

**ERRATA SHEET FOR
ANSI/ASHRAE/IES STANDARD 90.1-2010 (I-P edition)
Energy Standard for Buildings Except Low-Rise Residential Buildings**

September 7, 2011

The corrections listed in this errata sheet apply to ANSI/ASHRAE/IES Standard 90.1-2010, I-P edition. The first printing is identified on the outside back cover of the standard as “Product Code: 86267 10/10” and the second printing as Product code: 86267 6/11 *Errata noted in the list dated 4/14/11 have been corrected.*”. The shaded item has been added since the previously published errata sheet dated 8/15/2011 was distributed. Items identified with an asterisk “*” apply to both the first and second printing. Items identified with two asterisks “**” apply only to the second edition.

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/publications/detail/15620>.

Page(s) Erratum

- 9*** **3.2 Definitions.** In the definition of *essential facility*, second column on page 9 immediately following “8. Buildings and other structures having critical national defense functions.”, delete the sentence “Buildings and other structures having critical national defense functions.” This sentence is a duplicate of item 8 under the definition of *essential facility*.

- 12** **3.2 Definitions.** Change the definition of *multiscene control:* to *multi-scene control:*.

- 13** **3.2 Definitions.** In the definition of *primary sidelighted area*, in the 2nd item number 1, change window “heat” height to window “head” height.

- 15** **3.2 Definitions.** In the definition of *room cavity ration (RCR)* delete “...as follows:” from the end of the definition.

- 29*** **TABLE 5.5-4 Building Envelope Requirements for Climate Zone 4 (A, B, C).** In Table 5.5-4, for *Opaque Doors*, Nonswinging, Nonresidential, change the Assembly Maximum from “U-1.500” to “U-0.500”.

- 34** **5.5.3.1.1 Roof Solar Reflectance and Thermal Emittance.** In Section 5.5.3.1.1b change the convection coefficient from “2.1 BTU/h·ft²” to “2.1 BTU/h·ft²·°F”.

- 35*** **5.5.4.4 Fenestration Solar Heat Gain Coefficient (SHGC).** In the title of Section 5.5.4.4 delete the “a” in front of “aGain”.

- 45**** **6.4.4.2.2 Duct Leakage Tests.** In the first sentence of Section 6.4.4.2.2 change “750 Pa” to “3 in. w.c.”. For the term “*C_L*” change “250 in. w.c.” to “1 in. w.c.”.

- 50** **TABLE 6.5.3.1.1.B Fan Powered Limitation Pressure Drop Adjustment.** For the Energy Recovery Device, other than Coil Runaround Loop, replace the dash “—” in the Adjustment

equation with a minus “-“ sign so it reads as follows:

(2.2 x Energy Recovery Effectiveness) - 0.5 in w.c. for each airstream

- 53 **TABLE 6.5.6.1.** Change the title of Table 6.5.6.1 as follows:
(Note: Additions are shown in underline)

TABLE 6.5.6.1 Exhaust Air Energy Recovery Requirements

- 56 **TABLE 6.8.1A.** The following was removed from Table 6.8.1A by Addendum f to 90.1-2004 and was corrected in 90.1-2007 by a 3/12/2008 erratum and should not be included in 90.1-2010. (Note: Deletions shown in ~~strikethrough~~.)

Small-duct high-velocity, (air-cooled)	<65,000-Btu/h ^e	All	Split system	10.0 SEER
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- 58 **TABLE 6.8.1B Electrically Operated Unitary and Applied Heat Pumps – Minimum Efficiency Requirements.** See attached corrections to Table 6.8.1B (in red text).
(Note: Additions are shown in underline and deletions are shown in ~~strikethrough~~.)

- 60 **TABLE 6.8.1C Water Chilling Packages – Efficiency Requirements.** Replace Table 6.8.1C with the attached corrected Table 6.8.1C.

- 60** **TABLE 6.8.1C Water Chilling Packages.** For Equipment Type – Water-cooled, electrically operated, centrifugal: change “≤ 150 tons” to “< 150 tons” and change “≥0.634” to “≤0.634”.

- 75 **9.1.3 Installed Lighting Power.** In Section 9.1.3 change the reference to Section “9.4.5” to Section “9.4.3”.

- 76 **9.4.1 Lighting Control.** In the second paragraph of Section 9.4.1 change the reference to “9.4.1.4” to “9.4.1.6” so it now reads as follows:

9.4.1 Lighting Control. Building *controls* shall meet the provisions of 9.4.1.1, 9.4.1.2, 9.4.1.3, 9.4.1.4, 9.4.1.5, 9.4.1.6, and 9.4.1.7.

Any *automatic control device* required in sections 9.4.1.1, 9.4.1.2, and 9.4.1.6 shall either be *manual* on or shall be controlled to automatically turn the lighting on to not more than 50% power, except in the following *spaces* where full automatic-on is allowed;...

- 199* **Informative Appendix E Informative References.** In the first paragraph of Informative Appendix E change the reference to “90.1-2007” to “90.1-2010”.

- 213 **TABLE G 3.1 Modeling Requirements for Calculating Proposed and Baseline Building Performance (continued).** For No. 5 Building Envelope, under the Baseline Building Performance column, make the following corrections:

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

d. **Skylights and Glazed Smoke Vents.** Skylight area shall be equal to that in the proposed building design or 5% of the gross roof area that is part of the *building envelope*, whichever is smaller. If the skylight area of the proposed building design is greater than 5% of the gross roof area, baseline skylight area shall be decreased by an identical

percentage in all roof components in which skylights are located to reach the 5% skylight-to-roof ratio. Skylight orientation and tilt shall be the same as in the proposed building design. Skylight U-factor and SHGC properties shall match the appropriate requirements in Tables 5.5-1 through 5.5-8.

- ~~e.~~ **Roof Solar Reflectance and Thermal Emittance.** The exterior *roof* surfaces shall be modeled with a solar *reflectance* and thermal *emittance* as required in Section 5.5.3.1.1(a). All other roofs, including *roofs* exempted from the requirements in Section 5.5.3.1.1, shall be modeled using a solar *reflectance* of 0.30 and a thermal *emittance* of 0.90.
- ~~e.~~ **Roof albedo.** All roof surfaces shall be modeled with a reflectivity of 0.30.
- f **Existing Buildings.** For existing *building envelopes*, the *baseline building design* shall reflect existing conditions prior to any revisions that are part of the scope of work being evaluated.

218 **TABLE G3.1.1.B Baseline System Descriptions.** For System No. 6 change the System Type as follows:

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

TABLE G3.1.1B Baseline System Descriptions

System No.	System Type	Fan Control	Cooling Type	Heating Type
6. Packaged VAV with PFP Boxes	Packaged rooftop VAV with parallel fan power boxes and reheat	VAV	Direct expansion	Electric resistance

**TABLE 6.8.1 B Electrically Operated Unitary and Applied Heat Pumps—
Minimum Efficiency Requirements**

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency ^a	Test Procedure ^b
Air cooled (cooling mode)	<65,000 Btu/h ^c	All	Split System	13.0 SEER	
			Single Packaged	13.0 SEER	
Through-the-wall, (air cooled, <u>cooling mode</u>)	≤30,000 Btu/h ^c	All	Split System	13.0 <u>12.0</u> SEER	AHRI 210/240
			Single Packaged	13.0 <u>12.0</u> SEER	
<u>Small-duct high-velocity (air cooled)</u>	<u><65,000 Btu/h^c</u>	<u>All</u>	<u>Split System</u>	<u>10.0 SEER</u>	
Air Cooled (Cooling Mode)	≥65,000 Btu/h and <135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	AHRI 340/360
		All other	Split System and Single Package	10.8 EER 11.0 IEER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.6 EER 10.7 IEER	
		All other	Split System and Single Package	10.4 EER 10.5 IEER	
	≥240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.5 EER 9.6 IEER	
		All other	Split System and Single Package	9.3 EER 9.4 IEER	
Water source (cooling mode)	<17,000 Btu/h	All	86 °F entering water	11.2 EER	ISO 13256-1
	≥17,000 Btu/h and <65,000 Btu/h	All	86 °F entering water	12.0 EER	
	≥65,000 Btu/h and <135,000 Btu/h	All	86 °F entering water	12.0 EER	
Groundwater source (cooling mode)	<135,000 Btu/h	All	59 °F entering water	16.2 EER	
		<u>All</u>	<u>77 F entering water</u>	<u>13.4 EER</u>	
<u>Ground source (cooling mode)</u>	<u>≤135,000 Btu/h</u>	<u>All</u>	<u>77 F entering water</u>	<u>13.4 EER</u>	
<u>Water source water to water (cooling mode)</u>	<u><135,000 Btu/h</u>	<u>All</u>	<u>86 °F entering water</u>	<u>10.6 EER</u>	<u>ISO 13256-2</u>
			<u>59 °F entering water</u>	<u>16.3 EER</u>	
<u>Ground source Brine to water (cooling mode)</u>	<u><135,000 Btu/h</u>	<u>All</u>	<u>77 °F entering water</u>	<u>12.1 EER</u>	

**TABLE 6.8.1 B Electrically Operated Unitary and Applied Heat Pumps—
Minimum Efficiency Requirements (continued)**

Equipment Type	Size Category	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency ^a	Test Procedure ^b
Water source water to water (cooling mode)	<135,000 Btu/h	All	86 °F entering water	10.6 EER	
Groundwater source water to water (Cooling Mode)	<135,000 Btu/h	All	59 °F entering water	16.3 EER	ISO-13256-2
Ground source Brine to water (cooling mode)	<135,000 Btu/h	All	77 °F entering water	12.1 EER	
Air cooled (heating mode)	<65,000 Btu/h ^c	–	Split System	7.7 HSPF	AHRI 210/240
		–	Single Package	7.7 HSPF	
Through-the-wall, (air cooled, heating mode)	≤30,000 Btu/h ^c (cooling capacity)	–	Split System	7.4 HSPF	
		–	Single Package	7.4 HSPF	
Air Cooled (Heating Mode)	≥65,000 Btu/h and <135,000 Btu/h (Cooling Capacity)	–	47°F db/43°F wb Outdoor Air	3.3 COP	AHRI 340/360
		–	17°F db/15°F wb Outdoor Air	2.25 COP	
	≥135,000 Btu/h (Cooling Capacity)	–	47°F db/43°F wb Outdoor Air	3.2 COP	
		–	17°F db/15°F wb Outdoor Air	2.05 COP	
Water source (heating mode)	<135,000 Btu/h (cooling capacity)	–	68 °F entering water	4.2 COP	
Ground water source (heating mode)	<135,000 Btu/h (cooling capacity)	–	50 °F entering water	3.6 COP	ISO 13256-1
Ground source (heating mode)	<135,000 Btu/h (cooling capacity)	–	32 °F entering fluid	3.1 COP	
Water-source water to water (heating mode)	<135,000 Btu/h (cooling capacity)	–	68 °F entering water	3.7 COP	
		–	50 °F entering water	3.1 COP	
<u>Groundwater source water to water (heating mode)</u>	<u><135,000 Btu/h (cooling capacity)</u>	<u>=</u>	<u>50 °F entering water</u>	<u>3.1 COP</u>	ISO 13256-2
Ground source brine to water (heating mode)	<135,000 Btu/h (cooling capacity)	–	32 °F entering fluid	2.5 COP	

^a IPLV and part load rating conditions are only applicable to equipment with capacity modulation.

^b Section 12 contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

^c Single phase, air cooled air conditioners <65,000 Btu/hr are regulated by NAECA, SEER values are those set by NAECA.

TABLE 6.8.1C Water Chilling Packages—Efficiency Requirements^a

Equipment Type	Size Category	Units	Path A		Path B		Test Procedure ^b
			Full Load	IPLV	Full Load	IPLV	
Air-Cooled Chillers	< 150 tons	EER	≥9.562	≥12.500	NA ^d	NA ^d	AHRI 550/590
	≥ 150 tons	EER	≥9.562	≥12.750	NA ^d	NA ^d	
Air-Cooled without Condenser, Electrical Operated	All Capacities	EER	Air-cooled chillers without condensers must be rated with matching condensers and comply with the air-cooled chiller <i>efficiency</i> requirements.				
Water Cooled, Electrically Operated, Reciprocating	All Capacities	kW/ton	Reciprocating units must comply with water-cooled positive displacement <i>efficiency</i> requirements.				
Water Cooled, Electrically Operated, Positive Displacement	< 75 tons	kW/ton	≤0.780	≤0.630	≤0.800	≤0.600	
	≥ 75 tons and < 150 tons	kW/ton	≤0.775	≤0.615	≤0.790	≤0.586	
	≥ 150 tons and < 300 tons	kW/ton	≤0.680	≤0.580	≤0.718	≤0.540	
	≥ 300 tons	kW/ton	≤0.620	≤0.540	≤0.639	≤0.490	
Water Cooled, Electrically Operated, Centrifugal	< 150 tons	kW/ton	≤0.634	≤0.596	≤0.639	≤0.450	
	≥ 150 tons and < 300 tons	kW/ton	≤0.634	≤0.596	≤0.639	≤0.450	
	≥ 300 tons and < 600 tons	kW/ton	≤0.576	≤0.549	≤0.600	≤0.400	
	≥ 600 tons	kW/ton	≤0.570	≤0.539	≤0.590	≤0.400	
Air Cooled Absorption Single Effect	All Capacities	COP	≥0.600	NR ^e	NA ^d	NA ^d	AHRI 560
Water-Cooled Absorption Single Effect	All Capacities	COP	≥0.700	NR ^e	NA ^d	NA ^d	
Absorption Double Effect Indirect-Fired	All Capacities	COP	≥1.000	≥1.050	NA ^d	NA ^d	
Absorption Double Effect Direct-Fired	All Capacities	COP	≥1.000	≥1.000	NA ^d	NA ^d	

^a The centrifugal chiller *equipment* requirements after adjustment per 6.4.1.2 do not apply to chillers where the design leaving evaporator temperature is < 36°F. The requirements do not apply to positive displacement chillers with design leaving fluid temperatures ≤ 32°F. The requirements do not apply to absorption chillers with design leaving fluid temperatures < 40°F.

^b Compliance with this standard can be obtained by meeting the minimum requirements of Path A or Path B. However, both the full load and *IPLV* must be met to fulfill the requirements of Path A or Path B.

^c Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

^d *NA* means that this requirement is not applicable and cannot be used for compliance.

^e *NR* means that there are no minimum requirements for this category.