

**ERRATA SHEET FOR
ANSI/ASHRAE/IESNA STANDARD 90.1-2007 (SI edition)
Energy Standard for Buildings Except Low-Rise Residential Buildings**

March 8, 2018

The corrections listed in this errata sheet apply to the first printing of ANSI/ASHRAE/IESNA Standard 90.1-2007, SI edition, identified on the outside back cover of the standard as “86149 PC 12/08”. The shaded item has been added since the previously published errata sheet dated May 14, 2015 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 <http://www.ashrae.org/standards-research--technology/standards--guidelines/standards-activities/project-committee-list-servers>.

Page(s) Erratum

- 11 **Section 3.2 Definitions.** On page 11 delete the following definition:
(Note: the standard does not include a definition for lamp wattage, rated and this term is not used in the standard.)
- rated lamp wattage: see lamp wattage, rated.*
- 23 **Table 5.5-5 Building Envelope Requirements for Climate Zone 5 (A, B, C).** In the first column of Table 5.5-5 under the heading “**Fenestration**” change “*Vertical Glazing, % of Wall*” to read “*Vertical Glazing, 0% - 40% of Wall*”.
- 27 **5.5.3.3 Below-Grade Wall Insulation.** Change the first sentence in Section 5.5.3.3 as follows:
(Note: Additions are shown in underline and deletions are shown in ~~strikethrough~~.)
- 5.5.3.3 Below-Grade Wall Insulation.** *Below-grade walls shall have a rated R-value of insulation not less than that the insulation values specified in Tables 5.5-1 through 5.5-8.*
- 28 **5.5.4.2.1 Vertical Fenestration Area.** Change the Exception to 5.5.4.2.1 as follows:
(Note: Additions are shown in underline and deletions are shown in ~~strikethrough~~.)
- Exception:** *Vertical fenestration complying with Exception (c)~~(b)~~ to Section 5.5.4.4.1.*
- 45 **TABLE 6.8.1B Electrically Operated Unitary and Applied Heat Pumps – Minimum Efficiency Requirements.** In Table 6.8.1B for Equipment Type “Air cooled (heating mode)” change “<40 kW^c (cooling capacity)” to “<19 kW^c (cooling capacity)” in the Size Category column.
- 48 **TABLE 6.8.1F Gas-and Oil-Fired Boilers, Minimum Efficiency Requirements.** Change the size category (Input) for oil-fired hot water boilers as follows:

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

(See next page)

TABLE 6.8.1F Gas- and Oil-Fired Boilers, Minimum Efficiency Requirements

Equipment Type ^a	Subcategory or Rating Condition	Size Category (Input)	Minimum Efficiency ^{b,c}	Efficiency as of 3/2/2010 (Date 3 yrs after ASHRAE Board Approval)	Efficiency as of 3/2/2020 (Date 13 yrs after ASHRAE Board Approval)	Test Procedure
Boilers, hot water	Gas-fired	<88 kW	80% AFUE	80% AFUE	80% AFUE	10 CFR Part 430
		≥88 kW and ≤733 kW	75% E_t	80% E_t	80% E_t	10 CFR Part 431
		>733 kW ^a	80% E_c	82% E_c	82% E_c	
	Oil-fired ^e	<88 kW	80% AFUE	80% AFUE	80% AFUE	10 CFR Part 430
		≥88 kW and ≤733 kW	78% E_t	82% E_t	82% E_t	10 CFR Part 431
		<u>>733</u> 88 kW ^a	83% E_c	84% E_c	84% E_c	

54 **TABLE 6.8.3 Minimum Pipe Insulation Thickness^a.** In the column titled “Nominal Pipe or Tube Size (in.)” change “(in.)” to “(mm)”.

57 **TABLE 7.8 Performance Requirements for Water Heating Equipment.** The 2007 SI edition of Standard 90.1 incorrectly included the I-P version of Table 7.8. See Table 7.8 for changes (attached). Table changed to reflect SI units. (Note: Additions are shown in underline and deletions are shown in ~~strikethrough~~.)

64 **TABLE 9.6.1 Lighting Power Densities Using the Space-by-Space Method (continued).** In the second column of Table 9.6.1, under Retail Sales Area, change the reference from “Section 9.6.3(c)” to “Section 9.6.2(b).”

97 **Table A6.3 Assembly F-Factors for Slab-on-Grade Floors.** In the second set of values for both unheated and heated slabs (300, 600, 900, and 1200 mm) change the word “horizontal” to “vertical”. See attached Table A6.3 for changes.

104 **TABLE A9.4C Effective R-Values for Fiberglass.** In the row titled “Standard Thickness, in.” change “in.” to “mm”.

152 **Table D-3 International Climate Data (continued).** For China, Cangzhou, under the second column titled “Providence or Region” change “Municipalities” to “Hebei” and relocate this row (Cangzhou) to Table D-3, page 154, and place between “Baoding” and “Chengde” which are also located (and alphabetically listed) in Hebei.

173 **Informative Appendix F Addenda Description Information.** For Addendum “ad” in Table F-1, in the column titled “Description of Changes”, change Section “5.3.1.1” to Section “5.5.3.1”.

174 **Informative Appendix F Addenda Description Information.** For Addendum 90.1ak in Table F-1, in the column titled “Description of Changes”, change Table “6.2.1G” to Table “6.8.1G”.

183 **Section G3.1.2.9 System Fan Power.** Change the equation in Section G3.1.2.9 as follows: (Note: Additions are shown in underline and deletions are shown in ~~strikethrough~~.)

For Systems 1 and 2,

$$P_{fan} = CFM_S \cdot 0.3$$

For Systems 3 through 8,

$$P_{fan} = \underline{\text{input kW}_i} \text{Watts} \times 746 / \text{Fan Motor Efficiency}$$

where

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

input kW_i = input kW_i 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 input kW using the enclosed motor at 1800 rpm.

CFM_S = the baseline system maximum design supply fan airflow rate in L/s

183 **Section G3.1.2.9 System Fan Power.** Change the equation in Section G3.1.2.9 as follows: (Note: Additions are shown in underline and deletions are shown in ~~strikethrough~~.)

For Systems 1 and 2,

$$P_{fan} = CFM_S \cdot \underline{0.64} \text{ } \del{0.3}$$

183 **TABLE G3.1.2.9 Baseline Fan Power.** Change Table G3.1.2.9 as follows: (Note: Additions are shown in underline and deletions are shown in ~~strikethrough~~.)

Change the title as follows:

TABLE G3.1.2.9 Baseline Fan Motor Power

For Constant Volume Systems 3-4 in column one change:

$$\underline{\text{kW}_i} = L_S \cdot 0.0015 + A$$

For Variable Volume Systems 5-8 in column 2 change:

$$\underline{\text{kW}_i} = L_S \cdot 0.0021 + A$$

184 **TABLE G3.1.3.7 Type and Number of Chillers.** Revise Table G3.1.3.7 as follows: (Note: Additions are shown in underline and deletions are shown in ~~strikethrough~~.)

TABLE G3.1.3.7 Type and Number of Chillers

Building Peak Cooling Load	Number and Type of Chiller(s)
$\leq 1055 \text{ kW}$ $11,148 \text{ m}^2$	1 water-cooled screw chiller
$> 1055 \text{ kW}$ $11,148 \text{ m}^2$, $< 2110 \text{ kW}$ $22,296 \text{ m}^2$	2 water-cooled screw chillers sized equally
$\geq 2110 \text{ kW}$ $22,296 \text{ m}^2$	2 water-cooled centrifugal chillers minimum with chillers added so that no chiller is larger than 2813 kW, all sized equally

Table 7.8
Performance Requirements for Water Heating Equipment

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Performance Required ^a	Test Procedure ^b
Electric water heaters	≤ 12 kW	Resistance ≥75.7 L	0.93- 0.00132-0.00035 V EF	DOE 10 CFR Part 430
	>12 kW	Resistance ≥75.7 L	20 + 355.9 + 5.3 √V SL, W	ANSI Z21.10.3
	≤ 24 Amps and ≤ 250 Volts	Heat Pump	0.93- 0.00132-0.00035 V EF	DOE 10 CFR Part 430
Gas storage water heaters	≤ 22.98 kW	≥75.7 L	0.62- 0.00190.0005 V EF	DOE 10 CFR Part 430
	>22.98 kW	<309.75 W/L	80% E_t (Q/ 800 + 110799 + 16.6 √V) SL, W	ANSI Z21.10.3
Gas instantaneous water heaters	>14.66 kW and <58.62 kW	≥309.75 W/L and <7.57 L	0.62- 0.00190.0005 V EF	DOE 10 CFR Part 430
	≥58.62 kW ^c	≥309.75 W/L and <37.85	80% E_t	ANSI Z21.10.3
	≥58.62 kW	≥309.75 W/L and ≥37.85	80% E_t (Q/ 800 + 110799 + 16.6 √V) SL, W	
Oil storage water heaters	≤ 30.78 kW	≥75.7 L	0.59- 0.00190.0005 V EF	DOE 10 CFR Part 430
	>30.78 kW	<309.75 W/L	78% E_t (Q/ 800 + 110799 + 16.6 √V) SL, W	ANSI Z21.10.3
Oil instantaneous water heaters	≤ 61.55 kW	≥309.75 W/L and <7.57 L	0.59- 0.00190.0005 V EF	DOE 10 CFR Part 430
	>61.55 kW	≥309.75 W/L and <37.85	80% E_t	ANSI Z21.10.3
	>61.55 kW	≥309.75 W/L and ≥37.85	78% E_t (Q/ 800 + 110799 + 16.6 √V) SL, W	
Hot-water supply boilers, gas and oil	≥61.55 kW and <3663.8 kW	≥309.75 W/L and <37.85	80% E_t	ANSI Z21.10.3
Hot-water supply boilers, gas		≥309.75 W/L and ≥37.85	80% E_t (Q/ 800 + 110799 + 16.6 √V) SL, W	
Hot-water supply boilers, oil		≥309.75 W/L and ≥37.85	78% E_t (Q/ 800 + 110799 + 16.6 √V) SL,W	
Pool heaters oil and gas	All		78% E_t	ASHRAE 146
Heat pump pool heaters	All		4.0 COP	ASHRAE 146

Unfired storage tanks	All		R-2.2	(none)
<p>^a Energy factor (EF) and thermal <i>efficiency</i> (<i>Et</i>) are minimum requirements, while standby loss (SL) is maximum W based on a 38.9°C temperature difference between stored water and ambient requirements. In the EF equation, <i>V</i> is the rated volume in gallons <u>liters</u>. In the SL equation, <i>V</i> is the rated volume in gallons <u>liters</u> and <i>Q</i> is the nameplate input rate in W.</p> <p>^b Section 12 contains a complete specification, including the year version, of the referenced test procedure.</p> <p>^c Instantaneous water heaters with input rates below 58.62 W must comply with these requirements if the water heater is designed to heat water to temperatures 82.2°C or higher.</p>				

TABLE A6.3 Assembly F-Factors for Slab-on-Grade Floors

Insulation Description	Rated R-Value of Insulation												
	R-0.0	R-0.9	R-1.3	R-1.8	R-2.6	R-3.5	R-4.4	R-5.3	R-6.2	R-7.0	R-7.9	R-8.8	R-9.7
Unheated Slabs													
None	1.26												
300 mm horizontal		1.24	1.23	1.23	1.23								
600 mm horizontal		1.21	1.21	1.20	1.19								
900 mm horizontal		1.18	1.17	1.15	1.14								
1200 mm horizontal		1.16	1.13	1.11	1.09								
300 mm vertical horizontal		1.05	1.03	1.01	0.99	0.98	0.98	0.98					
600 mm vertical horizontal		1.00	0.97	0.93	0.90	0.88	0.87	0.87					
900 mm vertical horizontal		0.97	0.93	0.88	0.84	0.82	0.80	0.80					
1200 mm vertical horizontal		0.93	0.88	0.83	0.78	0.75	0.73	0.72					
Fully insulated slab		0.80	0.71	0.62	0.52	0.45	0.40	0.37	0.34	0.32	0.30	0.29	0.28
Heated Slabs													
None	2.33												
300 mm horizontal		2.27	2.26	2.26	2.25								
600 mm horizontal		2.21	2.19	2.18	2.16								
900 mm horizontal		2.14	2.10	2.07	2.04								
1200 mm horizontal		2.08	2.02	1.96	1.92								
300 mm vertical horizontal		1.84	1.76	1.73	1.70	1.67	1.67	1.66					
600 mm vertical horizontal		1.72	1.64	1.57	1.50	1.46	1.44	1.43					
900 mm vertical horizontal		1.64	1.54	1.45	1.36	1.32	1.29	1.28					
1200 mm vertical horizontal		1.57	1.47	1.35	1.25	1.19	1.16	1.14					
Fully insulated slab		1.28	1.11	0.95	0.76	0.65	0.56	0.51	0.47	0.44	0.41	0.39	0.38