

**ERRATA SHEET FOR
ANSI/ASHRAE/IES STANDARD 90.1-2016 (SI Edition)
Energy Standard for Buildings Except Low-Rise Residential Buildings**

March 18, 2019

The corrections listed in this errata sheet apply to ANSI/ASHRAE/IES Standard 90.1-2016, SI Edition. The first printing is identified on the outside back cover of the standard as “Product code: 86276 10/16”. Shaded items have been added since the previously published errata sheet dated February 27, 2019 was distributed.

NOTICE: ASHRAE now has a list server for Standing Standards Project Committee 90.1 (SSPC 90.1). Interested parties can now subscribe and unsubscribe to the list server and be automatically notified via e-mail when activities and information related to the Standard and the User’s Manual is available. To sign up for the list server please visit **Project Committee List Servers for Standard** on the Technology / Standards section of the ASHRAE website at <https://www.ashrae.org/technical-resources/standards-and-guidelines/project-committee-list-servers>.

- | <u>Page(s)</u> | <u>Erratum</u> |
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| 10 | <p>Footnote 1 (bottom of page). Change the URL for the schedules and internal loads as shown below.</p> <p>1. Schedules and internal loads by <i>building</i> area type are at http://sspc901.ashraepcs.org/documents.php.</p> |
| 37 | <p>3.3 Abbreviations and Acronyms. Change IES from “Illumination Engineering Society of North America” to “Illuminating Engineering Society”.</p> |
| 53 | <p>Table 5.5-2 Building Envelope Requirements for Climate Zone 2 (A, B)*. In Table 5.5-2, in the row for Floors, Mass, in the column Nonresidential, Insulation Min. R-Value, change “R-1.9” to “R-1.1”.</p> |
| 70 | <p>5.9.1 Inspections. Insert the following informative note immediately after Section 5.9.1. (Note: Additions are shown in <u>underline</u>.)</p> <p><u>Informative Note:</u> See Appendix E for commissioning references.</p> |

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| 85 | <p>6.4.4.2.2 Duct Leakage Tests. Correct the equation in Section 6.4.4.2.2 as shown below. (Note: Additions are shown in <u>underline</u> and deletions are shown in strikethrough.)</p> |
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$$L_{max} = C_L(P^{0.65}/1000)$$

where

L_{max} = maximum permitted leakage, L/s·per m² of duct surface area

C_L = ~~4~~0.00563, duct leakage class, L/s·per m² of duct surface area ~~at 250~~per Pa^{0.65}

P = test pressure, which shall be equal to the design duct pressure class rating, Pa

- 99 **6.5.4.4 Chilled- and Hot-Water Temperature Reset Controls.** In the Exceptions to 6.5.4.4, Exception 3, change the reference to “Section 6.5.4.1” to “Section 6.5.4.2”.
- 100 **TABLE 6.5.4.6 Piping System Design Maximum Flow Rate in L/s.** Change “1” L/s to “11” L/s for Nominal Pipe Size 90 mm in column 2 (≤ 2000 Hours/Yr, Other).
- 115 **TABLE 6.8.1-4 Electrically Operated Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, Single-Package Vertical Heat Pumps, Room Air Conditioners, and Room Air-Conditioner Heat Pumps – Minimum Efficiency Requirements.** Remove “/1000” from the efficiency equations in Table 6.8.1-4 as shown below. (Note: Deletions are shown in ~~strikethrough~~.)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure ^a
PTAC (cooling mode) standard size	All capacities	35.0°Cdb outdoor air	4.04 – (0.300 × Cap /1000) ^c COP _c (before 1/1/2015) 4.10 – (0.300 × Cap /1000) ^c COP _c (as of 1/1/2015)	AHRI 310/380
PTAC (cooling mode) nonstandard size ^b	All capacities	35.0°Cdb outdoor air	3.19 – (0.213 × Cap /1000) ^c COP _c	AHRI 310/380
PTHP (cooling mode) standard size	All capacities	35.0°Cdb outdoor air	4.10 – (0.300 × Cap /1000) ^c COP _c	AHRI 310/380
PTHP (cooling mode) nonstandard size ^b	All capacities	35.0°Cdb outdoor air	3.16 – (0.213 × Cap /1000) ^c COP _c	AHRI 310/380
PTHP (heating mode) standard size	All capacities		3.7 – (0.052 × Cap /1000) ^c COP _H	AHRI 310/380
PTHP (heating mode) nonstandard size ^b	All capacities		2.9 – (0.026 × Cap /1000) ^c COP _H	AHRI 310/380

- 120 **Table 6.8.1-10 Electrically Operated Variable-Refrigerant-Flow and Applied Heat Pumps – Minimum Efficiency Requirements (Continued).** Revise the equipment type subcategory for “VRF groundwater source (cooling mode)” as shown in the attached Table 6.8.1-10. (Note: Deletions are shown in ~~strikethrough~~.)
- 127 **Table 6.8.3-1 Minimum Piping Insulation Thickness Heating and Hot Water Systems^{a,b,c,d,e} (Steam, Steam Condensate, Hot-Water Heating and Domestic Water Systems).** Revise Note e of Table 6.8.3-1 as shown below. (Note: Additions are shown in underline and deletions are shown in ~~strikethrough~~.)
- e. The table is based on steel pipe. Nonmetallic pipes schedule 80 thickness or less shall use the table values. For other nonmetallic pipes having *thermal resistance* greater than that of steel pipe, reduced insulation thicknesses are permitted if documentation is provided showing that the pipe with the proposed insulation has no more heat transfer per metre ~~foot~~ than a steel pipe of the same size with the insulation thickness shown in the table.
- 128 **Table 6.8.3-2 Minimum Piping Insulation Thickness Cooling Systems (Chilled Water, Brine, and Refrigerant).** Change the insulation thickness requirement from “15 mm” to “13 mm” in three places.
- 143 **Exception to 9.4.1.1(g).** Revise the Exception to 9.4.1.1(g) as shown below.

(Note: Additions are shown in underline and deletions are shown in ~~strikethrough~~.)

Exception to 9.4.1.1(g)

This requirement does not have to be complied with in *spaces* that meet all ~~four~~ three of the following requirements:

1. The *space* has an installed *LPD* of no more than 0.80 W/ft².
2. The *space* is lighted by *HID lamp*.
3. The *general lighting* power in the *space* is automatically reduced by at least 30% within 20 minutes of all occupants leaving the *space*.
4. Lighting load does not exceed 0.02 W/ft² multiplied by the *gross lighted area* of the *building*.

144 **94.1.1 Interior Lighting Controls.** Add the following exception to the Exceptions to 9.4.1.1(h) as shown below.

4. Lighting load not exceeding 0.22 W/m² multiplied by the *gross lighted area* of the *building*.

147 **Table 9.4.2-2 Individual Lighting Power Allowance for *Building* Exteriors.** For Nontradable Surfaces, *Building* facades, change “66 W/lin m of facade length” to “8.2 W/lin m of facade length”.

151 **Table 9.5.1 Lighting Power Density Allowances Using the *Building* Area Method.** Add the *LPD* value for Workshop as “9.7” W/m².

183 **12. Normative References.** In Section 12 make the following correction.

(Note: Deletions are shown in ~~strikethrough~~.)

AHRI 340/360-2015 (~~I-P~~) and AHRI 341/361-2015 (~~SI~~) Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment

205 **Table A3.1-3 Assembly *U-Factors*, *C-Factors*, *R_u*, *R_c*, and *HC* for Concrete Block Walls (Continued).** In Table A3.1-3 for 200 mm block, Density 1,680 kg/m³, Partly Grouted, Cells Empty, change *HC* from “0.8” to “208”.

249 **Footnote 2 (bottom of page).** Change the URL for the schedules and internal loads as shown below.

2. Schedules and internal loads by *building* area type are found at

<http://sspc901.ashraepcs.org/documents.php>.

257 **Informative Appendix E Informative References.** In the table in Informative Appendix E make the following corrections. See attached.

(Note: Additions are shown in underline and deletions are shown in ~~strikethrough~~.)

282 **G3.1.3.11 Heat Rejection (Systems 7, 8, 9, 12, and 13).** In Section G3.1.3.11 replace “water-side economizer” with “fluid economizer” in two places.

285 **Table G3.1.1.-3 Baseline *HVACV* System Types.** In the first column of Table G3.1.1-3 change “residential” to “nonresidential” in three places.

311 **Table H-1 Addenda to ANSI/ASHRAE/IES Standard 90.1-2013 (Continued).** For Addendum ad in Table H-1 change “unlabeled” to “unlabeled”.

- 376** **Section Annex1-1: ASHRAE Standard 169-2013, Section A3: Climate Zone Definitions.** In Section A3, sentence immediately following item b.3 delete the extra “the” from the first word “Userthe” so the sentence reads “Use the third criteria below for determining the Dry/Humid threshold if not Marine (C)”.

Table 6.8.1-10 Electrically Operated Variable-Refrigerant-Flow and Applied Heat Pumps— Minimum Efficiency Requirements (Continued)

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
VRF groundwater source (cooling mode)	<40 kW	All	VRF multisplit system with heat recovery 15°C entering water	4.75 COP _C	AHRI 1230
			VRF multisplit system with heat recovery 15°C entering water	4.69 COP _C	
	VRF multisplit system with heat recovery 15°C entering water		4.04 COP _C		
	VRF multisplit system with heat recovery 15°C entering water		3.99 COP _C		
	≥40 kW				

**Informative Appendix E
Informative References**

Subsection No.	Reference	Title/Source
<u>5.9.1</u>	<u>ASTM E2947-14</u>	<u>Standard Guide for Building Enclosure Commissioning</u>
<u>5.9.1</u>	<u>ASTM E2813-12</u>	<u>Standard Practice for Building Enclosure Commissioning</u>
<u>6.7.2.3-6.7.2.4</u>	NEBB Procedural Standards—2013	Procedural Standards for Building Systems Commissioning
<u>6.7.2.3.1</u>	AABC 2002	Associated Air Balance Council, National Standards for Total System Balance
<u>6.7.2.3.1</u>	ASHRAE Standard 111-2008	Measurement, Testing, Adjusting and Balancing of Building HVAC Systems
<u>6.7.2.4</u>	<u>ASHRAE Standard 202-2013</u>	<u>Commissioning Process for Buildings and Systems</u>
<u>6.7.2.4</u>	<u>ASHRAE Guideline 0-2013</u>	<u>The Commissioning Process</u>

Table G3.1.1-3 Baseline HVAC System Types

<i>Building Type, Number of Floors, and Gross Conditioned Floor Area</i>	<i>Climate Zones 3B, 3C, and 4 to 8</i>	<i>Climate Zones 0 to 3A</i>
Residential	<i>System 1—PTAC</i>	<i>System 2—PTHP</i>
Public assembly <11,000 m ²	<i>System 3—PSZ-AC</i>	<i>System 4—PSZ-HP</i>
Public assembly ≥11,000 m ²	<i>System 12—SZ-CV-HW</i>	<i>System 13—SZ-CV-ER</i>
Heated-only storage	<i>System 9—Heating and ventilation</i>	<i>System 10—Heating and ventilation</i>
Retail and 2 floors or fewer	<i>System 3—PSZ-AC</i>	<i>System 4—PSZ-HP</i>
Other nonresidential and 3 floors or fewer and <2300 m ²	<i>System 3—PSZ-AC</i>	<i>System 4—PSZ-HP</i>
Other nonresidential and 4 or 5 floors and <2300 m ² or 5 floors or fewer and 2300 m ² to 14,000 m ²	<i>System 5—Packaged VAV with reheat</i>	<i>System 6—Packaged VAV with PFP boxes</i>
Other nonresidential and more than 5 floors or >14,000 m ²	<i>System 7—VAV with reheat</i>	<i>System 8—VAV with PFP boxes</i>