ANSI/ASHRAE/IESNA Addenda ag, ai, aj, ak, ay, bc, and bd to
ANSI/ASHRAE/IESNA Standard 90.1-2007

ASHRAE STANDARD

Energy Standard for Buildings Except Low-Rise Residential Buildings

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FOREWORD

This addendum adds a requirement for joint insulation.

Addendum ag to 90.1-2007

Revise the Standard as follows (I-P and S-I units):

5.8.1.10 Joints in rigid insulation. Where two or more layers of rigid insulation board are used in a construction assembly, the edge joints between each layer of boards shall be staggered.

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FOREWORD

This addendum is intended to reduce the inequities typically associated with modeling district cooling systems per the requirements of Appendix G of ASHRAE/IESNA Standard 90.1-2007. Specifically, this addendum removes the requirement for comparing proposed buildings utilizing purchased chilled water with a baseline building with on-site chillers, and instead requires a baseline that also uses purchased chilled water.

The existing requirement that proposed buildings with purchased heat be compared to a baseline building with purchased heat is clarified. This addendum details the modifications that are to be made to the baseline HVAC systems when purchased chilled water or heat are included.

This addendum modifies language that is also modified in Addendum "r" for purchased chilled water modeling.

Addendum ai to 90.1-2007

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

G3.1.1.1 Purchased Heat. For systems using purchased hot water or steam, the heating source shall be modeled as purchased hot water or steam in both the *proposed* and *baseline building designs*. Hhot water or steam costs shall be based on actual utility rates and on-site boilers, electric heat, and furnaces shall not be modeled in the *baseline building design*.

G3.1.1.2 Purchased Chilled Water. For systems using purchased chilled water, the cooling source shall be modeled as purchased chilled water in both the proposed and baseline building designs. Purchased chilled water costs shall be based on actual utility rates and on-site chillers and direct expansion equipment shall not be modeled in the *baseline building design.*

G3.1.1.3 *Baseline* HVAC System Requirements for Systems Utilizing Purchased Chilled Water and/or Purchased Heat. If the *proposed building design* uses purchased chilled water and/or purchased heat, the following modifications to the Baseline HVAC System Types in Table G3.1.1B shall be used:

G3.1.1.3.1 Purchased Heat Only. If the *proposed building design* uses purchased heat, but does not use purchased chilled water, then Table G3.1.1A and Table G3.1.1B shall be used to select the Baseline HVAC System Type, with the modifications listed below:

Purchased heat shall be substituted for the Heating Type in Table G3.1.1B. The same heating source shall be used in the *proposed* and *baseline building design*.

G3.1.1.3.2 Purchased Chilled Water Only. If the *proposed building design* uses purchased chilled water, but does not use purchased heat, then Table G3.1.1A and Table G3.1.1B shall be used to select the Baseline HVAC System Type, with the modifications listed below:

Purchased chilled water shall be substituted for the Cooling Types in Table G3.1.1B.

System 1 and 2 shall be constant volume fan coil units with fossil fuel boiler(s).

System 3 and 4 shall be constant volume single zone air handlers with fossil fuel furnace(s).

System 7 shall be used in place of System 5.

System 8 shall be used in place of System 6.

G3.1.1.3.3 Purchased Chilled Water and Purchased Heat. If the *proposed building design* uses purchased chilled water and purchased heat, then Table G3.1.1A and Table G3.1.1.B shall be used to select the Baseline HVAC System Type, with the following modifications:

Purchased heat and purchased chilled water shall be substituted for the Heating Types and Cooling Types in Table G3.1.1B.

System 1 shall be constant volume fan coil units.

System 3 shall be constant volume single zone air handlers.

System 7 shall be used in place of System 5.

TABLE G3.1.1A *Baseline* HVAC System Types

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

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.

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 with Reheat	Packaged rooftop VAV with reheat	VAV	Direct expansion	Hot water fossil fuel boiler
6. Packaged VAV with PFP Boxes	Packaged rooftop VAV with reheat	VAV	Direct expansion	Electric resistance
7. VAV with Reheat	Packaged rooftop VAV with reheat	VAV	Chilled water	Hot water fossil fuel boiler
8. VAV with PFP Boxes	VAV with reheat	VAV	Chilled water	Electric resistance

Note: For purchased chilled water and purchased heat, see G3.1.1.3.

G3.1.1.3.4 On-Site Distribution Pumps. All on-site distribution pumps shall be modeled in both the baseline and proposed designs.

G3.1.3.5 Hot Water Pumps ~~(Systems 1, 5, and 7)~~

Exception to G3.1.3.5: The pump power for systems using purchased heat shall be 14 W/gpm.

G3.1.3.6 Piping Losses ~~(Systems 1, 5, and 7)~~

G3.1.3.7 Type and Number of Chillers (Systems 7 and 8). Electric chillers shall be used in the *baseline building design* regardless of the cooling energy source, e.g., direct-fired absorption~~,~~ or absorption from purchased steam~~, or purchased chilled water~~. The *baseline building design's* chiller plant shall be modeled with chillers having the number and type as indicated in Table G3.1.3.7 as a function of building conditioned floor area.

Exception: Systems using purchased chilled water shall be modeled in accordance with Section G3.1.1.3.

G3.1.3.10 Chilled-Water Pumps ~~(Systems 1, 5, and 7)~~

Exception to G3.1.3.10: The pump power for systems using chilled water shall be 16 W/gpm.

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FOREWORD

Section 313 of the Energy Independence and Security Act of 2007 (EISA 2007) mandates that the efficiency of general purpose motors (manufactured or imported) that are rated at 1.0 horsepower and larger be increased in December, 2010. In addition, there are new efficiency standards that are required for larger motors that may be used by commercial/industrial customers (sized greater than 200 horsepower and less than or equal to 500 horsepower).

The proposed changes update the text and table of Chapter 10 to comply with the new federal law. Since the new law and the new version of ASHRAE 90.1 will both occur in 2010, this change will ensure that there is no confusion about the new energy efficiency standards for motors that are manufactured in 2010 and beyond.

According to a March 21, 2007 press release by the American Council for an Energy-Efficient Economy (ACEEE) and the National Electrical Manufacturers Association (NEMA), the new motor efficiency standards will create a cumulative national energy savings of 8 quadrillion Btu's over 20 years (2010 to 2030), with a net energy cost savings to commercial and industrial consumers of almost $500 million.

Further information can be found at the following web sites:

- *http://www.nema.org/stds/complimentary-docs/upload/MG1premium.pdf*
- *http://www.nema.org/prod/ind/motor/*
- *http://www.nema.org/gov/energy/efficiency/premium/*

The energy used by motors is significant, especially in the industrial sector of the US economy. More information can be found at:

- *http://www1.eere.energy.gov/industry/bestpractices/pdfs/mtrmkt.pdf*

Adding this information to the next version of ASHRAE 90.1 will help designers, end-use customers, and code officials with motor specifications and verifications. These standards have been vetted and analyzed and agreed to by motor manufacturers.

Addendum aj to 90.1-2007

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

Modify and add new text to Chapter 10.4.1 as follows:

<u>10.4 Mandatory Provisions</u>

10.4.1 Electric Motors. <u>Until December 18, 2010</u>, ~~Electric~~ <u>electric</u> motors shall comply with the requirements of the Energy Policy Act of 1992 where applicable, as shown in Table 10.8<u>a</u>. ~~Motors that are not included in the scope of the Energy Policy Act of 1992 have no performance requirements in this section~~.

<u>Electric motors manufactured as of December 19, 2010, shall comply with the requirements of the Energy Independence and Security Act of 2007, as shown in Table 10.8b. Motors that are not included in the scope of the Energy Independence and Security Act of 2007 have no performance requirements in this section.</u>

Modify and add new text and a tables to Chapter 10.8 as follows (I-P units):

10.8 Product Information

Table 10.8a Minimum Nominal Efficiency for General Purpose Design A and Design B Motors Rated 600 Volts or Less[a]

Minimum Nominal Full-Load Efficiency (before 12/19/2010)						
	Open Drip-Proof Motors			Totally Enclosed Fan-Cooled Motors		
Number of Poles ⇒	**2**	**4**	**6**	**2**	**4**	**6**
Synchronous Speed (RPM) ⇒	**3600**	**1800**	**1200**	**3600**	**1800**	**1200**
Motor Horsepower						
1	—	82.5	80.0	75.5	82.5	80.0
1.5	82.5	84.0	84.0	82.5	84.0	85.5
2	84.0	84.0	85.5	84.0	84.0	86.5
3	84.0	86.5	86.5	85.5	87.5	87.5
5	85.5	87.5	87.5	87.5	87.5	87.5
7.5	87.5	88.5	88.5	88.5	89.5	89.5
10	88.5	89.5	90.2	89.5	89.5	89.5
15	89.5	91.0	90.2	90.2	91.0	90.2
20	90.2	91.0	91.0	90.2	91.0	90.2
25	91.0	91.7	91.7	91.0	92.4	91.7
30	91.0	92.4	92.4	91.0	92.4	91.7
40	91.7	93.0	93.0	91.7	93.0	93.0
50	92.4	93.0	93.0	92.4	93.0	93.0
60	93.0	93.6	93.6	93.0	93.6	93.6
75	93.0	94.1	93.6	93.0	94.1	93.6
100	93.0	94.1	94.1	93.6	94.5	94.1
125	93.6	94.5	94.1	94.5	94.5	94.1
150	93.6	95.0	94.5	94.5	95.0	95.0
200	94.5	95.0	94.5	95.0	95.0	95.0

[a] Nominal efficiencies shall be established in accordance with NEMA Standard MG1. Design A and Design B are National Electric Manufacturers Association (NEMA) design class designations for fixed-frequency small and medium AC squirrel-cage induction motors.

TABLE 10.8b Minimum Nominal Efficiency for General Purpose Design A and Design B Motors Rated 600 Volts or Less[a]

Minimum Nominal Full Load Efficiency (%) as of December 19, 2010						
	Open Drip-Proof Motors			Totally Enclosed Fan-Cooled Motors		
Number of Poles ⇒	2	4	6	2	4	6
Synchronous Speed (RPM) ⇒	3600	1800	1200	3600	1800	1200
Motor Horsepower						
1	77.0	85.5	82.5	77.0	85.5	82.5
1.5	84.0	86.5	86.5	84.0	86.5	87.5
2	85.5	86.5	87.5	85.5	86.5	88.5
3	85.5	89.5	88.5	86.5	89.5	89.5
5	86.5	89.5	89.5	88.5	89.5	89.5
7.5	88.5	91.0	90.2	89.5	91.7	91.0
10	89.5	91.7	91.7	90.2	91.7	91.0
15	90.2	93.0	91.7	91.0	92.4	91.7
20	91.0	93.0	92.4	91.0	93.0	91.7
25	91.7	93.6	93.0	91.7	93.6	93.0
30	91.7	94.1	93.6	91.7	93.6	93.0
40	92.4	94.1	94.1	92.4	94.1	94.1
50	93.0	94.5	94.1	93.0	94.5	94.1
60	93.6	95.0	94.5	93.6	95.0	94.5
75	93.6	95.0	94.5	93.6	95.4	94.5
100	93.6	95.4	95.0	94.1	95.4	95.0
125	94.1	95.4	95.0	95.0	95.4	95.0
150	94.1	95.8	95.4	95.0	95.8	95.8
200	95.0	95.8	95.4	95.4	96.2	95.8
250	95.0	95.8	95.4	95.8	96.2	95.8
300	95.4	95.8	95.4	95.8	96.2	95.8
350	95.4	95.8	95.4	95.8	96.2	95.8
400	95.8	95.8	95.8	95.8	96.2	95.8
450	95.8	96.2	96.2	95.8	96.2	95.8
500	95.8	96.2	96.2	95.8	96.2	95.8

[a] Nominal efficiencies shall be established in accordance with NEMA Standard MG1. Design A and Design B are National Electric Manufacturers Association (NEMA) design class designations for fixed-frequency small- and medium-AC squirrel-cage induction motors.

Modify and add new text and a tables to Chapter 10.8 as follows (SI units):

10.8 Product Information

Table 10.8a Minimum Nominal Efficiency for General Purpose Design A and Design B Motors Rated 600 Volts or Less[a]

Minimum Nominal Full-Load Efficiency (before 12/19/2010)						
	Open Drip-Proof Motors			Totally Enclosed Fan-Cooled Motors		
Number of Poles ⇒	**2**	**4**	**6**	**2**	**4**	**6**
Synchronous Speed (RPM) ⇒	**3600**	**1800**	**1200**	**3600**	**1800**	**1200**
Motor Size (kW)						
1	—	82.5	80.0	75.5	82.5	80.0
1.5	82.5	84.0	84.0	82.5	84.0	85.5
2	84.0	84.0	85.5	84.0	84.0	86.5
3	84.0	86.5	86.5	85.5	87.5	87.5
5	85.5	87.5	87.5	87.5	87.5	87.5
7.5	87.5	88.5	88.5	88.5	89.5	89.5
10	88.5	89.5	90.2	89.5	89.5	89.5
15	89.5	91.0	90.2	90.2	91.0	90.2
20	90.2	91.0	91.0	90.2	91.0	90.2
25	91.0	91.7	91.7	91.0	92.4	91.7
30	91.0	92.4	92.4	91.0	92.4	91.7
40	91.7	93.0	93.0	91.7	93.0	93.0
50	92.4	93.0	93.0	92.4	93.0	93.0
60	93.0	93.6	93.6	93.0	93.6	93.6
75	93.0	94.1	93.6	93.0	94.1	93.6
100	93.0	94.1	94.1	93.6	94.5	94.1
125	93.6	94.5	94.1	94.5	94.5	94.1
150	93.6	95.0	94.5	94.5	95.0	95.0
200	94.5	95.0	94.5	95.0	95.0	95.0

[a] Nominal efficiencies shall be established in accordance with NEMA Standard MG1. Design A and Design B are National Electric Manufacturers Association (NEMA) design class designations for fixed-frequency small and medium AC squirrel-cage induction motors.

TABLE 10.8b Minimum Nominal Efficiency for General Purpose Design A and Design B Motors Rated 600 Volts or Less[a]

Minimum Nominal Full Load Efficiency (%) as of December 19, 2010						
	Open Drip-Proof Motors			Totally Enclosed Fan-Cooled Motors		
Number of Poles ⇒	2	4	6	2	4	6
Synchronous Speed (RPM) ⇒	3600	1800	1200	3600	1800	1200
Motor Horsepower						
0.7	77.0	85.5	82.5	77.0	85.5	82.5
1.1	84.0	86.5	86.5	84.0	86.5	87.5
1.5	85.5	86.5	87.5	85.5	86.5	88.5
2.2	85.5	89.5	88.5	86.5	89.5	89.5
3.7	86.5	89.5	89.5	88.5	89.5	89.5
5.6	88.5	91.0	90.2	89.5	91.7	91.0
7.5	89.5	91.7	91.7	90.2	91.7	91.0
11.2	90.2	93.0	91.7	91.0	92.4	91.7
14.9	91.0	93.0	92.4	91.0	93.0	91.7
18.7	91.7	93.6	93.0	91.7	93.6	93.0
22.4	91.7	94.1	93.6	91.7	93.6	93.0
29.8	92.4	94.1	94.1	92.4	94.1	94.1
37.3	93.0	94.5	94.1	93.0	94.5	94.1
44.8	93.6	95.0	94.5	93.6	95.0	94.5
56.0	93.6	95.0	94.5	93.6	95.4	94.5
74.6	93.6	95.4	95.0	94.1	95.4	95.0
93.3	94.1	95.4	95.0	95.0	95.4	95.0
111.9	94.1	95.8	95.4	95.0	95.8	95.8
149.2	95.0	95.8	95.4	95.4	96.2	95.8
186.5	95.0	95.8	95.4	95.8	96.2	95.8
223.8	95.4	95.8	95.4	95.8	96.2	95.8
261.1	95.4	95.8	95.4	95.8	96.2	95.8
298.4	95.8	95.8	95.8	95.8	96.2	95.8
335.7	95.8	96.2	96.2	95.8	96.2	95.8
373.0	95.8	96.2	96.2	95.8	96.2	95.8

[a] Nominal efficiencies shall be established in accordance with NEMA Standard MG1. Design A and Design B are National Electric Manufacturers Association (NEMA) design class designations for fixed-frequency small- and medium-AC squirrel-cage induction motors.

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FOREWORD

Five basic changes are included in this addendum. The rationale for each is included below.

Rationale for Deletion of 10 HP from 6.5.4

The applicable pump motor size or system size criteria are already included in each specific requirement in this section. For example, the variable flow requirement and the VSD requirements list motor sizes. The pump isolation requirement is only for systems with multiple chillers and boilers and the temperature reset requirement has a minimum Btuh. Specifying the applicable size with each requirement makes the standard clearer.

Rationale for 6.5.4.1 "Chilled Water" Wording

The original wording required variable speed pumping on heating systems. The economics of this are very different from the economics for cooling systems. In heating systems the wasted pump energy (other than the motor inefficiency) becomes useful heat in the water. In cooling systems the extra pumping energy is a cost plus the heat produced must be removed. This addendum limits the requirement to cooling systems.

Rationale for Change to 7.5 HP (5.6 kW) (Exceeding 5 HP [3.7 kW])

The cost of variable speed technology has dropped rapidly. For fans, the committee chose to set the threshold at 10 hp [7.5 kW]. California performed economic analysis justifying VSDs on 7.5 hp [5.6 kW] and above in developing their 2005 Title 24 rule. We reviewed the assumptions and the VFD pricing listed in the latest Means books.

Rationale for 6.5.4.2 Differential Pressure Reset

Resetting the pressure setpoint can save a significant portion of annual pumping energy. It will also save chiller energy because of the reduction in pump heat going into the chilled water. No additional hardware is required to implement temperature and pressure setpoint reset in a DDC system. Some additional control programming and commissioning is required. Furthermore, the cost to implement the resets will go down over time as engineers and contractors gain experience and controls manufacturers improve their products.

Pressure reset has been successfully implemented on hundreds, perhaps thousands, of chilled water systems. The reset sequence must be properly tuned to insure that the savings are achieved and that the controls are stable but there are no fundamental obstacles to temperature and pressure reset. To achieve the full energy savings potential, "rogue" zones must be identified and addressed. A rogue zone is one where the valve is consistently wide open. Causes include faulty controls, inappropriate setpoints, pipe blockages, and higher than expected zone loads. Options for addressing rogue zones include replacing coils or valves or locking the zone out of the reset sequence. In a worst case scenario, with constantly starved zones, the pressure setpoint would not be reset at all, i.e. it would be the same as if there were no reset at all. Thus a system with pressure reset cannot be less efficient than one without reset; it can only be more efficient.

This requirement does not preclude also implementing chilled water supply temperature setpoint reset. Resetting chilled water temperature setpoint allows chillers to operate more efficiently. It also increases the "free cooling" provided by a water economizer. Whether it is more efficient to reset pressure first or temperature first will depend on the specific installation.

Rationale for Inclusion of Heat Pump and Water-Cooled Unitary Air-Conditioners

These units may not have modulating valves, but because of diversity their hydronic systems can minimize energy use by reducing pumping energy.

Addendum ak to 90.1-2007

Revise the Standard as follows (SI and IP units):

6.5.4 Hydronic System Design and Control. ~~HVAC hydronic systems having a total pump system power exceeding 10 hp [7.5 kW] shall meet provisions of Sections 6.5.4.1 through 6.5.4.4.~~

6.5.4.1 Hydronic Variable Flow Systems. HVAC pumping systems having a total pump system power exceeding 10 hp [7.5 kW] that include control valves designed to modulate or step open and close as a function of load shall be designed for variable fluid flow and shall be capable of reducing pump flow rates to 50% or less of the design flow rate. Individual chilled water pumps serving variable flow systems having ~~pump head exceeding 100 ft [300 kPa] and~~ motors exceeding ~~50 [37]~~ 5 hp [3.7 kW] shall have controls and/or devices (such as variable speed control) that will result in pump motor demand of no more than 30% of design wattage at 50% of design water flow. The controls or devices shall be controlled as a function of desired flow or to maintain a minimum required differential pressure. Differential pressure shall be measured at or near the most remote heat exchanger or the heat exchanger requiring the greatest differential pressure. The differential pressure setpoint shall be no more than 110% of that required to achieve design flow through the heat exchanger. Where differential pressure control is used to comply with this section and DDC controls are used the setpoint shall be reset downward based on valve positions until one valve is nearly wide open.

Exceptions:

a. Systems where the minimum flow is less than the minimum flow required by the equipment *manufacturer* for the proper operation of equipment served by the system, such as chillers, and where total pump system power is 75 hp [60 kW] or less.

b. Systems that include no more than three control valves.

6.5.4.2 Pump Isolation. When a chilled-water plant includes more than one chiller, provisions shall be made so that the flow in the chiller plant can be automatically reduced, correspondingly, when a chiller is shut down. Chillers referred to in this section, piped in series for the purpose of increased temperature differential, shall be considered as one chiller.

When a boiler plant includes more than one boiler, provisions shall be made so that the flow in the boiler plant can be automatically reduced, correspondingly, when a boiler is shut down.

6.5.4.3 Chilled- and Hot-Water Temperature Reset Controls. Chilled- and hot-water systems with a design capacity exceeding 300,000 Btu/h [88 kW] supplying chilled or heated water (or both) to comfort conditioning systems shall include controls that automatically reset supply water temperatures by representative building loads (including return water temperature) or by *outdoor air* temperature.

Exceptions:

a. Where the supply temperature reset controls cannot be implemented without causing improper operation of heating, cooling, humidifying, or dehumidifying systems.

b. Hydronic systems, such as those required by Section 6.5.4.1 that use variable flow to reduce pumping energy.

6.5.4.4 Hydronic (Water Loop) Heat Pumps and Water-Cooled Unitary Air-Conditioners.

6.5.4.4.1 Each hydronic heat pumps and water-cooled unitary air-conditioner shall have a two-position automatic valve interlocked to shut off water flow when the compressor is off.

Exception: Units employing water economizers.

6.5.4.4.2 Hydronic heat pumps and water-cooled unitary air-conditioners having a total pump system power exceeding 5 hp [3.7 kW] shall have controls and/or devices (such as variable speed control) that will result in pump motor demand of no more than 30% of design wattage at 50% of design water flow.

(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 current language specifies the application of space LPDs based on spaces surrounded by ceiling height partitions or walls only. This change more correctly requires users to identify spaces by function and is consistent with a previous interpretation. It is expected that the net energy result will be positive.

Addendum ay to 90.1-2007

Revise the Standard as follows (I-P and S-I units):

9.6.1 Space-by-Space Method of Calculating Interior Lighting Power Allowance. Use the following steps to determine the *interior lighting power allowance* by the Space-by-Space Method:

~~a. Determine the appropriate building type from Table 9.6.1. For building types not listed, selection of a reasonably equivalent type shall be permitted.~~

~~b. For each space enclosed by partitions 80% or greater than ceiling height, determine the gross interior floor area by measuring to the center of the partition wall. Include the floor area of balconies or other projections. Retail spaces do not have to comply with the 80% partition height requirements.~~

~~c. Determine the *interior lighting power allowance* by using the columns designated Space-by-Space Method in Table 9.6.1. Multiply the floor area(s) of the space(s) times the allowed *LPD* for the space type that most closely represents the proposed use of the space(s). The product is the *lighting power allowance* for the space(s). For space types not listed, selection of a reasonable equivalent category shall be permitted.~~

a. For each space enclosed by partitions that are 80% of the ceiling height or taller, determine the appropriate space type from Table 9.6.1. If a space has multiple functions, where more than one space type is applicable, that space shall be broken up into smaller subspaces, each using their own space type from Table 9.6.1. Any of these subspaces that are smaller in floor area than 20% of the original space and less than 1000 ft^2 (300 m^2) need not be broken out separately. Include the floor area of balconies and other projections in this calculation.

b. In calculating the area of each space and subspace, the limits of the area are defined by the centerline of interior walls, the dividing line between subspaces and the outside surface of exterior walls.

c. Based on the space type selected for each space or subspace, determine the *lighting power allowance* of each space or subspace by multiplying the calculated area of the space or subspace by the appropriate LPD determined in 9.6.1(a) above. For space types not listed, selection of a reasonable equivalent category shall be permitted.

d. The *interior lighting power allowance* is the sum of *lighting power allowances* of all spaces and subspaces. Trade-offs among spaces and subspaces are permitted provided that the total *installed interior lighting power* does not exceed the *interior lighting power allowance*.

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FOREWORD

This addendum clarifies that the requirements in Section 5.5.4.2.3 are also specified for unconditioned spaces.

Addendum bc to 90.1-2007

Revise Section 5.1 as follows:

5.1 General

5.1.1 Scope. Section 5 specifies requirements for the *building envelope.*

5.1.2 Space-Conditioning Categories

5.1.2.1 Separate *exterior building envelope* requirements are specified for each of three categories of conditioned space: (a) *nonresidential conditioned* space, (b) *residential conditioned* space, and (c) *semiheated* space

<u>**5.1.2.2** The minimum skylight area requirements in Section 5.5.4.2.3 are also specified for *unconditioned* spaces.</u>

Renumber the remainder of 5.1.2.

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FOREWORD

This change removes emergency circuits not used for normal building operation from the requirements which will lead to increased compliance. The change:

- *Allows for an increased conformance/use of the 90.1 standard by eliminating issues of impracticality of feeder drop requirements for emergency circuits*
- *provides significant initial cost savings*

Current Section Reads...

8.4.1.1 Feeders. *Feeder conductors shall be sized for a maximum voltage drop of 2% at design load.*

8.4.1.2 Branch Circuits. *Branch Circuit conductors shall be sized for a maximum voltage drop of 3% at design load.*

This would make ***Section 8****. consistent with the basis of exception* ***a****. to* ***9.1.1*** *This would allow feeders such as those installed and dedicated for emergency use only [not normally energized], to be an exception to the requirements of this section. (specific cost implication in high rise construction, utilizing secondary EM risers/feeders for generators operation).*

Addendum bd to 90.1-2007

Add Exception to 8.4.1 as follows:

Exception: *Feeder conductors* and *branch circuits* that are dedicated to emergency services.