hours only - Alternative 2

System/Room Description	Unmet Clg Load Hours	---- Maximum---- Temp	Mo	Hr	Day	— Number of Hours at each Temp Range (°F) — >100°	100-95	95-90	90-85	85-80	80-75	75-70	70-65	65-60	60-55	55-50	< 50°	---- Minimum---- Temp	Mo	Hr	Day	Unmet Htg Load Hours
Zone - N3	0	77	7	8	Dsgn	0	0	0	0	0	18	2,054	675	18	18	0	0	58	12	8	Mon	43

BUILDING TEMPERATURE PROFILES

By Trial

Unmet Cooling Hours - Alternative 2

System/Room Description	Hr In Day => 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daytype with most Unmet hours
System per Floor -- 2																									
Zone - B2																									
July	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - C2																									
July	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - E2																									
July	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - G2																									
July	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - J2																									
July	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - K2																									
July	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - L2																									
July	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - M2																									
July	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
System per Floor -- 3																									
Zone - A3																									
July	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - B3																									
May	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
June	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
July	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
August	0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - C3																									
May	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
June	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
July	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
August	0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - D3																									
June	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
July	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
August	0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	61	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - E3																									
May	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
June	0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
July	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
August	0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - G3																									

*Note: Applying an optimum start schedule of "Available (100%)" may help to reduce the occurrence of unmet loads if they happened during morning pickup or pulldown hours.

BUILDING TEMPERATURE PROFILES

By Trial

Unmet Cooling Hours - Alternative 2

System/Room Description	Hr in Day =>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daytype with most Unmet hours
May		0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
June		0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
July		0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
August		0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total		0	0	0	0	0	0	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - H3																										
June		0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
July		0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
August		0	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total		0	0	0	0	0	0	0	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - I3																										
June		0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
July		0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
August		0	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total		0	0	0	0	0	0	0	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - J3																										
May		0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
June		0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
July		0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
August		0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total		0	0	0	0	0	0	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - K3																										
May		0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
June		0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
July		0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
August		0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total		0	0	0	0	0	0	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - L3																										
May		0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
June		0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
July		0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
August		0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total		0	0	0	0	0	0	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - M3																										
May		0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
June		0	0	0	0	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
July		0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
August		0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total		0	0	0	0	0	0	0	79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy

*Note: Applying an optimum start schedule of "Available (100%)" may help to reduce the occurrence of unmet loads if they happened during morning pickup or pulldown hours.

BUILDING TEMPERATURE PROFILES

By Trial

Unmet Heating Hours - Alternative 2

System/Room Description	Hr In Day => 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daytype with most Unmet hours
System per Floor — 1																									
Zone - A																									
January	0	0	0	0	0	0	0	21	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
February	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	52	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - C																									
January	0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	Mon
February	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	Mon
Annual Total	0	0	0	0	0	0	0	18	18	18	18	18	10	10	10	0	0	0	0	0	0	0	0	0	Mon
Zone - D																									
January	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
February	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Annual Total	0	0	0	0	0	0	0	18	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - E																									
January	0	0	0	0	0	0	0	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
February	0	0	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Annual Total	0	0	0	0	0	0	0	18	18	18	10	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - F																									
January	0	0	0	0	0	0	0	21	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
February	0	0	0	0	0	0	0	19	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
March	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	68	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - G																									
January	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
February	0	0	0	0	0	0	0	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
April	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
October	0	0	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Annual Total	0	0	0	0	0	0	0	27	27	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon

*Note: Applying an optimum start schedule of "Available (100%)" may help to reduce the occurrence of unmet loads if they happened during morning pickup or pulldown hours.

BUILDING TEMPERATURE PROFILES

By Trial

Unmet Heating Hours - Alternative 2

System/Room Description Hr in Day =>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daytype with most Unmet hours
Zone - H																									
January	0	0	0	0	0	0	0	21	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
February	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	52	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - I																									
January	0	0	0	0	0	0	0	21	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
February	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	52	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - N																									
January	0	0	0	0	0	0	0	21	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
February	0	0	0	0	0	0	0	19	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
March	0	0	0	0	0	0	0	23	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
November	0	0	0	0	0	0	0	21	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
December	0	0	0	0	0	0	0	20	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	104	68	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - O																									
January	0	0	0	0	0	0	0	21	21	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
February	0	0	0	0	0	0	0	19	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
March	0	0	0	0	0	0	0	23	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
April	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
October	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	21	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
December	0	0	0	0	0	0	0	20	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	113	68	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - P																									
January	0	0	0	0	0	0	0	21	21	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
February	0	0	0	0	0	0	0	19	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
March	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
April	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
October	0	0	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	20	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	77	61	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
System per Floor – 2																									
Zone - A2																									
January	0	0	0	0	0	0	0	21	21	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
February	0	0	0	0	0	0	0	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon

*Note: Applying an optimum start schedule of "Available (100%)" may help to reduce the occurrence of unmet loads if they happened during morning pickup or pulldown hours.

BUILDING TEMPERATURE PROFILES

By Trial

Unmet Heating Hours - Alternative 2

System/Room Description	Hr in Day => 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daytype with most Unmet hours
December	0	0	0	0	0	0	0	20	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	52	52	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - C2																									
January	0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	Mon
February	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	Mon
Annual Total	0	0	0	0	0	0	0	18	18	18	18	18	10	10	10	0	0	0	0	0	0	0	0	0	Mon
Zone - D2																									
January	0	0	0	0	0	0	0	21	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
February	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	52	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - E2																									
January	0	0	0	0	0	0	0	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
February	0	0	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
October	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Annual Total	0	0	0	0	0	0	0	23	18	18	10	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - F2																									
January	0	0	0	0	0	0	0	21	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
February	0	0	0	0	0	0	0	19	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
March	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total	0	0	0	0	0	0	0	68	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Zone - G2																									
January	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
February	0	0	0	0	0	0	0	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
April	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
October	0	0	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Annual Total	0	0	0	0	0	0	0	27	27	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - H2																									
January	0	0	0	0	0	0	0	21	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
February	0	0	0	0	0	0	0	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	20	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy

*Note: Applying an optimum start schedule of "Available (100%)" may help to reduce the occurrence of unmet loads if they happened during morning pickup or pulldown hours.

BUILDING TEMPERATURE PROFILES

By Trial

Unmet Heating Hours - Alternative 2

System/Room Description	Hr In Day =>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daytype with most Unmet hours
Annual Total		0	0	0	0	0	0	0	52	18	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - I2																										
January		0	0	0	0	0	0	0	21	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
February		0	0	0	0	0	0	0	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March		0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November		0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December		0	0	0	0	0	0	0	20	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total		0	0	0	0	0	0	0	52	18	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - N2																										
January		0	0	0	0	0	0	0	21	21	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
February		0	0	0	0	0	0	0	19	19	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
March		0	0	0	0	0	0	0	23	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
November		0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December		0	0	0	0	0	0	0	20	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
Annual Total		0	0	0	0	0	0	0	87	68	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Wkdy
System per Floor -- 3																										
Zone - A3																										
January		0	0	0	0	0	0	0	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
February		0	0	0	0	0	0	0	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March		0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November		0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December		0	0	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Annual Total		0	0	0	0	0	0	0	18	18	18	7	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - B3																										
January		0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December		0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Annual Total		0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - C3																										
January		0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	4	4	4	0	0	0	0	0	0	Mon
February		0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	Mon
March		0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	Mon
April		0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
October		0	0	0	0	0	0	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November		0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	Mon
December		0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	Mon
Annual Total		0	0	0	0	0	0	0	27	27	23	18	18	18	18	18	18	10	7	0	0	0	0	0	0	Mon
Zone - D3																										
January		0	0	0	0	0	0	0	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
February		0	0	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March		0	0	0	0	0	0	0	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November		0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December		0	0	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Annual Total		0	0	0	0	0	0	0	18	18	18	14	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - E3																										
January		0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	Mon

*Note: Applying an optimum start schedule of "Available (100%)" may help to reduce the occurrence of unmet loads if they happened during morning pickup or pulldown hours.

BUILDING TEMPERATURE PROFILES

By Trial

Unmet Heating Hours - Alternative 2

System/Room Description	Hr in Day =>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daytype with most Unmet hours
February		0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	Mon
March		0	0	0	0	0	0	0	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0	Mon
April		0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
October		0	0	0	0	0	0	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November		0	0	0	0	0	0	0	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0	Mon
December		0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	Mon
Annual Total		0	0	0	0	0	0	0	27	27	23	18	18	18	18	10	7	0	0	0	0	0	0	0	0	Mon
Zone - F3																										
January		0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
February		0	0	0	0	0	0	0	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March		0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November		0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December		0	0	0	0	0	0	0	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Annual Total		0	0	0	0	0	0	0	18	18	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - G3																										
January		0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	Mon
February		0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	Mon
March		0	0	0	0	0	0	0	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0	Mon
April		0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
October		0	0	0	0	0	0	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November		0	0	0	0	0	0	0	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	Mon
December		0	0	0	0	0	0	0	20	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	Mon
Annual Total		0	0	0	0	0	0	0	44	27	27	18	18	18	14	10	0	0	0	0	0	0	0	0	0	Mon
Zone - H3																										
January		0	0	0	0	0	0	0	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
February		0	0	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March		0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November		0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December		0	0	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Annual Total		0	0	0	0	0	0	0	18	18	18	10	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - I3																										
January		0	0	0	0	0	0	0	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
February		0	0	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March		0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November		0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December		0	0	0	0	0	0	0	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Annual Total		0	0	0	0	0	0	0	18	18	18	10	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Zone - J3																										
January		0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	4	4	4	0	0	0	0	0	0	Mon
February		0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	Mon
March		0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	Mon
April		0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
October		0	0	0	0	0	0	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November		0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	Mon
December		0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	Mon
Annual Total		0	0	0	0	0	0	0	27	27	27	18	18	18	18	18	10	7	7	0	0	0	0	0	0	Mon

*Note: Applying an optimum start schedule of "Available (100%)" may help to reduce the occurrence of unmet loads if they happened during morning pickup or pulldown hours.

BUILDING TEMPERATURE PROFILES

By Trial

Unmet Heating Hours - Alternative 2

System/Room Description	Hr in Day => 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Daytype with most Unmet hours
Zone - K3																									
January	0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	4	4	4	0	0	0	0	0	0	Mon
February	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	Mon
April	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
October	0	0	0	0	0	0	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	Mon
Annual Total	0	0	0	0	0	0	0	27	27	27	18	18	18	18	18	10	10	7	0	0	0	0	0	0	Mon
Zone - L3																									
January	0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	4	4	4	0	0	0	0	0	0	Mon
February	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	Mon
April	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
October	0	0	0	0	0	0	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	Mon
Annual Total	0	0	0	0	0	0	0	27	27	27	18	18	18	18	18	10	10	7	0	0	0	0	0	0	Mon
Zone - M3																									
January	0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	4	4	4	0	0	0	0	0	0	Mon
February	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	Mon
April	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
October	0	0	0	0	0	0	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	Mon
Annual Total	0	0	0	0	0	0	0	27	27	27	18	18	18	18	18	10	10	7	0	0	0	0	0	0	Mon
Zone - N3																									
January	0	0	0	0	0	0	0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
February	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
March	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
November	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
December	0	0	0	0	0	0	0	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon
Annual Total	0	0	0	0	0	0	0	18	18	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Mon

*Note: Applying an optimum start schedule of "Available (100%)" may help to reduce the occurrence of unmet loads if they happened during morning pickup or pulldown hours.

Report H

MONTHLY ENERGY CONSUMPTION

By Trial

------ Monthly Energy Consumption ------

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 1 **This is for 7-24 operation**													
Electric													
On-Pk Cons. (kWh)	75,797	62,160	66,424	69,821	89,809	94,251	100,629	99,146	77,900	72,194	63,202	75,087	946,419
On-Pk Demand (kW)	123	135	152	179	218	221	224	226	206	177	135	124	226

Energy Consumption

Building	91,862	Btu/(ft2-year)
Source	275,612	Btu/(ft2-year)
Floor Area	35,163	ft2

Environmental Impact Analysis

CO_2	1,710,728 lbm/year
SO_2	11,872 gm/year
NOX	2,967 gm/year

Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Alternative: 2 **5 DAYS A WEEK 7AM-6PM Schedule**													
Electric													
On-Pk Cons. (kWh)	36,442	27,567	29,787	28,506	41,496	46,270	44,321	48,523	33,102	30,603	27,659	34,841	429,117
On-Pk Demand (kW)	203	197	196	179	218	222	225	227	208	185	187	205	227

Energy Consumption

Building	41,651	Btu/(ft2-year)
Source	124,966	Btu/(ft2-year)
Floor Area	35,163	ft2

Environmental Impact Analysis

CO_2	775,663 lbm/year
SO_2	5,383 gm/year
NOX	1,345 gm/year

Report I

EQUIPMENT ENERGY CONSUMPTION

By Trial

Alternative: 1 This is for 7-24 operation

Equipment - Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
	------- Monthly Consumption -------												
Lights													
Electric (kWh)	26,161.3	23,629.5	26,161.3	25,317.4	26,161.3	25,317.4	26,161.3	26,161.3	25,317.3	26,161.3	25,317.4	26,161.3	308,027.9
Peak (kW)	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2
Misc. Ld													
Electric (kWh)	25,357.8	22,903.7	25,357.8	24,539.7	25,357.7	24,539.8	25,357.7	25,357.8	24,539.7	25,357.7	24,539.7	25,357.7	298,566.8
Peak (kW)	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1
Cooling Coil Condensate													
Recoverable Water (1000gal)	0.1	0.1	0.2	0.1	6.0	8.1	10.5	7.8	2.8	0.7	0.0	0.1	36.4
Peak (1000gal/Hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cpl 1: Building Main AHU [Sum of dsn coil capacities=100 tons]													
Air cooled DX unit - 100 tons - split [Clg Nominal Capacity/F.L.Rate=100 tons / 98.30 kW] (Cooling Equipment)													
Electric (kWh)	713.3	1,255.5	2,929.1	7,767.5	21,823.2	26,664.9	29,827.1	28,837.2	14,537.6	8,649.5	2,656.2	706.3	146,367.3
Peak (kW)	18.0	28.0	36.6	55.9	88.5	92.7	93.5	96.4	77.6	56.7	30.7	16.1	96.4
Condenser fan for MZ rooftop [Design Heat Rejection/F.L.Rate=128.0 tons / 10.75 kW]													
Electric (kWh)	153.3	269.8	627.6	1,519.7	3,434.9	3,924.0	4,330.4	4,140.9	2,469.6	1,646.3	569.8	151.8	23,238.1
Peak (kW)	3.6	5.3	6.6	8.3	10.5	10.6	10.6	10.7	9.8	8.1	5.5	3.3	10.7
Cntl panel & interlocks - 0.125 KW [F.L.Rate=0.12 kW] (Misc Accessory Equipment)													
Electric (kWh)	38.0	49.1	71.6	90.0	93.0	90.0	93.0	93.0	90.0	93.0	68.6	37.8	907.1
Peak (kW)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Hpl 1: Building Main AHU - Reheat [Sum of dsn coil capacities=682.6 mbh]													
Electric Duct Heater [Nominal Capacity/F.L.Rate=682.6 mbh / 200 kW] (Heating Equipment)													
Electric (kWh)	18,934.8	9,057.1	4,335.7	1,211.3	0.0	0.0	0.0	0.0	0.0	905.0	3,741.9	18,161.5	56,347.2
Peak (kW)	50.2	31.4	17.8	8.1	0.0	0.0	0.0	0.0	0.0	6.8	12.4	51.2	51.2
Sys 1: System per Floor -- 1													
BI Centrifugal var spd mtr [DsnAirflow/F.L.Rate=20,730 cfm / 12.44 kW] (Main Clg Fan)													
Electric (kWh)	1,208.6	1,274.5	1,618.1	1,991.3	2,560.4	2,738.7	3,035.4	2,935.5	2,216.1	1,989.0	1,506.2	1,224.1	24,297.8
Peak (kW)	4.7	6.0	6.9	7.8	8.6	8.8	9.5	9.1	8.3	7.5	5.6	4.3	9.5
Series Fan Powered VAV [DsnAirflow/F.L.Rate=20,730 cfm / 0.00 kW] (Main Htg Fan)													
Electric (kWh)	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	2.2

EQUIPMENT ENERGY CONSUMPTION
By Trial

Alternative: 1 This is for 7-24 operation

Equipment - Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
					------ Monthly Consumption ------								
Sys 1: System per Floor -- 1													
FC Centrifugal var freq drv [DsnAirflow/F.L.Rate=20,730 cfm / 8.08 kW] (Main Return Fan)													
Electric (kWh)	785.6	828.2	1,051.7	1,294.2	1,664.2	1,780.2	1,973.0	1,908.1	1,440.5	1,292.9	979.0	795.6	15,793.1
Peak (kW)	3.0	3.9	4.5	5.0	5.6	5.7	6.2	5.9	5.4	4.9	3.6	2.8	6.2
Sys 2: System per Floor -- 2													
BI Centrifugal var spd mtr [DsnAirflow/F.L.Rate=18,762 cfm / 11.26 kW] (Main Clg Fan)													
Electric (kWh)	1,268.6	1,334.9	1,685.7	2,028.1	2,601.3	2,707.7	3,021.0	2,921.4	2,279.3	2,037.4	1,569.5	1,285.1	24,740.0
Peak (kW)	5.6	7.3	8.4	9.7	11.0	10.4	11.3	11.3	10.7	9.1	6.4	5.0	11.3
Series Fan Powered VAV High Efficiency [DsnAirflow/F.L.Rate=22,098 cfm / 0.00 kW] (Main Htg Fan)													
Electric (kWh)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.4
FC Centrifugal var freq drv [DsnAirflow/F.L.Rate=22,098 cfm / 8.62 kW] (Main Return Fan)													
Electric (kWh)	846.2	889.0	1,118.9	1,323.0	1,638.5	1,684.8	1,857.3	1,806.3	1,458.9	1,336.0	1,046.4	857.0	15,862.3
Peak (kW)	3.3	4.1	4.6	5.2	5.8	5.5	5.9	5.9	5.6	4.9	3.7	3.0	5.9
Sys 3: System per Floor -- 3													
BI Centrifugal var spd mtr [DsnAirflow/F.L.Rate=20,773 cfm / 12.46 kW] (Main Clg Fan)													
Electric (kWh)	199.5	404.6	879.6	1,661.9	2,738.6	2,956.9	3,059.6	3,068.5	2,160.1	1,644.9	723.5	211.1	19,708.7
Peak (kW)	4.0	6.7	9.4	11.3	12.5	12.5	12.5	12.5	12.3	10.4	6.6	4.0	12.5
Series Fan Powered VAV [DsnAirflow/F.L.Rate=23,753 cfm / 0.00 kW] (Main Htg Fan)													
Electric (kWh)	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	1.9
FC Centrifugal var freq drv [DsnAirflow/F.L.Rate=23,753 cfm / 9.26 kW] (Main Return Fan)													
Electric (kWh)	129.7	263.5	586.7	1,076.9	1,734.8	1,846.5	1,912.6	1,915.4	1,389.9	1,080.3	483.3	137.2	12,556.8
Peak (kW)	2.6	4.0	5.3	6.2	6.7	6.7	6.7	6.7	6.6	5.8	3.9	2.5	6.7

EQUIPMENT ENERGY CONSUMPTION
By Trial

Alternative: 2 5 DAYS A WEEK 7AM-6PM Schedule

Equipment - Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
	------ Monthly Consumption ------												
Lights													
Electric (kWh)	9,969.5	9,015.9	10,663.9	9,535.9	10,316.7	10,230.3	9,622.3	10,663.9	9,535.9	10,316.7	9,883.1	9,622.3	119,375.9
Peak (kW)	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2	35.2
Misc. Ld													
Electric (kWh)	9,165.9	8,290.1	9,860.3	8,758.3	9,513.1	9,452.7	8,818.7	9,860.3	8,758.3	9,513.1	9,105.5	8,818.7	109,915.1
Peak (kW)	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1
Cooling Coil Condensate													
Recoverable Water (1000gal)	0.1	0.1	0.3	0.3	2.4	3.7	3.5	3.0	1.6	0.6	0.2	0.0	15.8
Peak (1000gal/Hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cpl 1: Building Main AHU [Sum of dsn coil capacities=100 tons]													
Air cooled DX unit - 100 tons - split [Clg Nominal Capacity/F.L.Rate=100 tons / 98.30 kW] (Cooling Equipment)													
Electric (kWh)	457.1	748.0	1,776.1	4,297.2	12,348.7	16,069.9	15,473.4	16,831.4	8,005.5	4,702.4	1,659.2	415.2	82,784.1
Peak (kW)	20.2	29.3	36.7	56.1	89.5	92.7	93.5	96.4	78.7	56.9	35.6	18.1	96.4
Condenser fan for MZ rooftop [Design Heat Rejection/F.L.Rate=128.0 tons / 10.75 kW]													
Electric (kWh)	98.2	160.7	380.3	827.2	1,865.8	2,229.0	2,169.2	2,300.8	1,305.0	873.4	355.6	89.2	12,654.4
Peak (kW)	4.0	5.5	6.6	8.3	10.5	10.6	10.6	10.7	10.1	8.9	6.4	3.7	10.7
Cntl panel & interlocks - 0.125 KW [F.L.Rate=0.12 kW] (Misc Accessory Equipment)													
Electric (kWh)	22.5	30.6	50.6	61.5	78.5	79.8	84.3	81.9	53.3	55.6	49.4	20.0	667.9
Peak (kW)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Hpl 1: Building Main AHU - Reheat [Sum of dsn coil capacities=682.6 mbh]													
Electric Duct Heater [Nominal Capacity/F.L.Rate=682.6 mbh / 200 kW] (Heating Equipment)													
Electric (kWh)	15,111.7	7,397.6	3,945.6	653.8	0.0	0.0	0.0	0.0	19.0	846.8	3,970.1	14,342.1	46,286.7
Peak (kW)	130.4	115.5	107.1	100.9	100.9	92.3	81.0	77.5	93.3	100.9	100.9	132.3	132.3
Sys 1: System per Floor -- 1													
Bl Centrifugal var spd mtr [DsnAirflow/F.L.Rate=20,681 cfm / 12.41 kW] (Main Clg Fan)													
Electric (kWh)	447.0	497.0	719.6	917.9	1,425.0	1,568.0	1,584.2	1,674.6	1,080.4	906.3	637.2	421.5	11,878.6
Peak (kW)	4.8	6.0	6.9	8.1	12.3	12.5	12.5	12.5	12.0	11.4	5.6	4.4	12.5
Series Fan Powered VAV [DsnAirflow/F.L.Rate=20,681 cfm / 0.00 kW] (Main Htg Fan)													
Electric (kWh)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0

EQUIPMENT ENERGY CONSUMPTION

By Trial

Alternative: 2 5 DAYS A WEEK 7AM-6PM Schedule

Equipment - Utility	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
					---- Monthly Consumption ----								
Sys 1: System per Floor -- 1													
FC Centrifugal var freq drv [DsnAirflow/F.L.Rate=20,681 cfm / 8.07 kW] (Main Return Fan)													
Electric (kWh)	290.6	323.0	467.7	596.6	926.3	1,019.2	1,029.7	1,088.5	702.2	589.1	414.2	274.0	7,721.1
Peak (kW)	3.1	3.9	4.5	5.2	8.0	8.1	8.1	8.1	7.8	7.4	3.6	2.9	8.1
Sys 2: System per Floor -- 2													
BI Centrifugal var spd mtr [DsnAirflow/F.L.Rate=18,762 cfm / 11.26 kW] (Main Clg Fan)													
Electric (kWh)	456.0	515.6	744.6	958.3	1,494.6	1,654.6	1,675.3	1,799.7	1,151.0	958.4	659.5	429.9	12,497.4
Peak (kW)	5.6	7.3	8.4	9.7	11.3	11.3	11.3	11.3	11.3	11.3	6.4	5.0	11.3
Series Fan Powered VAV High Efficiency [DsnAirflow/F.L.Rate=22,093 cfm / 0.00 kW] (Main Htg Fan)													
Electric (kWh)	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.6
FC Centrifugal var freq drv [DsnAirflow/F.L.Rate=22,093 cfm / 8.62 kW] (Main Return Fan)													
Electric (kWh)	307.7	343.4	490.3	604.6	911.3	992.0	1,004.2	1,072.0	712.2	608.2	436.5	290.1	7,772.4
Peak (kW)	3.3	4.1	4.6	5.2	5.9	5.9	5.9	5.9	5.9	5.9	3.7	3.0	5.9
Sys 3: System per Floor -- 3													
BI Centrifugal var spd mtr [DsnAirflow/F.L.Rate=20,773 cfm / 12.46 kW] (Main Clg Fan)													
Electric (kWh)	70.3	148.4	413.3	790.9	1,635.1	1,871.2	1,794.8	1,983.0	1,098.7	748.9	293.5	71.7	10,919.8
Peak (kW)	5.4	7.6	9.4	11.3	12.5	12.5	12.5	12.5	12.5	11.0	8.4	4.6	12.5
Series Fan Powered VAV [DsnAirflow/F.L.Rate=23,753 cfm / 0.00 kW] (Main Htg Fan)													
Electric (kWh)	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.8
FC Centrifugal var freq drv [DsnAirflow/F.L.Rate=23,753 cfm / 9.26 kW] (Main Return Fan)													
Electric (kWh)	45.7	96.4	274.6	503.4	980.6	1,103.6	1,064.7	1,166.7	680.0	483.7	195.7	46.6	6,641.6
Peak (kW)	3.3	4.4	5.3	6.2	6.7	6.7	6.7	6.7	6.7	6.1	4.8	2.9	6.7

Report J

Report J

ELECTRICAL PEAK CHECKSUMS

By Trial

Alternative 1 **This is for 7-24 operation**

Yearly Time of Peak: 17(Hr) 8(Month)

Equipment Description		Electrical Demand (kw)	Percent of Total (%)
Cooling Equipment			
Air cooled DX unit - 100 tons - split		105.68	46.68
	Sub total	105.68	46.68
Fan Equipment			
Sys 3: System per Floor -- 3		19.23	8.49
Sys 2: System per Floor -- 2		17.16	7.58
Sys 1: System per Floor -- 1		15.07	6.66
	Sub total	51.46	22.73
Miscellaneous			
Misc Equipment		34.08	15.06
Base Utilities		0.00	0.00
Lights		35.16	15.53
	Sub total	69.24	30.59
	Total	226.38	100

Alternative 2 **5 DAYS A WEEK 7AM-6PI**

Yearly Time of Peak: 17(Hr) 8(Month)

Equipment Description		Electrical Demand (kw)	Percent of Total (%)
Cooling Equipment			
Air cooled DX unit - 100 tons - split		105.55	46.44
	Sub total	105.55	46.44
Fan Equipment			
Sys 3: System per Floor -- 3		19.23	8.46
Sys 2: System per Floor -- 2		17.16	7.55
Sys 1: System per Floor -- 1		16.08	7.07
	Sub total	52.47	23.08
Miscellaneous			
Misc Equipment		34.08	15.00
Base Utilities		0.00	0.00
Lights		35.16	15.47
	Sub total	69.24	30.47
	Total	227.26	100

Report K

ENERGY CONSUMPTION SUMMARY

By Trial

	Elect Cons. (kWh)	% of Total Building Energy	Total Building Energy (kBtu/yr)	Total Source Energy* (kBtu/yr)
Alternative 1				
Primary heating				
Primary heating	56,347	6.0 %	192,313	576,996
Other Htg Accessories		0.0 %	0	0
Heating Subtotal	**56,347**	**6.0 %**	**192,313**	**576,996**
Primary cooling				
Cooling Compressor	146,367	15.5 %	499,551	1,498,804
Tower/Cond Fans	23,238	2.5 %	79,312	237,959
Condenser Pump		0.0 %	0	0
Other Clg Accessories	907	0.1 %	3,096	9,289
Cooling Subtotal....	**170,512**	**18.0 %**	**581,959**	**1,746,052**
Auxiliary				
Supply Fans	112,964	11.9 %	385,547	1,156,757
Pumps		0.0 %	0	0
Stand-alone Base Utilities		0.0 %	0	0
Aux Subtotal....	112,964	11.9 %	385,547	1,156,757
Lighting				
Lighting	308,028	32.6 %	1,051,299	3,154,213
Receptacle				
Receptacles	298,567	31.6 %	1,019,009	3,057,332
Cogeneration				
Cogeneration		0.0 %	0	0
Totals				
Totals**	**946,419** *	**100.0 %**	**3,230,127**	**9,691,350**

Original Design

* Note: Resource Utilization factors are included in the Total Source Energy value.
** Note: This report can display a maximum of 7 utilities. If additional utilities are used, they will be included in the total.

Report L

ENERGY CONSUMPTION SUMMARY

By Trial

	Elect Cons. (kWh)	% of Total Building Energy	Total Building Energy (kBtu/yr)	Total Source Energy* (kBtu/yr)
Alternative 2				
Primary heating				
Primary heating	46,287	10.8 %	157,976	473,976
Other Htg Accessories		0.0 %	0	0
Heating Subtotal	**46,287**	**10.8 %**	**157,976**	**473,976**
Primary cooling				
Cooling Compressor	82,784	19.3 %	282,542	847,711
Tower/Cond Fans	12,654	3.0 %	43,189	129,581
Condenser Pump		0.0 %	0	0
Other Clg Accessories	668	0.2 %	2,279	6,839
Cooling Subtotal....	**96,106**	**22.4 %**	**328,011**	**984,131**
Auxiliary				
Supply Fans	57,433	13.4 %	196,020	588,117
Pumps		0.0 %	0	0
Stand-alone Base Utilities		0.0 %	0	0
Aux Subtotal....	57,433	13.4 %	196,020	588,117
Lighting				
Lighting	119,376	27.8 %	407,430	1,222,412
Receptacle				
Receptacles	109,915	25.6 %	375,140	1,125,533
Cogeneration				
Cogeneration		0.0 %	0	0
Totals				
Totals**	**429,117**	**100.0 %**	**1,464,577**	**4,394,170**

Proposed changed

* Note: Resource Utilization factors are included in the Total Source Energy value.
** Note: This report can display a maximum of 7 utilities. If additional utilities are used, they will be included in the total.

Invoice

Controlled Air, Inc.
12009 Tramway
Cincinnati, Ohio 45241
(513) 769-6600 Fax (513) 769-6633
www.controlled-air.com

Invoice Number: R131342-IN
Invoice Date: 4/29/2016
Salesperson: GREG
Tax Schedule: EX
Job Number: G2045
Customer Number: 10 248
Customer P.O.: 879687

DEBRA - KUEMPEL SVC
3976 SOUTHERN AVE
Cincinnati, OH 45227

Terms: 2% 10th Net 30

Item Code	Description	UM	Quantity	Price	Amount
JOB	HOSPICE COOPER ROAD	LOT	0.000	0.000	0.00
DIS	DTFS 12" TAG: 1-01	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG 1-02	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 1-03	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 1-04	LOT	1.000	0.000	0.00
DIS	DFTS 10" TAG: 1-05	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 1-06	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 1-07	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 1-08	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 1-09	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 1-10	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 1-11	LOT	1.000	0.000	0.00
DIS	DTFS 12" TAG: 1-12	LOT	1.000	0.000	0.00
DIS	DTFS 12" TAG: 1-13	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 1-14	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 1-15	LOT	1.000	0.000	0.00
DIS	DTFS 06" TAG: 1-16	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 2-01	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 2-02	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 2-03	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 2-04	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 2-05	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 2-06	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 2-07	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 2-08	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 2-09	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 2-10	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 2-11	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 2-12	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 2-13	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 2-14	LOT	1.000	0.000	0.00

Continued

Invoice

Controlled Air, Inc.
12009 Tramway
Cincinnati, Ohio 45241
(513) 769-6600 Fax (513) 769-6633
www.controlled-air.com

Invoice Number: R131342-IN
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Customer Number: 10 248
Customer P.O.: 879687

DEBRA - KUEMPEL SVC
3976 SOUTHERN AVE
Cincinnati, OH 45227

Terms: 2% 10th Net 30

Item Code	Description	UM	Quantity	Price	Amount
DIS	DTFS 10" TAG: 3-01	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 3-02	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 3-03	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 3-04	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 3-05	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 3-06	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 3-07	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 3-09	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 3-10	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 3-11	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 3-12	LOT	1.000	0.000	0.00
DIS	DTFS 08" TAG: 3-13	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 3-14	LOT	1.000	0.000	0.00
DIS	DTFS 10" TAG: 3-15	LOT	1.000	0.000	0.00
DIS	TOTAL FOR ABOVE	LOT	1.000	55,800.000	55,800.00

THANK YOU FOR YOUR BUSINESS!

Net Invoice:	55,800.00
Freight:	0.00
Sales Tax:	0.00
Invoice Total:	**55,800.00**

Smart $aver® Incentive Program
phone: 866.380.9580
fax: 980.373.9755
customprocessing@duke-energy-energyefficiency.com

4/5/2018

Diane Mattson
BETHESDA HOSPITAL ATTN: R BRADY 40 A - 4460205501
4310 COOPER RD BLDG 4360
CINCINNATI OH 45242-5613

Subject: Your Application for a Duke Energy Mercantile Self-Direct Rebate CMO17-0000129053

Dear Diane Mattson,

Thank you for your Duke Energy Mercantile Self Direct rebate application. As noted in the Energy Conservation Measure (ECM) chart on page 2, a total rebate of $7,160.00 has been proposed for your project completed in the 2016 calendar years. **All Self Direct Rebates are contingent upon approval by the Public Utilities Commission of Ohio (PUCO).**

At your earliest convenience, please indicate if you accept this rebate by:
- providing your signature on Page 2
- completing the PUCO-required affidavit on Page 3

Please return the documents to my attention via fax at 513.629.5572 or email to customprocessing@duke-energy-energyefficiency.com. Upon receipt, Duke Energy will submit the necessary documentation to PUCO. Following PUCO's approval, Duke Energy will remit payment.

We value your business and look forward to working with you on this and future energy efficiency projects. We hope you will consider our Smart $aver® incentives, when applicable. Please contact me if you have any questions.

Sincerely,

Andrew Taylor
Program Manager
Custom Incentives

cc: Mike Heath
Dave Behne

Please indicate your response to this rebate offer within 30 days of receipt.

☐ Rebate is accepted. ☐ Rebate is declined.

By accepting this rebate, BETHESDA HOSPITAL ATTN: R BRADY 40 A - 4460205501 affirms its intention to commit and integrate the energy efficiency projects listed on the following pages into Duke Energy's peak demand reduction, demand response and/or energy efficiency programs.

Additionally, BETHESDA HOSPITAL ATTN: R BRADY 40 A - 4460205501 also agrees to serve as joint applicant in any future filings necessary to secure approval of this arrangement as required by PUCO and to comply with any information and reporting requirements imposed by rule or as part of that approval.

Finally, BETHESDA HOSPITAL ATTN: R BRADY 40 A - 4460205501 affirms that all application information submitted to Duke Energy pursuant to this rebate offer is true and accurate. Information in question would include, but not be limited to, project scope, equipment specifications, equipment operational details, project costs, project completion dates, and the quantity of energy conservation measures installed.

If rebate is accepted, will you use the monies to fund future energy efficiency and/or demand reduction projects? ☐ Yes ☐ No

Customer Signature	Printed Name	Date

Proposed Rebate Amounts

Measure ID	Energy Conservation Measure	Proposed Rebate Amount
ECM-1	Installation of New BAS for Lighting and HVAC System	$7,160.00 per project X 1
	Total	**$7,160.00**

Ohio | Public Utilities Commission

(Mercantile Customers Only)

Application to Commit
Energy Efficiency/Peak Demand Reduction Programs

Case No.: ____-____-EL-EEC

State of ________________ :

____________________, **Affiant, being duly sworn according to law, deposes and says** th**at:**

1. I am the duly authorized representative of:

____

[INSERT CUSTOMER OR EDU COMPANY NAME AND ANY APPLICABLE NAME(S) DOING BUSINESS AS]

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 offines 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.

____

SIGNATURE OF AFFIANT & TITLE

Sworn and subscribed before me this ______ day of ________________ , __________

DAY MONTH YEAR

____ ____

SIGNATURE OF OFFICIAL ADMINISTERING OATH PRINT NAME AND TITLE

My commission expires on ____________________

DATE

Titus

Titus Alpha
BAC-8005 and BAC-8205
VAV Controller

Installation Guide

Contents

Section 1

About the controllers

Section 2

Installing the controllers

Section 3

Setting up VAV controllers

SECTION 1

About the controllers

This section provides a description of the Titus Alpha Controller BAC-8005 and BAC-8205 VAV controllers. It also introdeces safety information. Review this material before installing or operating the controllers.

The BAC-8005 and BAC-8205 are native BACnet, direct digital controllers designed for VAV terminal units. An integrated actuator and the supplied programs make these ideal controllers for temperature setback, overrides, reheat and other HVAC sequences. Install these versatile controllers in stand-alone environments or networked to other BACnet devices. As part of a complete facilities management system, the BAC-8005 and BAC-8205 controllers provide precise monitoring and control of connected points.

- BACnet MS/TP compliant
- Standard VAV control sequences are incorporated to provide pressure independent control of VAV unit
- Five reheat applications included
- On-board airflow sensor for use with a single or multi-point differential pressure measuring station or pitot tube.
- Control local lighting

Specifications

Analog inputs	All inputs are configured as analog objects
Active inputs	1
Passive inputs	3
Air flow sensor	1
Key features	Standard units of measure. Overvoltage input protection
Connector	Spade connectors, 0.25 inch
Conversion	12–bit analog–to–digital conversion
Input range	0–12 volts DC

Outputs, analog	2
Key features	Output short protection Configured as BACnet analog objects. Standard units of measure
Connector	Spade connectors, 0.25 inch
Conversion	12–bit analog–to–digital conversion
Output voltage	0–10 volts DC
Output current	30 mA per output, 30 mA total for all analog outputs
Outputs, binary	4 triacs for external equipment 2 for the internal actuator
Key features	Optically isolated triac output
Conversion	12–bit analog–to–digital conversion
Connector	Spade connectors, 0.25 inch
Output range	Maximum switching 24 VAC at 3 amperes
Communications	
BACnet MS/TP	EIA–485 operating at rates up to 76.8 kilobaud. Removable screw terminal block. Wire size 12–24 AWG
Sensor jack	RJ-45 jack compatible with model STE-8000 and STE-6000 models with RJ-45 jacks
Supported objects	See PIC statement for supported BACnet objects
Control Basic	5 program areas in BAC-8005 6 program areas in BAC-8205
PID loop objects	2
Value objects	60 analog, 32 binary, and 12 multistate
Memory	Programs and program parameters are stored in nonvolatile memory. Auto restart on power failure
Applications programs	Titus Controls supplies the BAC-8x07 with programming sequences for dual-duct VAV applications: ◆ Cooling VAV with modulating, time proportional, two-stage, three-stage, and tri-stage reheat ◆ Monitor CO2 to control indoor air quality ◆ Control local lighting with motion sensing ◆ Fan control ◆ Balancing ◆ UL 864 smoke controll (BAC-8205 only)

Air flow sensor features	Configured as BACnet analog input object. CMOS differential pressure 0-2 inches of water (0-500 Pa) measurement range. Internally linearized and temperature compensated. Span accuracy 4.5% of reading. Barbed connections for 1/4 FR tubing. Range dependent upon DP pickup, tubing size/ length and connections.
Actuator specifications	
Torque	40 in-lb. (4.5 N•m)
Angular rotation	0 to 95° Adjustable end stops at 45° and 60° rotation
Motor timing, BAC-8005	90 sec./90° at 60 Hz 108 sec./90° at 50 Hz
Motor timing, BAC-8205	60sec./90° at 60 Hz 72 sec./90° at 50 Hz
Shaft size	Directly mounts on 3/8 to 5/8 inch (9.5 to 16 mm) round or 3/8 to 7/16 inch (9.5 to 11 mm) square damper shafts.
Regulatory	UL 916 Energy Management Equipment FCC Class B, Part 15, Subpart B BACnet Testing Laboratory listed as an application specific controller (ASC). UL 864 smoke controls (BAC-8205 only)
Installation	
Supply voltage	24 volts AC, -15%, +20% 5 VA
Weight	13.2 ounces (376 grams)
Case material	Flame retardant plastic
Environmental limits	
Operating	32 to 120° F (0 to 49° C)
Shipping	–40 to 140° F (–40 to 60° C)
Humidity	5–95% relative humidity (non-condensing)
Models	
BAC-8005	Cooling VAV controller with 90 second actuator and reheat
BAC-8205	Cooling VAV controller with 60 second actuator, reheat, and UL 864 smoke control application

Dimensions

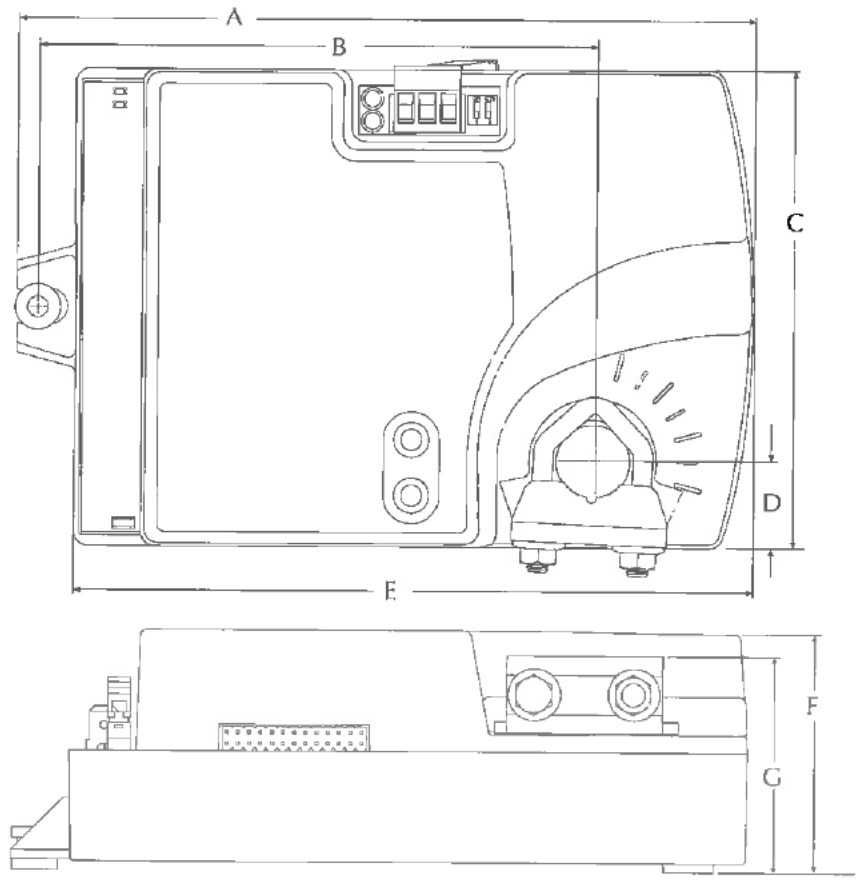


Table 1-1 BAC-8000 dimensions

A	B	C	D	E	F	G
6.53 in.	4.89 in.	4.25 in.	0.77 in.	6.00 in.	2.14 in.	1.92 in.
166 mm	124 mm	108 mm	19 mm	152 mm	54 mm	49 mm

Accessories

Power transformer

XEE-6111-40	Transformer, 120-to-24 VAC, 40 VA, single-hub
XEE-6112-40	Transformer, 120-to-24 VAC, 40 VA, dual-hub
XEE-6112-100	Transformer, 120-to-24 VAC, 96 VA, dual-hub (the XEE-6112-100 must be used in smoke control applications)

Surge suppressors

HPO-xxx	BAC-8000 input transient suppressor board
HPO-xxx	BAC-8000 output transient suppressor board
KMD-5567	EIA-485 surge suppressor

Connectors and bulbs	
xxx-xxx-xxx	Replacement three-pin removable terminal block
HPO-0054	Replacement bulb
HPO-0063	Replacement two-pin jumper

Safety considerations

Titus assumes the responsibility for providing you a safe product and safety guidelines during its use. Safety means protection to all individuals who install, operate, and service the equipment as well as protection of the equipment itself. To promote safety, we use hazard alert labeling in this manual. Follow the associated guidelines to avoid hazards.

Danger

Danger represents the most severe hazard alert. Bodily harm or death will occur if danger guidelines are not followed.

Warning

Warning represents hazards that could result in severe injury or death.

Caution

Caution indicates potential personal injury or equipment or property damage if instructions are not followed.

Note

Notes provide additional information that is important.

Detail

Provides programing tips and shortcuts that may save time.

SECTION 2

Installing the controllers

This section provides important instructions and guidelines for installing the BAC-8005 and BAC-8205 controllers. Carefully review this information before installing the controllers.

Installing a VAV controller includes the following topics that are covered in this section.

In addition to the topics, see the section *Application drawings* on page 23.

Setting the rotation limits

Before mounting the controller, set the rotation limits with the supplied stop screw. Installing the stop screw limits the shaft rotation to either 45 or 60 degrees.

Caution

Before setting the rotation limits on the controller, refer to the damper position specifications in the VAV control box to which the controller will be attached. Setting rotation limits that do not match the VAV damper may result in improper operation or equipment damage.

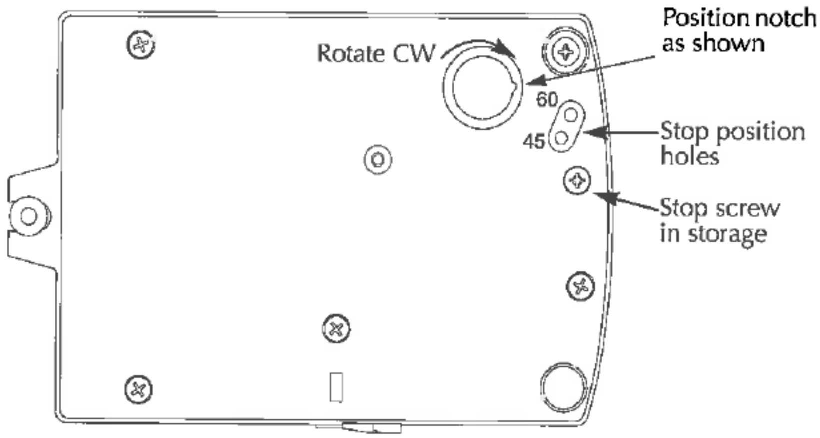


Illustration 2-1 Controller stop selections

To set the rotational limits:

1. Turn the controller over so you have access to the back.
2. Manually rotate the actuator fully clockwise as viewed from the back.
3. Remove the stop screw from its storage location and clean any debris from the threads.
4. Insert the screw into the correct stop position hole.
5. Tighten the screw only until the head touches the plastic in the bottom of the recess.

Mounting

Mount the controller inside of a metal enclosure. To maintain RF emissions specifications, use either shielded connecting cables or enclose all cables in conduit.

Mount the controller directly over the damper shaft. A minimum shaft length of 2.0 inch (51 mm) is required.

Note

The controller is designed to directly mount to 3/8 to 5/8 inch (9.5 to 16mm) round or 3/8 to 7/16 (9.5 to 11mm) square damper shafts.

Mount the controller close enough to the pitot tubes to keep the tubing length to a minimum. In typical installations the controller's inputs and sensors are within 24 inches of each other.

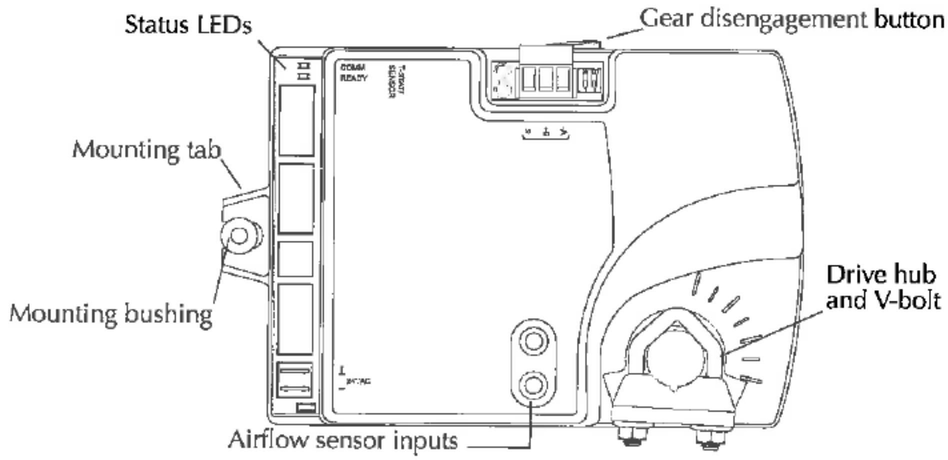


Illustration 2-2 Controls and indicators

Mount the controller as follows:

1. Loosen the nuts on the U-bolt until the shaft can fit through the collar.
2. Place the controller on the damper shaft in the approximate final position. Position the controller loosely against the mounting surface so that the mounting bushing can float freely in the mounting tab.
3. Center the mounting bushing in the slot of the mounting tab and secure it using a #8 self-tapping screw.
4. Manually position the damper in the full open position.
5. Adjust the drive hub as follows:
   a. If the damper rotates counter clockwise to close, depress the gear disengagement button and rotate the drive hub to the full clockwise position then release the button.
   b. If the damper rotates clockwise to close, depress the gear disengagement button and rotate the drive hub to the full counter clockwise position then release the button.
6. Lock the hub to the shaft by evenly tightening the V-bolt nuts to 30 to 35 in-lbs.

Connecting inputs

The BAC-8005 and BAC-8205 controllers have preconfigured analog inputs to support the supplied programs. The inputs cannot be changed to binary or accumulator inputs. Only one input has an externally available physical terminal. All of the inputs are preconfigured for the application programs supplied in the controllers and are listed in Table 2-1.

Table 2-1 BAC-8005 and BAC-8205 input objects

Object	Function	Name	Unit	Location	Pull up
AI1	Discharge Air Temperature	DISCHARGE AIR	°F	Terminal block	10kΩ
AI2	Space Sensor	SPACE SENSOR	°F	RJ-45	10kΩ
AI3	Space Setpoint	SPACE SETPOINT	°F	RJ-45	10kΩ
AI4	Primary Duct Pressure	PRIMARY DUCT	wc	Internal airflow sensor	N/A
AI5	Primary Damper Position	PRIMARY POSITION	Volts	Internal damper position	N/A

Discharge air temperature Connect a 10kΩ, Type 3 thermistor temperature probe to the discharge air temperature input. The input includes the internal pull-up resistor. An STE-1405 sensor is suitable for this application. Follow the instructions supplied with the sensor for installation. See *Setting temperature setpoints* on page 30 for setting up discharge air temperature limiting that requires this input sensor.

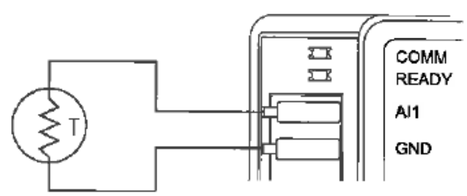


Illustration 2-3 Discharge air temperature

Space Temperature Input The space temperature input is connected only through the RJ-45 thermostat and sensor input jack. It is a configured as an analog input for STE-6010, STE-6014, and STE-6017 sensors. If an STE-8000 sensor is connected to the controller, this input is ignored. See *Connecting to sensors* on page 17.

Space Setpoint The space setpoint input is connected only through the RJ-45 thermostat and sensor input jack. It is a configured for the setpoint dials on STE-6014 or STE-6017 sensors. If an STE-6010 or STE-8000 sensor is connected to the controller, this input is ignored. See *Connecting to sensors* on page 17.

Primary Duct Pressure The primary duct pressure input is an internal measurement from the airflow sensor.

Primary Damper Position (BAC-8205 only) The primary damper position input is preconfigured as an analog input that represents the position of the internal damper.

Connecting outputs

The BAC-8005 and BAC-8205 controllers have eight preconfigured outputs to support the supplied programs. Only six have externally available physical terminals. All of the outputs are preconfigured for the application programs supplied in the in the dual-duct controllers and are listed in Table 2-2.

Table 2-2 BAC-8005 and BAC-8205output objects

Object	Function	Name	False value	True value	Default value	Type
BO1	Damper Clockwise	DAMPER CW	Neutral	Clockwise	Neutral	Internal
BO2	Damper Counter Clockwise	DAMPER CCW	Neutral	Counterclockwise	Neutral	Internal
AO3	Analog Heat	ANALOG HEAT			0	0-10 VDC
AO4	Fan Speed	FAN SPEED			0	0-10 VDC
BO5	Fan	FAN	On	Off	Off	Triac
BO6	Heating Stage 1	HT STAGE 1				Triac
BO7	Heating Stage 2	HT STAGE 2				Triac
BO8	Heating Stage3/Lite	HT STAGE 3/LITE				Triac

Damper Clockwise and Clockwise The damper outputs are binary output objects that control the motion of the internal damper.

Analog Heat The analog heat output controls modulating analog reheat. This output is active only if the controller is set up for reheat. For staged reheat applications, see the topic *Application drawings* on page 23.

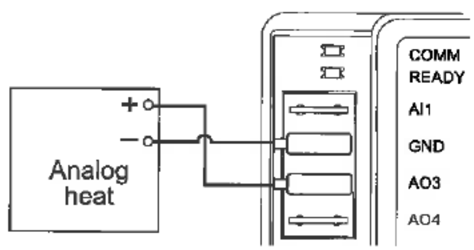


Illustration 2-4 Modulating heat output

Fan Speed Controls the speed of a variable speed fan if the controller is set up for fan operation.

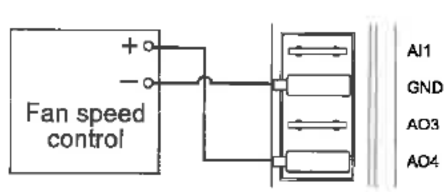


Illustration 2-5 Fan speed output

Fan The fan start output is preconfigured to either start or stop a single speed fan or enable a multispeed fan. The output is a triac that can switch up to 1 ampere at 24 volts AC.

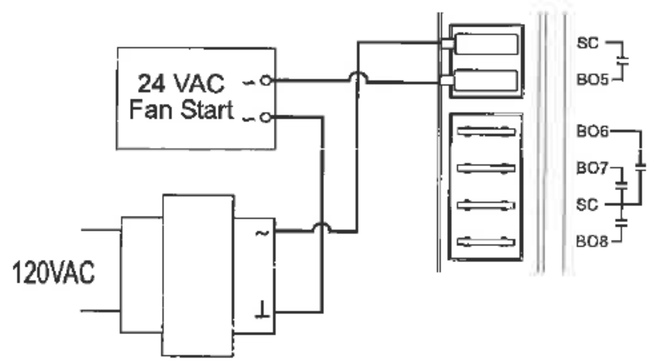


Illustration 2-6 Fan start output

Heating stages 1, 2, and 3 The three heating outputs are for various types of reheat. The connection diagrams for each type of reheat are covered in the following topics.

- *Modulating reheat* on page 23
- *Two-stage reheat* on page 24
- *Time proportional reheat* on page 24
- *Floating reheat* on page 26
- *Three stage reheat* on page 27

When local lighting controls is used, three stage reheat is not available.

Local lighting The lighting output is preconfigured to work with the motion sensor in an STE-8201 sensor to automatically control lights located in the same space as the VAV. The output is a triac that can switch up to 1 ampere at 24 volts AC.

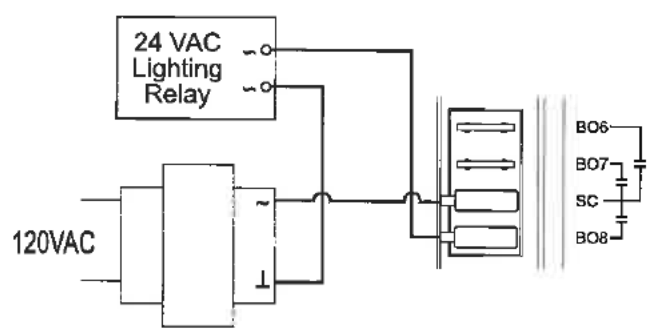


Illustration 2-7 Lighting output

Connecting to sensors

Connect any of the following sensors to the RJ-45 thermostat and sensor jack.

- STE-8001
- STE-8201
- STE-6010
- STE-6014
- STE-6017

Link the controller to sensors with standard straight-through Ethernet cables up to 75 feet long. See the installation guide supplied with the sensors for complete sensor installation instructions.

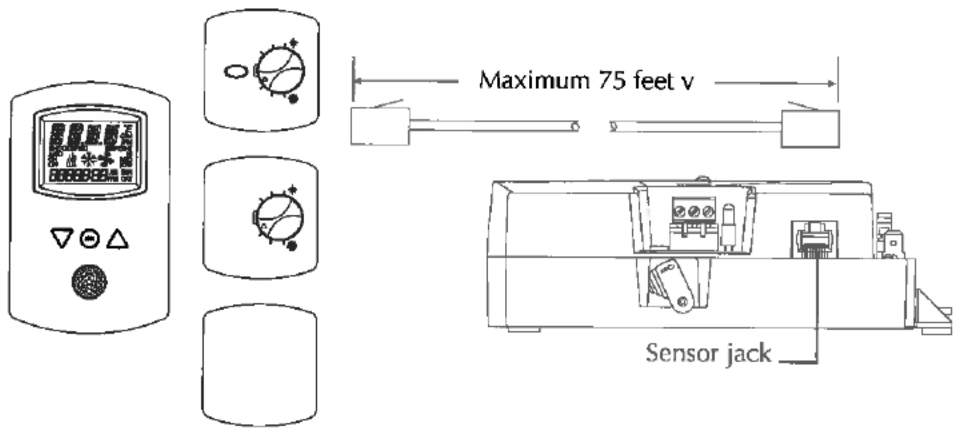


Illustration 2-8 Connecting to a sensor

No programming or configuration is required for the supported sensors. The controller is configured to automatically detect which type of sensor is connected to it.

Connecting to an MS/TP network

The BAC-8000 series controllers are BACnet MS/TP compliant controllers. Connect them only to a BACnet MS/TP network.

See Application Note AN0404A, *Planning BACnet Networks* for additional information about installing controllers.

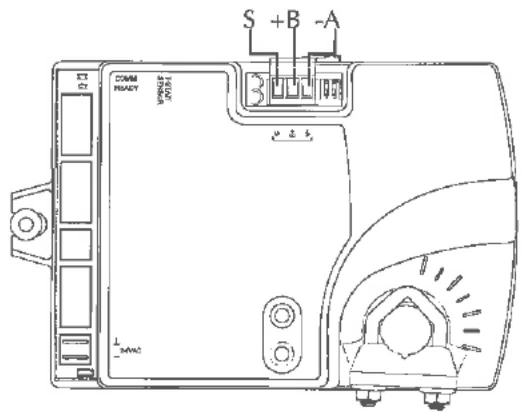


Illustration 2-9 MS/TP network connection

Connections and wiring

Use the following principles when connecting a controller to an MS/TP network:

- Connect no more than 128 addressable BACnet devices to one MS/TP network. The devices can be any mix of controllers or routers.
- To prevent network traffic bottlenecks, limit the MS/TP network size to 60 controllers.
- Use 18 gauge, twisted pair, shielded cable with capacitance of no more than 51 picofarads per foot for all network wiring. Belden cable model #82760 meets the cable requirements.
- Connect the *-A* terminal in parallel with all other - terminals.
- Connect the *+B* terminal in parallel with all other + terminals.
- Connect the shields of the cable together at each controller. For KMC BACnet controllers use the *S* terminal.
- Connect the shield to an earth ground at one end only.
- Use a KMD–5575 repeater between every 32 MS/TP devices or if the cable length will exceed 4000 feet (1220 meters). Use no more than four repeaters per MS/TP network.
- Place a KMD–5567 surge surpressor in the cable where it exits a building.

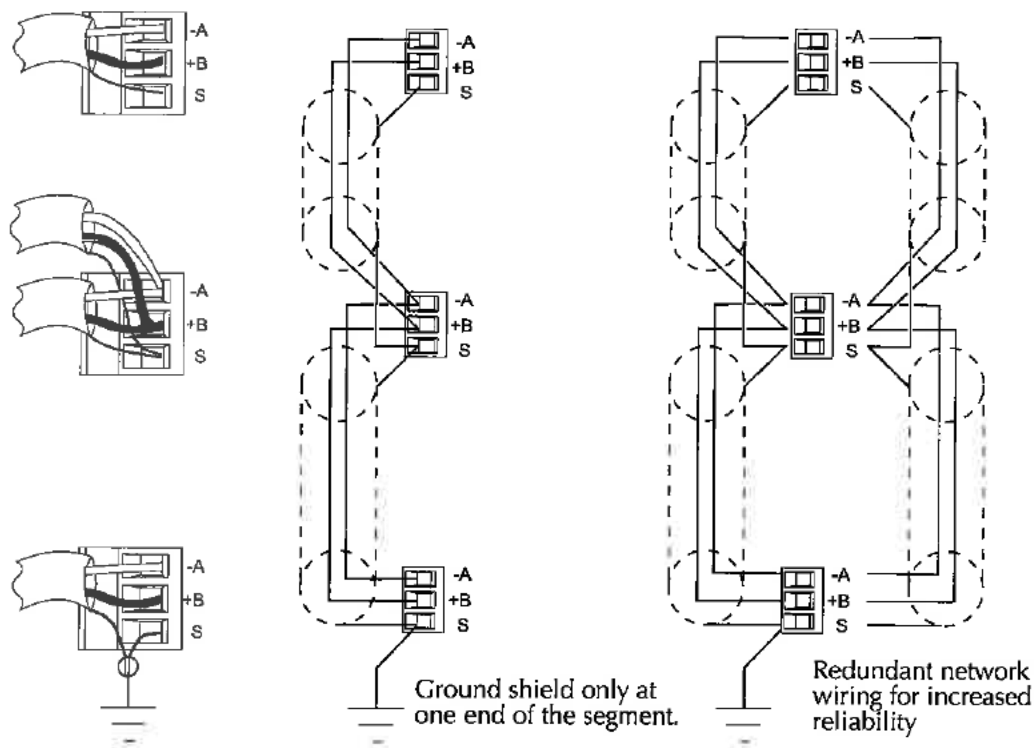


Illustration 2-10 MS/TP network wiring

Note

The MS/TP terminals are labeled *-A*, *+B* and *S*. The *S* terminal is provided as a connecting point for the shield. The terminal is not connected to the ground of the controller. When connecting to controllers from other manufacturers, verify the shield connection is not connected to ground.

End of line termination switches

The controllers on the physical ends of the EIA-485 wiring segment must have end-of-line termination installed for proper network operation. Set the end-of-line termination to *On* using the *EOL* switches.

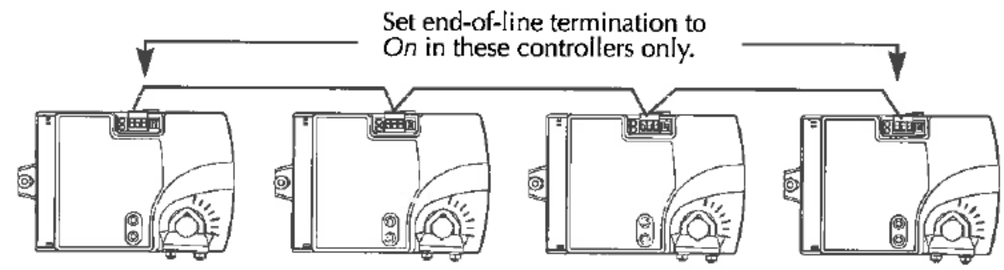


Illustration 2-11 End of line termination

Illustration 2-12 shows the position of the BAC-8000 End-of-Line switches associated with the MS/TP inputs.

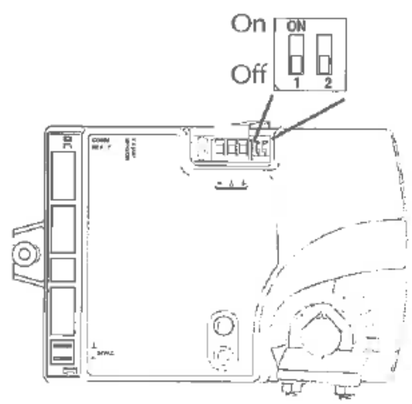


Illustration 2-12 Location of EOL switch

Connecting an airflow sensor

An airflow sensor is incorporated as one of the inputs to the controller. Remove the plugs and connect the tubing from the pitot assembly to the airflow sensor inputs next to the drive hub. (See Illustration 2-13). The airflow sensor is programmed as Input 4.

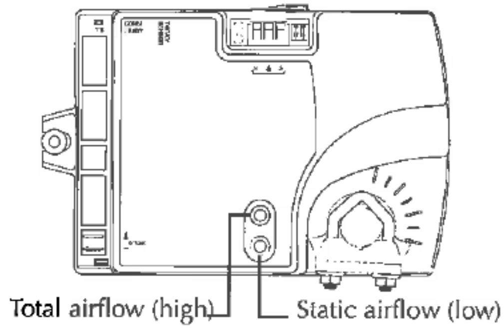


Illustration 2-13 Airflow sensor inputs

Connecting power

The controllers require an external, 24 volt, AC power source. Use the following guidelines when choosing and wiring transformers.

- Use a Class-2 transformer of the appropriate size to supply pwer to the controllers. Titus recommends powering ony one controller from each transformer.
- Do not run 24 volt, AC power from within an enclosure to external controllers.

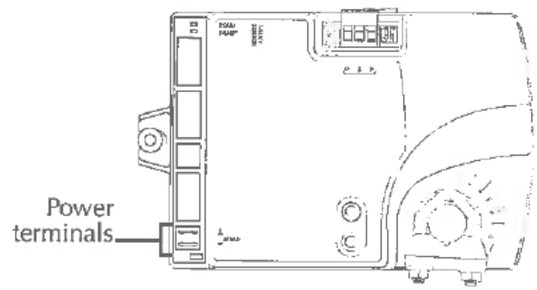


Illustration 2-14 Power terminals and jumper

Connect the 24 volt AC power supply to the power terminal block on the lower right side of the controller near the power jumper. Connect the ground side of the transformer to the ground terminal ⊥ and the AC phase to the phase ~ terminal. Power is applied to the controller when the transformer is powered.

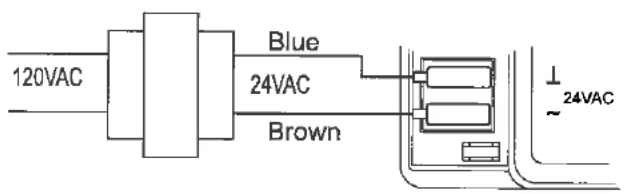


Illustration 2-15 Power connections

Application drawings

The BAC-8005 and BAC-8205 VAV controllers include several options for reheat. The following application drawings show the connections for each type of reheat.

- Modulating reheat
- *Two-stage reheat* on page 24
- *Time proportional reheat* on page 24
- *Floating reheat* on page 26
- *Three stage reheat* on page 27

Modulating reheat

When modulating reheat is selected, local lighting is also available. The analog reheat output varies between 0 and 10 volts DC.

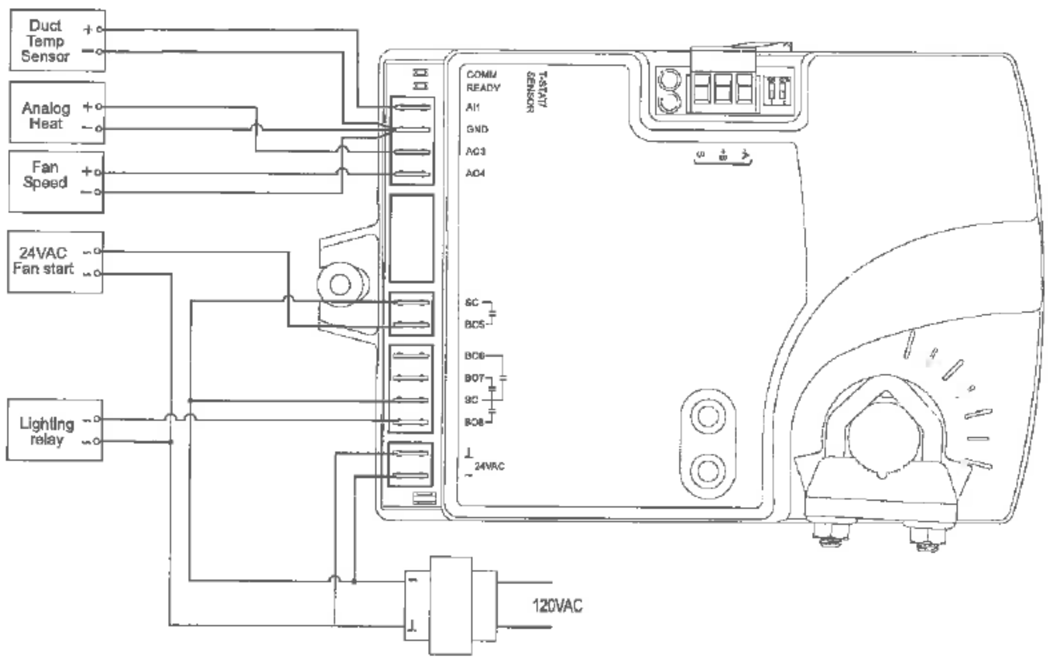


Illustration 2-16 Modulating reheat

Two-stage reheat

Two stage electric reheat connects to the triac outputs at BO6 and BO7. Local lighting is also available. The reheat and lighting outputs are triacs that can switch up to 1 ampere at 24 volts AC.

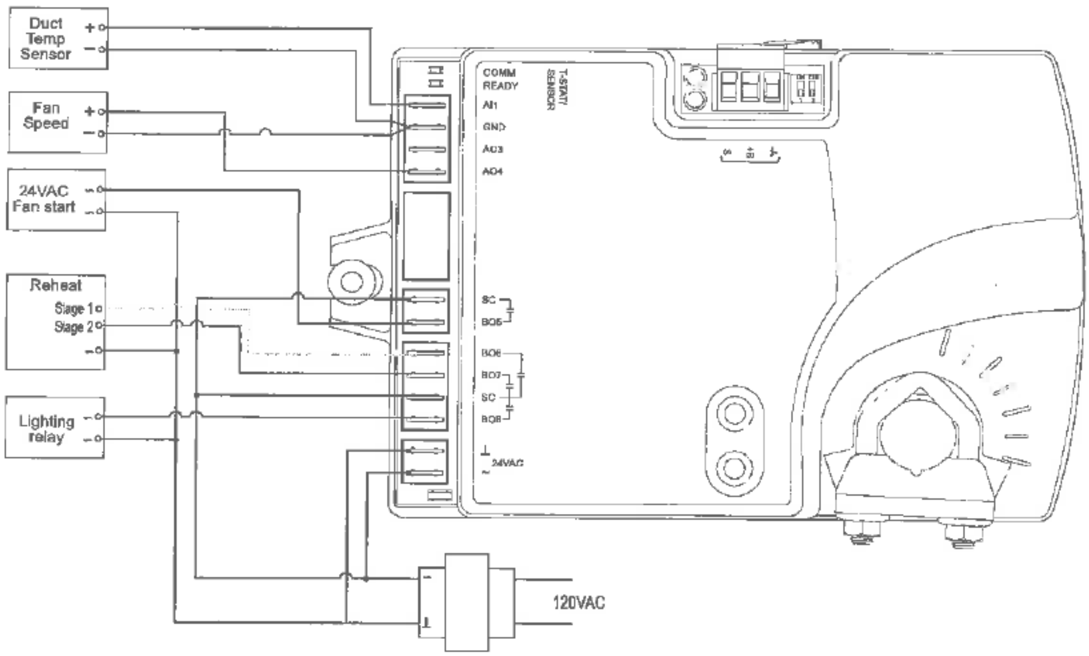


Illustration 2-17 Two-stage reheat

Time proportional reheat

Time proportional reheat option is typically used in hydronic systems with a hot water reheat coil and a wax top control valve.The reheat and lighting outputs are triacs that can switch up to 1 ampere at 24 volts AC.

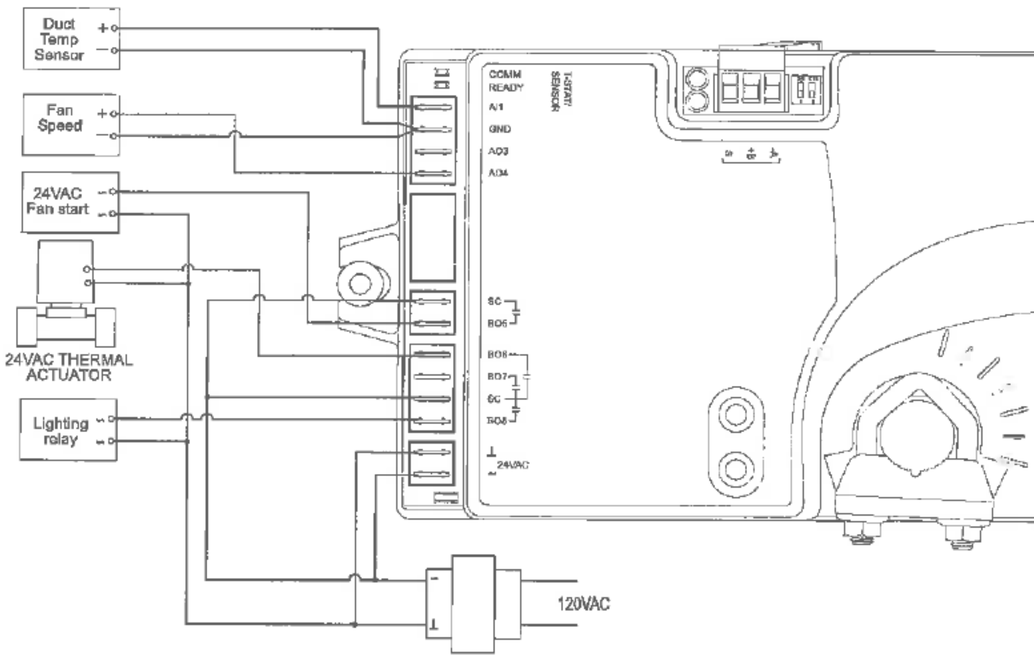


Illustration 2-18 Time proportional reheat

Floating reheat

Use the tristate reheat option in hydronic systems that are controlled by a tristate actuator. The reheat and lighting outputs are triacs that can switch up to 1 ampere at 24 volts AC.

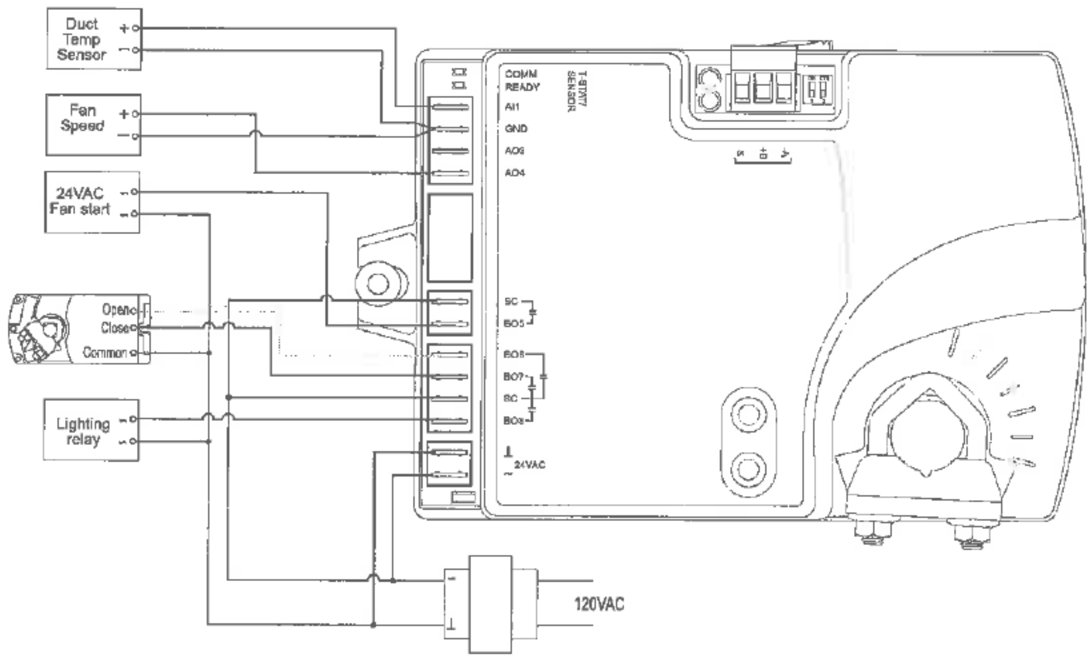


Illustration 2-19 Floating reheat

Three stage reheat

Three stage electric reheat connects directly to reheat units that can be controlled with 24 volts AC. If local lighting is enabled only two stage reheat is available.

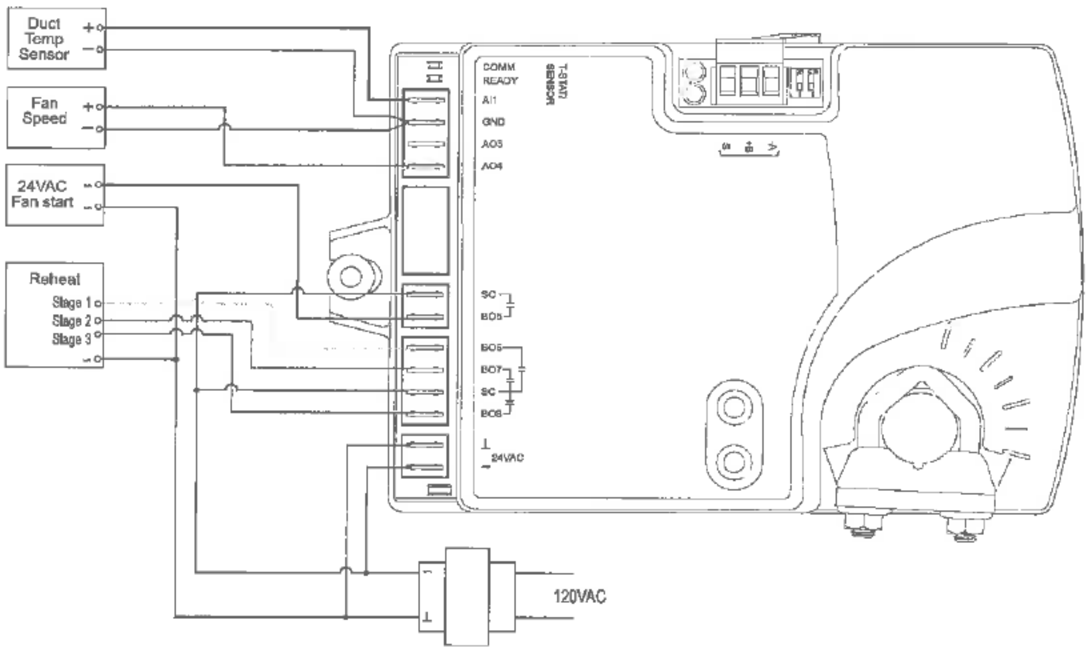


Illustration 2-20 Three-stage reheat

SECTION 3

Setting up VAV controllers

The topics in this section cover setting up the BAC-8005 and BAC-8205 for controllers for VAV operation. These are advanced topics for controls technicians and engineers.

The BAC-8005 and BAC-8205 VAV controllers are set up by the manufacturer to operate as soon as they are connected to external equipment and power is applied. Installation and connection instructions are covered in the section *Installing the controllers* on page 11.

Setting up the controllers may include setting BACnet objects with a BACnet Operator Workstation such as TotalControl. The objects may also be set up with a STE-8001 or STE-8201. The following topics are covered in this section.

- *Setting temperature setpoints* on page 30
- *Setting airflow setpoints* on page 31
- *Setting the VAV terminal unit parameters* on page 32
- *Setting up local lighting control* on page 33
- *Network communications* on page 29

Caution

Change only the present values of the objects listed in this section. Changing any other objects or properties will result in improper operation.

Network communications

Before connecting the controller to a BACnet MS/TP network, configure the following network parameters with either a BACnet operator workstation or temporarily connecting an STE-8001 or STE-8201 to the controller.

Device instance—Set from 0 to 4,194,302. A device instance number must be unique across the BACnet internetwork.
Baud—Valid baud settings are 9600, 19200, 38400, and 76800.
MAC—Set from 0 to 127. Must be unique on the MS/TP network to which the controller is connected.

Setting temperature setpoints

The space temperate setpoints listed in Table 3-1, "Temperature setpoints," on page 30 are used to control the controller VAV operation. The temperature setpoints have default values, but may be manipulated depending on which type of wall sensor is connected to the controller.

Occupied cooling and heating setpoints These setpoints are user controlled space setpoints that originate from an attached sensor. If no sensor is attached the values for these setpoints are manually entered by a controls technician.

Unoccupied cooling and heating setpoints The unoccupied setpoints are manually entered values to set the heating and cooling temperature when the space is unoccupied.

Minimum cooling setpoint A manually entered value to limit the occupied cooling setpoint regardless of the value entered by the user.

Maximum heating setpoint A manually entered value to limit the occupied heating setpoint regardless of the value entered by the user.

Minimum setpoint differential Sets the minimum temperature separation between occupied heating and cooling setpoints.

Standby differential This differential is added or subtracted from the occupied temperature setpoints to calculate the standby setpoints.

SAT changeover temperature Sets the supply air temperature at which the controller will change from heating to cooling. The changeover takes place when the supply air temperature is 2° above or below the discharge air temperature setpoint.

Table 3-1 Temperature setpoints

Object	Description	Name	Default
AV5	Occupied Cooling Setpoint	OCC CL STPT	74°F
AV6	Occupied Heating Setpoint	OCC HT SPT	70°F
AV7	Unoccupied Cooling Setpoint	UNOCC CL STPT	80°F
AV8	Unoccupied Heating Setpt	UNOCC HT STPT	64°F
AV9	Minimum Cooling Setpt	MIN CL STPT	70°F
AV10	Maximum Heating Setpoint	MAX HT STPT	76°F
AV11	Minimum Setpoint Differential	MIN STPT DIFF	4°F
AV12	Standby Differential	STBY DIFF	3°F
AV37	SAT Changeover Temp	SAT CHANGEOVER	75°F

Setting airflow setpoints

The airflow setpoints are limits for VAV unit operation. All values are entered by a controls technician.

Minimum and maximum cooling airflow Sets the airflow limits through the VAV unit when in the cooling mode.

Minimum and maximum heating airflow Sets the airflow limits through the VAV unit when in the heating mode.

Minimum and maximum fan speed Sets the limits on the fan speed. See Connecting outputs on page 15 for details for controlling a fan that is part of the VAV unit.

Table 3-2 Airflow setpoints

Object	Description	Name	Defaults
AV13	Min Cooling Airflow	MIN COOL FLOW	0 CFM
AV14	Max Cooling Airflow	MAX COOL FLOW	400 CFM
AV15	Min Heating Airflow	MIN HEAT FLOW	0 CFM
AV16	Max Heating Airflow	MAX HEAT FLOW	400 CFM
AV32	Minimum Fan Speed	MIN FAN SPEED	0%
AV33	Maximum Fan Speed	MAX FAN SPEED	100%

Setting the VAV terminal unit parameters

Terminal unit parameters set basic operating parameters and enable options such as reheat and series or parallel fan operation.

Reheat Enables and sets the type of reheat. Choose from the available types of reheat from the following list. All reheat options except modulating reheat use the 24-volt AC triac outputs.

None—Reheat is not enabled.
Staged, with lighting—If lighting is enabled the staged reheat is set to two stages.
Staged, without lighting—If lighting is not enabled, three reheat stages are available.
Modulating—The reheat output varies from 0-10 volts.
Floating—The reheat outputs control a tristate actuator.
Time proportional—Controls a thermal wax valve with a 24-volt triac output.

Reheat equipment is connected to the controller as described in the topic *Connecting outputs* on page 15 and *Application drawings* on page 23.

Damper direction to close Defines which direction the damper will turn to decrease airflow.

CCW—The actuator turns counterclockwise to close the damper.
CW—The actuator turns clockwise to close the damper.

Primary duct K-factor A property of the specific VAV unit and airflow sensor to which the primary controller is attached. This constant is supplied by the VAV unit manufacturer.

Fan operation Sets the type of VAV fan in the VAV terminal unit.

None—No fan is connected to the controller.
Series—The VAV unit includes a series fan. The fan runs during a fresh air purge, when the space is occupied or in standby.
Parallel—The VAV unit includes a parallel fan. The fan runs when there is a call for heat during a fresh air purge, when the space is occupied, or in standby.

Table 3-3 Unit parameters

Object	Description	Name	Default
MSV3	Reheat Type	REHEAT	None
AV18	Primary K factor	PR K FACT	904
BV10	Clockwise Close	CLOCKWISE CLOSE	CCW
MSV2	Fantype Configuration	FAN CONFIG	None

Setting up local lighting control

Automatic local lighting can controlled by the motion sensor in an STE-8201 connected to the controller. Local lighting is set up either with software or an attached STE-8201.

Lighting control enable When enabled, local lights will be turned on or off based on motion detected by an STE-8201. If lighting control is enabled the staged reheat is limited to two stages.

Light off delay Sets the interval local lights will remain turned on after the last motion is detected by an STE-8201.

Table 3-4 Local lighting options

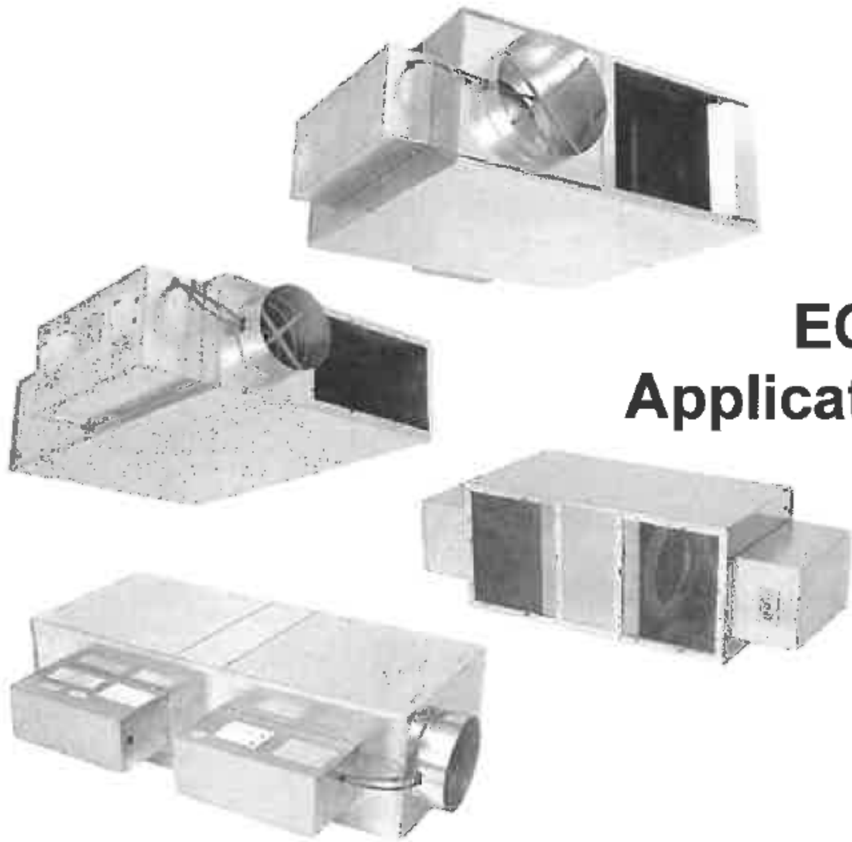
Object	Description	Name	Default
BV11	Lighting Control Enable	LIGHTING CONTROL	Enable
AV42	Light off delay	LITE OFF DELAY	15 minutes

Lighting equipment is connected to the controller as described in the topic Connecting outputs on page 15.

Balancing airflow

An airflow balancing program is included in BAC-8000 series controllers. See the manual *STE-8000 and STE-8201 Sensor Installation Guide* for balancing instructions.

AG-ECM-07
January 8, 2009



ECM Motors Application Guide

Titus
Air Distribution Technologies

605 Shiloh Road
Plano, Texas 75074
972.212.4800
www.titus-hvac.com

Contents Page

General

This document provides application highlights covering Electronically Commutated Motors (ECM™).

Additional information may be found at the Titus website, its address is www.titus-hvac.com.

Introduction

The ECM motor is a high efficiency, brushless DC motor with a unique microprocessor based motor controller. Motor efficiencies of 70% or better across the entire operating range of the motor saves considerable electrical energy when compared to conventional induction motors. The motor controller, when tuned to a Titus TQS fan powered terminal, provides a large turn down ratio and constant volume airflow regardless of changes in downstream static pressure operating against the fan. Additionally, Titus has developed a proprietary fan speed control that enables easy field adjustment of the unit if rebalancing is required. With the ECM motor, factory setting of the fan CFM is now possible.

ECM Features and Associated Benefits

- 70% motor efficiency across the entire operating range of the motor yields substantial electrical savings … payback in less than two years!
- Microprocessor based internal motor control maintains constant airflow regardless of changes in downstream static pressure.
- Motor operates efficiently down to 300 rpm providing a wide operating range covering most applications.
- Increased application flexibility due to larger operating range.
- Unique fan speed control provides simple manual or remote adjustment through the unit direct digital controls (DDC).
- Factory preset fan airflows minimize fan terminal balancing efforts.
- Ball bearing design and low heat rise characteristics substantially increase motor life.

Energy Savings Potential

The ECM motor when applied to a Titus TQS fan powered terminal offers significant energy savings over time to the owner when compared to conventional induction motors. However, the initial payback of the motor must be considered when applying ECM technology. Several variables will impact the payback of the ECM motor. Some of these are local electric rates, fan settings, whether occupancy schedules are in place for operating hours and the sizes of units installed in the application. Titus has evaluated an actual field trial and confirmed through bench testing an example of the potential energy savings when using the ECM motor. The following charts show the watt reduction associated with the ½ hp and 1 hp ECM motor when compared to standard TQS units of equivalent application range.

Titus retrofitted a floor of an existing building with ECM motors to conduct an energy comparison of ECM motors vs. standard permanent split capacitor (PSC) motors. The following charts (Figures 1 and 2) show the energy usage at several CFM points over the period of 12-18 months.

TQS Size 6 with 1 hp ECM motor watt comparison to standard permanent split capacitor motor. The average watt reduction over the above range is 335 watts.

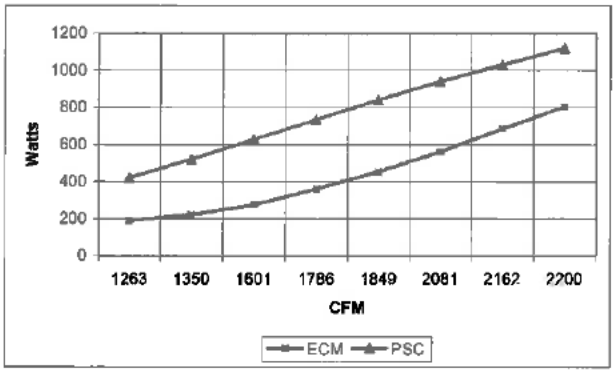


Figure 1. TQS Size 6 – 1 hp ECM Motor

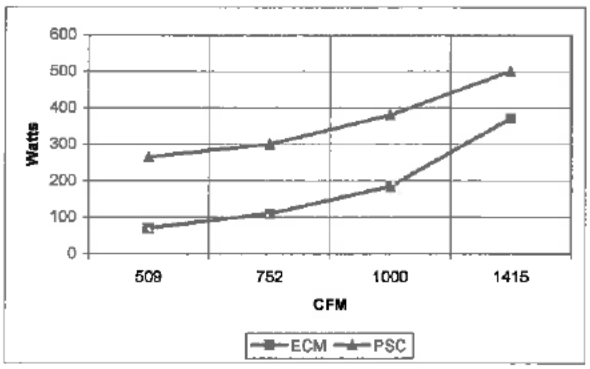


Figure 2. TQS Size 4 – ½ hp ECM Motor

TQS Size 4 with ½ hp ECM motor kW comparison to standard permanent split capacitor motor. The average watt reduction over the above range is 178 watts.

When evaluating this reduction in watts for energy usage the following table shows, at various usage rates, the annual savings per motor. Annual savings assume a run time of 3000 hours per year (250 days at 12 hours/day).

Table 1. Annual Dollar Savings

Usage Rate	kW/hr Reductions		
	0.2872	0.35	0.405
$0.05	$43.08	$52.50	$60.75
$0.06	$51.70	$63.00	$72.90
$0.07	$60.31	$73.50	$85.05
$0.08	$68.93	$84.00	$97.20
$0.10	$86.16	$105.00	$121.50
$0.12	$103.29	$126.00	$145.80
$0.14	$120.62	$147.00	$170.10

Reduction in demand charges must also be considered. Typically, demand charges are calculated during a 15-minute peak window. Some utilities will qualify the peak demand to only the summer months and use this peak as the monthly charge throughout the remainder of the year while other utilities will calculate demand charges using that month's peak kW requirement. The savings associated with reduced demand charges are substantial, as demand charges are usually several dollars per kW.

As an example, a typical multi-story office application may require 200 fan terminals. Each fan terminal equipped with an ECM motor may have a power reduction of approximately 0.4 kW. This translates to an 80 kW reduction in demand and with a demand rate of $10.00 per kW equates to a potential $800 per month reduction in the demand charges. While this model is simplistic, it is indicative of the payback potential of the motor. Utilities will vary not only in price but also in calculation methods with contract kW's versus actual kW usage therefore, actual savings must be calculated according to local market conditions.

Coupling the usage and demand savings associated with the ECM motors can provide a payback of the motor in less than two years to the owner and provide substantial savings then throughout the life of the building.

ECM motors may also be considered for the Leadership Energy and Environmental Design (LEED™) Optimize Energy Performance credit. The ECM motor has efficiencies of up to 70% across its entire operating (300-1200 rpm) and 80% over 400 rpm.

ECM vs. PSC Watt Comparison

The following table shows a watt comparison for the TQS size 4 and 6 vs. the appropriate size TQS with a standard PSC motor at various CFMs. As you turn down the ECM motor, the energy savings increases when compared to a standard motor operating at the same airflow.

For example, turning a size 4 TQS with ECM motor down to 509 CFM uses 75% less energy than a TQS size 2 operating at the same CFM. The ECM motor would be operating at a much lower rpm than the standard motor at this CFM.

Table 2. TQS Size 4 with ECM Motor

Fan CFM	Standard Box Size	ECM Watts	Standard Watts	% Energy Savings
509	2 (1/6 hp)	67	265	75%
752	2 (1/6 hp)	110	280	61%
1000	3 (1/4 hp)	180	380	53%
1415	3 (1/4 hp)	390	498	22%
1547	4 (1/3 hp)	490	520	6%

Table 3. TQS Size 6 with ECM Motor

Fan CFM	Standard Box Size	ECM Watts	Standard Watts	% Energy Savings
1263	5 (1/3 hp)	190	514	63%
1601	5 (1/3 hp)	330	610	46%
2162	6 (3/4 hp)	670	1040	36%
2387	6 (3/4 hp)	900	1130	20%
2626	6 (3/4 hp)	1200	1240	3%

TITAN™ ECM Programming Process

Any manufacturer can purchase the ECM motor. The difference is in the development and programming of the ECM motor to operate effectively and efficiency within the specific fan powered terminal's design and configuration. The ECM motor only provides a benefit if it is developed and programmed correctly within the specific fan box.

Titus uses the Titus Iterative Test & Analysis Network™ (TITAN™) ECM Programming Process in its ISO 9001:2000 certified lab, the Harold Straub Research & Training Center. The TITAN process ensures the performance of the ECM motor in all of the Titus fan-powered terminals.

The History of ECM Motors in Commercial HVAC

Titus has been programming ECM motors for almost a decade. In early 1995, General Electric (GE™) contacted Titus about helping them bring their ECM motors into the commercial heating ventilation and air conditioning (HVAC) market. Titus provided GE with the requirements of the commercial market such as required motor voltages (the ECM motor was not available in 277V at the time) and market size and ECM motor potential.

Understanding that the ECM motor was a significant price increase over standard PSC motors, Titus retrofitted one floor of the Oryx Energy Tower in Dallas, TX with ECM motors and compared the energy usage of that floor against a floor with PSC motors over an eighteen month period to prove the energy savings would provide an acceptable payback of three years or less.

Titus shipped the first ECM fan powered terminal to a school district in Houston in 1997. Titus has been shipping ECM motors ever since. This extensive history and commitment to the development of the ECM motor for commercial applications, makes Titus an expert in ECM development. This expertise is the basis of the TITAN ECM Programming Process.

Process Summary

The TITAN ECM Programming Process is an iterative process of developing constants for the ECM motor to operate at the optimum efficiency and provide pressure independent airflow. Up to a dozen test runs are preformed using the GE ECM motor programming interface equipment to ensure the correct motor constants. Developing the correct motor constants allows optimal control of the speed and torque of the motor in the particular fan box design.

The minimum and maximum fan curves are determined based on minimum and maximum rpm of the ECM motor (300 rpm and 1200 rpm respectively). The GE interface unit plots rpm versus torque of the motor and determines the difference between measured venturi CFM and the ECM calculated CFM. This test is repeated until the difference in venturi CFM and the ECM calculated CFM equals zero. Once the CFM difference is zero, or as close to zero as possible, the ECM constants are saved for that unit's airflow characteristics.

All Titus fan-powered terminals with ECM motors are provided with a factory installed pulse width modulation (PWM) controller. The PWM voltage signal is calibrated to provide 100% fan at full voltage (10.0V) and minimum fan at minimum voltage (1.0V). The calibrated PWM allows the ECM motor to operated as programmed by Titus regardless of what manufacturer's DDC controller provides the voltage signal to the PWM controller. This ensures the pressure independent operation of the motor with any DDC controller. The PWM signal can also be controlled manually using two dial pots much like a SCR on a standard PSC motor.

The TITAN ECM Programming Process extends from the lab to the ISO 9001:2000 certified factories where individual ECM motors are programmed with the appropriate ECM program for each order.

Building Codes

With energy considerations growing, there has been an increased interest in "green" buildings, sustainable design, and energy savings. Thirty-two states have mandatory energy codes. Most state energy codes are based on the International Energy Conservation Code (IECC) or ASHRAE/IESNA 90.1.

The IECC covers design of energy-efficient building envelopes and the installation of energy-efficient mechanical, lighting and power systems through requirements emphasizing performance. Chapter 7 of the IECC references ASHRAE/ IESNA 90.1. The standard ASHRAE/IESNA 90.1 was developed to provide minimum requirements for the energy-efficient design of buildings except low-rise residential buildings. Section 6 of the standard covers Heating, Ventilation, and Air Conditioning.

Although the U.S. Green Building Council is not a government agency, many local governing bodies are requesting, and in some cases requiring, green design features into their new construction requirements. Some states and cities offer tax incentives for buildings that meet green building codes or become LEED certified and other will most likely offer incentives in the future.

New York was the first state to implement a green building tax program. The credit allows builders who meet energy goals and use environmentally preferable materials to claim up to $3.75 per square foot for interior work and $7.50 per square foot for exterior work against their state tax bill. Maryland has implemented green building a tax credit program and Massachusetts is currently reviewing a green building program. Oregon's tax credit program uses LEED certification levels to determine the level of tax credit.

The Seattle Energy Code specifies ECM motors in Chapter 14, Building Mechanical Systems states that Fan motors less than 1 hp in series terminal units shall be either electronically-commutated motors, or have a minimum motor efficiency of 65% when rated in accordance with National Electrical Manufacturers Association (NEMA) Standard MG-1 at full load rating conditions.

The appendix shows the state energy code requirements (as of May 2004).

Suggested Specification

Fan motor assembly shall be forward curved centrifugal fan with a direct drive motor. Motors shall be General Electric ECM, variable-speed, DC, brushless motors specifically designed for use with single phase, 277 volt (or 120 volt), 60 hertz electrical input. Motor shall be complete with and operated by a single-phase integrated controller/inverter that operates the wound stator and senses rotor position to electronically commutate the stator. All motors shall be designed for synchronous rotation. Motor rotor shall be permanent magnet type with near zero rotor losses. Motor shall have built-in soft start and soft speed change ramps. Motor shall be able to be mounted with shaft in horizontal or vertical orientation. Motor shall be permanently lubricated with ball bearings. Motor shall be direct coupled to the blower. Motor shall maintain a minimum of 70% efficiency over its entire operating range. Provide manual (or optional remote) fan speed output control for field adjustment of the fan airflow setpoint. Inductors shall be provided to minimize harmonic distortion and line noise. Provide isolation between fan motor assembly and unit casing to eliminate any vibration from the fan to the terminal unit casing. Provide a motor that is designed to overcome reverse rotation and not affect life expectancy.

The terminal unit manufacturer shall provide a factory installed PWM controller for either manual or DDC controlled fan CFM adjustment. The manual PWM controller shall be field adjustable with a standard screwdriver. The remote PWM controller shall be capable of receiving a 0-10 Vdc signal from the DDC controller (provided by the controls contractor) to control the fan CFM. When the manual PWM controller is used, the factory shall preset the fan CFMs as shown on the schedule.

Abbreviations

The following table lists abbreviations used within this document.

Abbrev.	Term
ASHRAE	American Society of Heating, Refrigeration, and Air-Conditioning Engineers
CFM	cubic feet per minute
DC	Direct Current
DDC	Direct digital control
ECM	Electronically Commutated Motor
GE	General Electric
hp	horsepower
HVAC	Heating Ventilation and Air Conditioning
IECC	International Energy Conservation Code
IESNA	Illuminating Engineering Society of North America
ISO	International Standards Organization
LEED	Leadership Energy and Environmental Design
NEMA	National Electrical Manufacturers Association
PSC	Permanent Split Capacitor
PWM	Pulse Width Modulation
rpm	revolutions per minute
TITAN	Titus Iterative Test & Analysis Network
USGBC	United States Green Building Council
V	Volt
Vdc	Volt direct current

Appendix – State Energy Code Requirements

Updated 1/8/09

State	Website	Current Status Commercial	Mandatory Statewide
AK	http://www.ahfc.state.ak.us	None statewide.	No
AL	http://www.bsc.auburn.edu/aderhrw2/codes/	The Alabama Building Energy Conservation Code (ABECC) is a mandatory building code for state government buildings. The code is based on ASHRAE/IESNA 90.1 – 2001	Yes
AR	http://www.1800arkansas.com/energy/	2003 IECC including ASHRAE/IESNA 90.1-2001	Yes
AZ	http://www.azcommerce.com/Energy/default.asp	ASHRAE/IESNA 90.1-1999 mandatory for state-owned and state funded buildings only	Yes
CA	http://www.energy.ca.gov/title24/index.html	State developed code, Title 24, Part 6, meets or exceeds ASHRAE/IESNA 90.1-2004 (Updated Title 24 goes into effect August 2009	Yes
CO	http://www.coloradoenergy.org	Voluntary state provisions are based on 2003 IECC/ASHRAE/IESNA 90.1-2001	No
CT	http://www.opm.state.ct.us/default.htm	2003 IECC	Yes
DC	www.dcenergy.org	Builders may use either the 2008 D.C. Construction Codes (based on ASHRAE 90.1-2007) OR the previous code adopted in 2003 (which is based on the 2000 IECC)	Yes
DE	N/A	ASHRAE/IESNA 90.1-1999	Yes
FL	http://www.floridabuilding.org	State developed code, Chapter 13 of the Florida Building Code, meets or exceeds ASHRAE 90.1-2004	Yes
GA	http://www.gefa.org/energy_program.html	ASHRAE/IESNA 90.1-2004	Yes
HI	http://www.hawaii.gov/dbedt/ert/model_ec.html	ASHRAE/IESNA 90.1-1989 with modifications, mandatory in Hawaii County. Honolulu, Kauai and Maui Counties have adopted ASHRAE 90.1-1999	No
IA	http://www.state.ia.us/government/dnr/energy/	2006 IECC, referencing ASHRAE 90.1-2004	Yes
ID	http://www.state.id.us/dbs/energy/energy_code.html	2006 IECC	Yes
IL	http://www.commerce.state.il.us/com/energy/	2006 IECC and ASHRAE 90.1-2004 statewide	Yes
IN	http://www.state.in.us/sema/press_newcodes.html	State-developed code that does not meet ASHRAE/IESNA 90.1-1989	Yes
KS	http://www.kcc.state.ks.us/energy/energy.htm	Kansas has adopted the 2006 IECC as the applicable energy efficiency standard for commercial and industrial structures in the state. No enforcement mechanism is provided in the statute	Yes
KY	http://www.state.ky.us/agencies/cppr/dhbc/index.htm	2006 IECC and 2006 IBC	Yes
LA	http://www.dps.state.la.us/sfm/energycd.htm	ASHRAE/IESNA 90.1-2004, and 2006 IECC for buildings not covered by ASHRAE	Yes
MA	http://www.state.ma.us/bbrs/energy.htm	Seventh Edition, MA Basic Building Code (780 CMR) -- Chapter 13 calls for compliance with either the 2006 IECC becomes mandatory April; 6, 2009	Yes
MD	http://www.energy.state.md.us/	2006 IECC	Yes
ME	http://www.state.me.us/spo/ceo/ceohome.htm	2003 IECC or ASHRAE/IESNA 90.1-2004	Yes
MI	http://www.cis.state.mi.us/opla/eo/resid/	ASHRAE/IESNA 90.1-1999	Yes
MN	http://www.admin.state.mn.us/buildingcodes/	MN State Energy Code, exceeds ASHRAE/IESNA 90.1-1989	Yes
MO	http://www.dnr.state.mo.us/de/homede.htm	None statewide. State owned buildings must comply with ASHRAE/IESNA 90.1-1989	No
MS	http://www.mississippi.org/programs/energy/energy_overview.htm	ASHRAE 90-1975, mandatory for state owned buildings, public buildings, and high-	Yes

State	Website	Current Status Commercial	Mandatory Statewide
		rise buildings	
MT	http://discoveringmontana.com/dli/bsd/bc/index.htm	2003 IECC with reference to ASHRAE 90.1-2001	Yes
NC	http://www.ncdoi.com http://www.ncdoi.com/OSFM/default.asp	State-developed code based on the 2003 IECC and references the ASHRAE 90.1-2004	Yes
ND	http://www.state.nd.us/dcs	ASHRAE/IESNA 90.1-1989, voluntary	No
NE	http://www.nol.org/home/NEO/	2003 IECC All state-owned and state-funded buildings must comply with 2003 IECC	Yes
NH	http://www.puc.state.nh.us/energypg.html	New Hampshire Energy Code, references the 2006 IECC	Yes
NJ	http://www.state.nj.us/dca/codes/	ASHRAE/IESNA 90.1-2004	Yes
NM	http://www.emnrd.state.nm.us/ecmd	ASHRAE 90.1-2004 mandatory statewide	Yes
NV	http://www.energy.state.nv.us	2003 IECC mandatory for all jurisdictions that have not adopted an energy code; Jurisdictions in southern Nevada have adopted the 2006 Southern Nevada Energy Code, which is based on the 2006 IECC with amendments	No
NY	http://www.dos.state.ny.us/code/energycode/nyenergycode.htm	State-developed code (ECCCNYS) based on IECC 2003 and referencing ASHRAE 90.1-2004	Yes
OH	http://www.odod.state.oh.us/cdd/oee/	2006 IECC referencing ASHRAE 90.1-2004	Yes
OK	http://www.state.ok.us	2003 IECC mandatory for jurisdictions that do not adopt their own code and for state-owned and -leased facilities	Yes
OR	http://www.energy.state.or.us/code/codehm.htm	2007 Oregon Structural Specialty Code (OSSC) for non-residential buildings, based on the 2006 IBC, is mandatory statewide. Chapter 13 for energy efficiency is certified by the USGBC and is 1-2% more stringent than 90.1-2004.	Yes
PA	http://www.dli.state.pa.us/landi/cwp/view.asp?a=124&Q=61120%20	2006 IECC with reference to ASHRAE 90.1-2004	Yes
RI	N/A	2006 IECC amended to include ASHRAE/IESNA 90.1-2004	Yes
SC	http://www.state.sc.us/energy	2006 IECC	Yes
SD	N/A	None	No
TN	N/A	ASHRAE 90A-1980 and 90B-1975 is voluntary. Jurisdictions can adopt a more stringent code; IECC 2000 with 2001 amendments is an option	No
TX	http://www.seco.cpa.state.tx.us	2000 IECC with 2001 Supplement, with reference to ASHRAE 90.1-2001, mandatory for all buildings. Jurisdictions may adopt a more recent code. ASHRAE 90.1-2004 mandatory for state-funded buildings	Yes
UT	http://www.energy.utah.gov/	2006 IECC mandatory statewide including ASHRAE/IESNA 90.1- 2004	Yes
VA	http://www.mme.state.va.us/de/	2006 IECC	Yes
VT	http://www.state.vt.us/psd/ee/ee19.htm	202005 Vermont Guidelines for Energy Efficient Commercial Construction based upon amendments to the IECC 2004 Supplement and an alternative path of ASHRAE 90.1-2004 with amendments	No
WA	http://www.energy.wsu.edu	State-developed code that is equivalent to ASHRAE/IESNA 90.1-2004 for most commercial buildings	Yes
WI	http://www.commerce.state.wi.us/sb/sb-homepage.html	2000 IECC	Yes

State	Website	Current Status Commercial	Mandatory Statewide
WV	http://www.wvdo.org/community/eep.htm	2006 IECC	Yes
WY	N/A	1989 MEC may be adopted and enforced by local jurisdictions	No