ANSI/ASHRAE/IES Addenda dn, do, dp, dq, and dr to
ANSI/ASHRAE/IESNA Standard 90.1-2007

ASHRAE ADDENDA

Energy Standard for Buildings Except Low-Rise Residential Buildings

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FOREWORD

This public review draft shows changes in Appendix G relative to addendum "cj" (computer rooms) to 90.1-2007.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum dn to 90.1-2007

Modify the Standard as follows (SI and I-P Units).

Modify Appendix G as follows:

G3.1.1 Baseline HVAC System Type and Description. HVAC systems in the *baseline building design* shall be based on usage, number of floors, conditioned floor area, and heating source as specified in Table G3.1.1A and shall conform with the system descriptions in Table G3.1.1B. For systems 1, 2, 3, and 4, each thermal block shall be modeled with its own HVAC system. For systems 5, 6, 7, ~~and~~ 8, 10 and 11 each floor shall be modeled with a separate HVAC system. Floors with identical thermal blocks can be grouped for modeling purposes.

Exceptions:

a. Use additional system type(s) for nonpredominant conditions (i.e., residential/nonresidential or heating source) if those conditions apply to more than 20,000 ft^2 of conditioned floor area.

b. If the baseline HVAC system type is 5, 6, 7, ~~or~~ 8, 10 or 11 use separate single-zone systems conforming with the requirements of System 3 or System 4 (depending on building heating source) for any spaces that have occupancy or process loads or schedules that differ significantly from the rest of the building. Peak thermal loads that differ by 10 Btu/h · ft^2 or more from the average of other spaces served by the system or schedules that differ by more than 40 equivalent full-load hours per week from other spaces served by the system are considered to differ significantly. Examples where this exception may be applicable include, but are not limited to, computer server rooms, natatoriums, and continually occupied security areas.

c. If the baseline HVAC system type is 5, 6, 7, ~~or~~ 8, 10 or 11 use separate single-zone systems conforming with the requirements of System 3 or System 4 (depending on building heat source) for any zones having special pressurization relationships, cross-contamination requirements, or code-required minimum circulation rates.

d. For laboratory spaces with a minimum of 5000 cfm of exhaust, use system type 5 or 7 that reduce the exhaust and makeup air volume to 50% of design values during unoccupied periods. For all-electric buildings, the heating shall be electric resistance.

e. Thermal zones designed with heating only systems in the proposed design, serving storage rooms, stairwells, vestibules, electrical/mechanical rooms, and restrooms not exhausting or transferring air from mechanically cooled thermal zones in the proposed design shall use System type 10 or 11 in the baseline building design.

f. If the baseline HVAC system type is 10 or 11, all spaces that are mechanically cooled in the *proposed building design* shall be assigned to a separate baseline system determined by using the area and heating source of the mechanically cooled spaces.

G3.1.2.6 Economizers. Outdoor air economizers shall not be included in *baseline* HVAC Systems 1, ~~and~~ 2, 10, and 11. *Outdoor air* economizers shall be included in *baseline* HVAC Systems 3 through 9 based on climate as specified in Table G3.1.2.6A.

G3.1.2.8 Design Airflow Rates.

G3.1.2.8.1 Baseline System Types 1 through 8. System design supply airflow rates for the *baseline building design* shall be based on a supply-air-to-room-air temperature difference of 20°F or the minimum outdoor air flow rate, or the air flow rate required to comply with applicable codes or accreditation standards ~~required ventilation air or makeup air~~, whichever is greater. If return or relief fans are specified in the *proposed design*, the *baseline building design* shall also be modeled with fans serving the same functions and sized for the *baseline* system supply fan air quantity less the minimum *outdoor air*, or 90% of the supply fan air quantity, whichever is larger.

G3.1.2.8.2 Baseline System Types 10 and 11. System design supply airflow rates for the *baseline building design* shall be based on the temperature difference between a supply air temperature setpoint of 105º F and the design space heating temperature setpoint, the minimum outdoor air flow rate, or the air flow rate required to comply with applicable codes or accreditation standards, whichever is greater.

If the *Proposed Building Design* includes a fan(s) sized and controlled to provide non-mechanical cooling, the baseline building design shall include a separate fan to provide non-mechanical cooling, sized and controlled the same as the *proposed building design.*

G3.1.2.9 System Fan Power. System fan electrical power for supply, return, exhaust, and relief (excluding power to fan-powered VAV boxes) shall be calculated using the following formulas:

For Systems 1 and 2,

$$P_{fan} = CFMS \times 0.3$$

For systems 3 through 8,

$$P_{fan} = \text{bhp} \times 746 / \text{Fan Motor Efficiency}$$

For Systems 10 and 11 (supply fan),

$$\underline{P_{fan} = CFM_S \times 0.3}$$

For Systems 10 and 11 (non-mechanical cooling fan if required by Section G3.1.2.8.2)

$$\underline{P_{fan} = CFM_{nmc} \times 0.054}$$

where

P_{fan} = electric power to fan motor (watts)

and

bhp = brake horsepower of *baseline* fan motor from Table G3.1.2.9

Fan Motor Efficiency = the efficiency from Table 10.8 for the next motor size greater than the bhp using the enclosed motor at 1800 rpm.

CFMS = the baseline system maximum design supply fan airflow rate in cfm (L/s)

$\underline{CFM_{nmc}}$ = the baseline non-mechanical cooling fan airflow in cfm (L/s)

Modify table G3.1 as follows:

1. Design Model	
a. The simulation model of the *proposed design* shall be consistent with the design documents, including proper accounting of fenestration and opaque envelope types and areas; interior lighting power and controls; HVAC system types, sizes, and controls; and service water heating systems and controls. All end-use load components within and associated with the building shall be modeled, including, but not limited to, exhaust fans, parking garage ventilation fans, snowmelt and freeze-protection equipment, facade lighting, swimming pool heaters and pumps, elevators and escalators, refrigeration, and cooking. Where the simulation program does not specifically model the functionality of the installed system, spreadsheets or other documentation of the assumptions shall be used to generate the power demand and operating schedule of the systems.	The *baseline building design* shall be modeled with the same number of floors and identical conditioned floor area as the *proposed design*.
b. All conditioned spaces in the *proposed design* shall be simulated as being both heated and cooled even if no heating or cooling system is to be installed, and temperature and humidity control setpoints and schedules shall be the same for *proposed* and *baseline building designs*.	
Exception: Spaces using Baseline System types 10 and 11 shall not be simulated with mechanical cooling.	
c. When the *performance rating method* is applied to buildings in which energy-related features have not yet been designed (e.g., a lighting system), those yet-to-be-designed features shall be described in the *proposed design* exactly as they are defined in the *baseline building design*. Where the space classification for a space is not known, the space shall be categorized as an office space.	

10. HVAC Systems

The HVAC system type and all related performance parameters in the *proposed design*, such as equipment capacities and efficiencies, shall be determined as follows: a. Where a complete HVAC system exists, the model shall reflect the actual system type using actual component capacities and efficiencies. b. Where an HVAC system has been designed, the HVAC model shall be consistent with design documents. Mechanical equipment efficiencies shall be adjusted from actual design conditions to the standard rating conditions specified in Section 6.4.1 if required by the simulation model. c. Where no heating system exists or no heating system has been specified, the heating system classification shall be assumed to be electric, and the system characteristics shall be identical to the system modeled in the *baseline building design*. d. Where no cooling system exists or no cooling system has been specified, the cooling system shall be identical to the system modeled in the *baseline building design*. **Exception:** Spaces using baseline HVAC system types 10 and 11.	The HVAC system(s) in the *baseline building design* shall be of the type and description specified in Section G3.1.1, shall meet the general HVAC system requirements specified in Section G3.1.2, and shall meet any system-specific requirements in Section G3.1.3 that are applicable to the baseline HVAC system type(s). If the *proposed design* includes *computer room* humidification, then the *computer room* humidification system, schedules, and setpoints in the *baseline building design* shall be the same as the *proposed design*. For systems serving *computer rooms*, the baseline shall not have reheat for the purpose of dehumidification.

Modify Table G3.1.1A (I-P Units) as Follows:

TABLE G3.1.1A *Baseline* HVAC System Types

Building Type	Fossil Fuel, Fossil/Electric Hybrid, & Purchased Heat	Electric and Other
Residential	System 1 – PTAC	System 2 – PTHP
Nonresidential & 3 Floors or Less & <25,000 ft^2	System 3 – PSZ-AC	System 4 – PSZ-HP
Nonresidential & 4 or 5 Floors & <25,000 ft^2 or 5 Floors or Less & 25,000 ft2 to 150,000 ft^2	System 5 – Packaged VAV w/ Reheat	System 6 – Packaged VAV w/PFP Boxes
Nonresidential & More than 5 Floors or >150,000 ft^2	System 7 – VAV w/Reheat	System 8 – VAV w/PFP Boxes
Heated Only Storage	System 11– Heating and Ventilation	System 10 – Heating and Ventilation

Notes:
Residential building types include dormitory, hotel, motel, and multifamily. Residential space types include guest rooms, living quarters, private living space, and sleeping quarters. Other building and space types are considered nonresidential.
Where no heating system is to be provided or no heating energy source is specified, use the "Electric and Other" heating source classification.
Where attributes make a building eligible for more than one *baseline* system type, use the predominant condition to determine the system type for the entire building.
For laboratory spaces with a minimum of 5000 cfm of exhaust, use system type 5 or 7 and reduce the exhaust and makeup air volume to 50% of design values during unoccupied periods. For all-electric buildings, the heating shall be electric resistance.

Modify Table G3.1.1A (SI Units) as Follows:

TABLE G3.1.1A *Baseline* HVAC System Types

Building Type	Fossil Fuel, Fossil/Electric Hybrid, & Purchased Heat	Electric and Other
Residential	System 1 – PTAC	System 2 – PTHP
Nonresidential & 3 Floors or Less & <2300 m^2	System 3 – PSZ-AC	System 4 – PSZ-HP
Nonresidential & 4 or 5 Floors & <2300 m^2 or 5 Floors or Less & 2300 m^2 to 13,800 m^2	System 5 – Packaged VAV w/ Reheat	System 6 – Packaged VAV w/PFP Boxes
Nonresidential & More than 5 Floors or >13,800 m^2	System 7 – VAV w/Reheat	System 8 – VAV w/PFP Boxes
Heated Only Storage	System 11 – Heating and Ventilation	System 10 – Heating and Ventilation

Notes:
Residential building types include dormitory, hotel, motel, and multifamily. Residential space types include guest rooms, living quarters, private living space, and sleeping quarters. Other building and space types are considered nonresidential.
Where no heating system is to be provided or no heating energy source is specified, use the "Electric and Other" heating source classification.
Where attributes make a building eligible for more than one *baseline* system type, use the predominant condition to determine the system type for the entire building.
For laboratory spaces with a minimum of 2400 L/s of exhaust, use system type 5 or 7 and reduce the exhaust and makeup air volume to 50% of design values during unoccupied periods.
For all-electric buildings, the heating shall be electric resistance.

Modify Table G3.1.1B (I-P and SI Units) as Follows:

TABLE G3.1.1B *Baseline* System Descriptions

System No.	System Type	Fan Control	Cooling Type	Heating Type
1. PTAC	Packaged terminal air conditioner	Constant Volume	Direct Expansion	Hot Water Fossil Fuel Boiler
2. PTHP	Packaged terminal heat pump	Constant Volume	Direct Expansion	Electric Heat Pump
3. PSZ-AC	Packaged rooftop air conditioner	Constant Volume	Direct Expansion	Fossil Fuel Furnace
4. PSZ-HP	Packaged rooftop heat pump	Constant Volume	Direct Expansion	Electric Heat Pump
5. Packaged VAV w/ Reheat	Packaged rooftop variable air volume with reheat	VAV	Direct Expansion	Hot Water Fossil Fuel Boiler
6. Packaged VAV w/PFP Boxes	Packaged rooftop variable air volume with reheat	VAV	Direct Expansion	Electric Resistance
7. VAV w/Reheat	Variable air volume with reheat	VAV	Chilled Water	Hot Water Fossil Fuel Boiler
8. VAV w/PFP Boxes	Variable air volume with parallel fan powered boxes and reheat	VAV	Chilled Water	Electric Resistance
9. SZ – VAV	Single Zone VAV	VAV	Chilled Water	See Notes
10. Heating and Ventilation	Warm air furnace, electric	Constant Volume	None	Electric resistance
11. Heating and Ventilation	Warm air furnace, gas fired	Constant Volume	None	Fossil fuel furnace

Notes:
Where the *proposed design* heating source is electric or other, the heating type shall be electric resistance. Where the *proposed design* heating source is fossil fuel, fossil/electric hybrid, or purchased heat, the heating type shall be hot-water fossil fuel boiler.

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FOREWORD

This addendum attempts to clearly establish the goals and requirements of the lighting system including controls and to ensure that the owner is provided all the information necessary to best use and maintain the lighting systems.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum do to 90.1-2007

Modify the Standard as follows (SI and I-P Units).

4.2.2.3 Manuals. Operating and … specified in Sections 6.7.2.2, ~~and~~ 8.7.2~~.~~and 9.7.2.2.

9.7 Submittals

~~**9.7.1 System Commissioning.**~~

~~**9.7.1.1 Commissioning Automatic Daylighting Controls.** Automatic daylighting control systems shall be tested to ensure that control elements are calibrated, adjusted, and in proper working condition to *manufacturer*'s specifications. System performance shall be demonstrated to perform as specified by the design plans and specifications.~~

9.7.1 General. Where required by the a*uthority having jurisdiction* the submittal of compliance documentation and supplemental information shall be in accordance with section 4.2.2.

9.7.2 Completion requirements. The following requirements are mandatory provisions and are necessary for compliance with this standard.

9.7.2.1 Drawings. Construction documents shall require that within 90 days after the date of system acceptance, record drawings of the actual installation be provided to the building owner or the designated representative of the building owner. Record drawings shall include, as a minimum, the location, luminaire identifier, control, and circuiting for each piece of lighting equipment.

9.7.2.2 Manuals. Construction documents shall require for all lighting equipment and lighting controls, an operating and maintenance manual be provided to the building owner or the designated representative of the building owner within 90 days after the date of system acceptance. These manuals shall include, at a minimum, the following:

a. Submittal data indicating all selected options for each piece of lighting equipment and lighting controls.
b. Operation and maintenance manuals for each piece of lighting equipment and lighting controls with routine maintenance clearly identified including, as a minimum, a recommended relamping program and a schedule for inspecting and recalibrating all lighting controls.
c. A complete narrative of how each lighting control system is intended to operate including recommended settings.

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FOREWORD

This addendum updates the references in ASHRAE Standard 90.1. While these changes reflect the current edition of the cited standard it should be noted that substantive changes in the referenced documents did not affect the requirements in 90.1 or change the stringency of the requirements of 90.1.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum dp to 90.1-2007

Revise the Standard as follows (I-P and SI units).

12. NORMATIVE REFERENCES

Reference	Title
American National Standards Institute, 11 West 42nd Street, New York, NY 10036	
ANSI Z83.8-~~2006~~ 2009	Gas Unit Heaters and Duct Furnaces
Association of Home Appliance Manufacturers, ~~20 North Wacker Drive, Chicago, IL 60606~~ 1111 19th Street NW, Suite 402, Washington, DC 20036	
ANSI/AHAM RAC-1-~~2003~~ R2008	Room Air Conditioners
Air-Conditioning, Heating and Refrigeration Institute, ~~4100 North Fairfax Drive, Suite 200, Arlington, VA 22203~~ 2111 Wilson Blvd., Suite 500, Arlington, VA 22201	
AHRI 210/240-~~2006~~ 2008	Unitary Air Conditioning and Air-Source Heat Pump Equipment
AHRI 310/380-2004	Packaged Terminal Air-Conditioners and Heat Pumps
AHRI 340/360-2004	Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment
AHRI 365-~~2002~~ 2009	Commercial and Industrial Unitary Air-Conditioning Condensing Units
AHRI 390-2003	Performance Rating of Single Packaged Vertical Air-Conditioners and Heat Pumps
AHRI 460-2005	Remote Mechanical Draft Air Cooled Refrigerant Condensers
AHRI 550/590-2003	Water-Chilling Packages Using the Vapor Compression Cycle
AHRI 560-2000	Absorption Water Chilling and WAter Heating Packages
AHRI-1160-2008	Performance Rating of Heat Pump Pool Heaters
BTS 2000	Testing Standard Method to Determine Efficiency of Commercial Space Heating Boilers
Cooling Technology Institute, 2611 FM 1960 West, Suite A-101, Houston, TX 77068-3730; P.O. Box 73383, Houston, TX 77273-3383	
CTI STD-201 (~~04~~ 09)	~~Standard for Certification of Water Cooling Tower Thermal Performance~~ Standard for Thermal Performance Certification of Evaporative Heat Transfer Equipment
~~**Hydronics Institute, Division of Gama, 35 Russo Place, P.O. Box 218, Berkeley Heights, NJ 07922**~~	
~~BTS 2000~~	~~Testing Standard Method to Determine Efficiency of Commercial Heating Boilers~~
National Electrical Manufacturers Association, 1300 N. 17th Street, Suite 1847, Rosslyn, VA 22209	
ANSI/NEMA MG 1- ~~1993~~ 2006	Motors and Generators
Underwriters Laboratories, Inc., 333 Pfinsten Rd., Northbrook, IL 60062	
UL 727-~~94~~ 06	UL Standard for Safety—Oil Fired Central Furnaces
UL 731-~~96~~ 06	UL Standard for Safety—Oil Fired Unit Heaters

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FOREWORD

This addendum modifies the calculations found in Appendix C in order to reflect modifications to the modeling assumptions in the equations.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum dq to 90.1-2007

Revise the Standard as follows (I-P units).

NORMATIVE APPENDIX C METHODOLOGY FOR BUILDING ENVELOPE TRADE-OFF OPTION IN SUBSECTION 5.6

~~**C5.6** *Envelope performance factor (EPF)* is defined in the following equation.~~

$$\text{Envelope Performance Factor} = \frac{\text{MBtu} \times 6600 + \text{kWh} \times 80}{\text{Total Building Floor Area}} \quad \text{(C-1)}$$

Subsequent equations to be editorially renumbered throughout the remaining sections of Appendix C.

C6.2 Envelope Performance Factor. The *EPF* of a building shall be calculated using Equation C-~~2~~1.

$$\text{EPF} = \text{FAF} \times [\Sigma\text{HVAC}_{surface} + \Sigma\text{Lighting}_{zone}] \quad \text{(C-}\sout{2}\text{1)}$$

where

FAF = floor area factor for the entire building

$\Sigma\text{HVAC}_{surface}$ = sum of HVAC for each surface calculated using Equation C-~~3~~2

$\Sigma\text{Lighting}_{zone}$ = sum of lighting for each zone calculated using Equation C-~~4~~3

TABLE C6.1 Input Variables

Variable	Description	I-P Units
~~CFA~~	~~Conditioned floor area~~	~~ft^2~~
~~FAF~~	~~Building floor area factor~~	~~1000/CFA, ft^2~~

No other changes to Table C6.1.

In the remaining sections only the equations and the equation numbers change.

C6.3 HVAC. The HVAC term for each *exterior* or *semi-exterior* surface in the building shall be calculated using Equation C-~~3~~2.

$$HVAC_{surface} = \underline{0.0939 \times} COOL + \underline{1.22 \times} HEAT \quad (C\text{-}\sout{3}\underline{2})$$

C6.4 Lighting. The lighting term for each zone in the building as defined in Section C4 shall be calculated using Equation C-~~4~~3.

$$Lighting_{zone} = LPDadj_{zone} \times AREA_{zone} \times \sout{216}\ \underline{2700 \times 0.0939} \quad (C\text{-}\sout{4}\underline{3})$$

C6.8.2 Cooling Factor. The cooling factor for the surfaces in the zone shall be calculated using Equation C-1~~4~~3.

$$COOL = \sout{0.005447}\ \underline{1000/(1200\times12.24)} \times [CLU + CLUO + CLXUO + CLM + CLG + CLS + CLC] \quad (C\text{-}1\sout{4}\underline{3})$$

C6.8.3 Heating Factor. The heating factor for the surfaces in the zone shall be calculated using Equation C-1~~6~~5.

$$HEAT = \sout{0.007669}\ 10\underline{/(1200 \times 0.608488)} \times [HLU + HLUO + HLXUO + HLM + HLG + HLS + HLC] \quad (C\text{-}1\sout{6}\underline{5})$$

C6.9 Skylights in the Exterior Building Envelope. HEAT and COOL shall be calculated for *skylights* in *nonresidential conditioned* and *residential conditioned* zones using Equations C-1~~8~~7 and C-1~~9~~8.

$$HEAT = Area_{sky} \times HDD65 \times \sout{0.66} \times (H_2 \times U_{sky} + H_3 \times \sout{1.163} \times SHGC\underline{/0.86}) \quad (C\text{-}1\sout{8}\underline{7})$$

$$COOL = Area_{sky} \times C_2 \times CDD50 \times \sout{0.093} \times SHGC\underline{/0.86} \quad (C\text{-}1\sout{9}\underline{8})$$

C6.10.3 Calculation of COOL and HEAT. COOL and HEAT shall be calculated for each surface using Equations C-2~~2~~1 and C-2~~3~~2 and coefficients from Table C6.10.2, which depend on surface classification and *space-conditioning category.*

$$COOL = Size \times Factor \times \sout{0.08} \times (Ccoef1 \times CDD50 + Ccoef2) \quad (C\text{-}2\sout{2}\underline{1})$$

$$HEAT = Size \times Hcoef \times Factor \times HDD65 \times \sout{0.66} \quad (C\text{-}2\sout{3}\underline{2})$$

Revise the Standard as follows (SI units).

NORMATIVE APPENDIX C METHODOLOGY FOR BUILDING ENVELOPE TRADE-OFF OPTION IN SUBSECTION 5.6

~~**C5.6** *Envelope performance factor (EPF)* is defined in the following equation.~~

$$\sout{\text{Envelope Performance Factor} = \frac{\text{MBtu} \times 6600 + \text{kWh} \times 80}{\text{Total Building Floor Area}}} \quad \sout{(C\text{-}1)}$$

Subsequent equations to be editorially renumbered throughout the remaining sections of Appendix C.

C6.2 Envelope Performance Factor. The *EPF* of a building shall be calculated using Equation C-~~2~~1.

$$EPF = \sout{FAF \times}\ [\Sigma HVAC_{surface} + \Sigma Lighting_{zone}] \quad (C\text{-}\sout{2}\underline{1})$$

where

~~FAF = floor area factor for the entire building~~

$\Sigma HVAC_{surface}$ = sum of HVAC for each surface calculated using Equation C-~~3~~2

$\Sigma Lighting_{zone}$ = sum of lighting for each zone calculated using Equation C-~~4~~3

TABLE C6.1 Input Variables

Variable	Description	SI Units
~~CFA~~	~~Conditioned floor area~~	~~m^2~~
~~FAF~~	~~Building floor area factor~~	~~10764/CFA, m^2~~

No other changes to Table C6.1.

In the remaining sections only the equations and the equation numbers change.

C6.3 HVAC. The HVAC term for each *exterior* or *semi-exterior* surface in the building shall be calculated using Equation C-~~3~~2.

$$HVAC_{surface} = \underline{0.0939 \times} COOL + \underline{1.16 \times} HEAT \quad (C\text{-}\sout{3}\underline{2})$$

C6.4 Lighting. The lighting term for each zone in the building as defined in Section C4 shall be calculated using Equation C-~~4~~3.

$$Lighting_{zone} = LPDadj_{zone} \times AREA_{zone} \times \sout{216}\ \underline{2700 \times 0.0939} \quad (C\text{-}\sout{4}\underline{3})$$

C6.8.2 Cooling Factor. The cooling factor for the surfaces in the zone shall be calculated using Equation C-14~~3~~.

$$COOL = \sout{0.005447}\ \underline{1{,}000 \times 10.8/(1200 \times 12.24)} \times [CLU + CLUO + CLXUO + CLM + CLG + CLS + CLC] \quad (C\text{-}14\underline{3})$$

C6.8.3 Heating Factor. The heating factor for the surfaces in the zone shall be calculated using Equation C-16~~5~~.

$$HEAT = \sout{0.007669}\ \underline{1{,}000{,}000 \times 10.8 \times 1.055/(1200 \times 0.608488)} \times [HLU + HLUO + HLXUO + HLM + HLG + HLS + HLC] \quad (C\text{-}16\underline{5})$$

C6.9 Skylights in the Exterior Building Envelope. HEAT and COOL shall be calculated for *skylights* in *nonresidential conditioned* and *residential conditioned* zones using Equations C-1~~8~~7 and C-1~~9~~8.

$$HEAT = Area_{sky} \times HDD65 \times \sout{0.66} \times (H_2 \times U_{sky} + H_3 \times \sout{1.163} \times SHGC/\underline{0.86}) \quad (C\text{-}1\sout{8}\underline{7})$$

$$COOL = Area_{sky} \times C_2 \times CDD50 \times \sout{0.093} \times SHGC/\underline{0.86} \quad (C\text{-}1\sout{9}\underline{8})$$

C6.10.3 Calculation of COOL and HEAT. COOL and HEAT shall be calculated for each surface using Equations C-2~~2~~1 and C-2~~3~~2 and coefficients from Table C6.10.2, which depend on surface classification and *space-conditioning category.*

$$COOL = Size \times Factor \times \sout{0.08} \times (Ccoef1 \times CDD50 + Ccoef2) \quad (C\text{-}2\sout{2}\underline{1})$$

$$HEAT = Size \times Hcoef \times Factor \times HDD65 \times \sout{0.66} \quad (C\text{-}2\sout{3}\underline{2})$$

(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

The original purpose for this provision was to limit the use of inefficient lighting sources for high wattage applications when there was not a comprehensive table of exterior LPD limits. With the table of requirements now in the 2007 and beyond versions of the standard, the need for this limit is superseded.

Note: In this addendum, changes to the current standard are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) unless the instructions specifically mention some other means of indicating the changes.

Addendum dr to 90.1-2007

Revise the Standard as follows (I-P and SI units).

Remove section 9.4.4 and renumber other sections as needed editorially.

~~9.4.4 Exterior Building Grounds Lighting.~~ ~~All exterior building grounds luminaires that operate at greater than 100 W shall contain lamps having a minimum efficacy of 60 lm/W unless the luminaire is controlled by a motion sensor or qualifies for one of the exceptions under Section 9.1.1 or 9.4.5.~~

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the standards and guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive technical committee structure, continue to generate up-to-date standards and guidelines where appropriate and adopt, recommend, and promote those new and revised standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating standards and guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.