ADDENDA

ANSI/ASHRAE/IES Addendum af to
ANSI/ASHRAE/IES Standard 90.1-2013

Energy Standard for Buildings Except Low-Rise Residential Buildings

Approved by the ASHRAE Standards Committee on January 23, 2016; by the ASHRAE Board of Directors on January 27, 2016; by the IES Board of Directors on December 31, 2015; and by the American National Standards Institute on January 28, 2016.

This addendum was approved by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE website (www.ashrae.org) or in paper form from the Senior Manager of Standards.

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FOREWORD

This proposed addendum addresses a comment that was submitted to correct an error in addendum "bo" to 90.1-2010. The comment was accepted by the Mechanical Subcommittee but inadvertently not provided to the SSPC for approval. The proposal restores the specification of the rating conditions for measuring the efficiency of heat-pump pool heaters that existed in ASHRAE 90.1-2010. This is necessary because the referenced AHRI standard has more than one set of test conditions. Also, the footnotes for the SI version of the table have been editorially corrected to match the I-P version of the table.

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 af to 90.1-2013

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

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TABLE 7.8 Performance Requirements for Water Heating Equipment (I-P Units)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Performance Required[a]	Test Procedure[b,c]
Electric table-top water heaters	≤12 kW	Resistance ≥20 gal	0.93–0.00132V EF	DOE 10 CFR Part 430
Electric water heaters	≤12 kW	Resistance ≥20 gal	0.97–0.00132V EF	DOE 10 CFR Part 430
	>12 kW[e]	Resistance ≥20 gal	$0.3 + 27/V_m$%/h	Section G.2 of ANSI Z21.10.3
	≤24 Amps and ≤250 Volts	Heat Pump	0.93–0.00132V EF	DOE 10 CFR Part 430
Gas storage water heaters	≤75,000 Btu/h	≥20 gal	0.67–0.0019V EF	DOE 10 CFR Part 430
	>75,000 Btu/h[f]	<4000 (Btu/h)/gal	80% E_t (Q/800 + 110 √V) SL, Btu/h	Section G.1 and G.2 of ANSI Z21.10.3
Gas instantaneous water heaters	>50,000 Btu/h and <200,000 Btu/h	≥4000 (Btu/h)/gal and <2 gal	0.62–0.0019V EF	DOE 10 CFR Part 430
	≥200,000 Btu/h[d,f]	≥4000 (Btu/h)/gal and <10 gal	80% E_t	Section G.1 and G.2 of ANSI Z21.10.3
	≥200,000 Btu/h[f]	≥4000 (Btu/h)/gal and ≥10 gal	80% E_t (Q/800 + 110 √V) SL, Btu/h	
Oil storage water heaters	≤105,000 Btu/h	≥20 gal	0.59–0.0019V EF	DOE 10 CFR Part 430
	>105,000 Btu/h	<4000 (Btu/h)/gal	80% E_t (Q/800 + 110 √V) SL, Btu/h	Section G.1 and G.2 of ANSI Z21.10.3
Oil instantaneous water heaters	≤210,000 Btu/h	≥4000 (Btu/h)/gal and <2 gal	0.59–0.0019V EF	DOE 10 CFR Part 430
	>210,000 Btu/h	≥4000 (Btu/h)/gal and <10 gal	80% E_t	Section G.1 and G.2 of ANSI Z21.10.3
	>210,000 Btu/h	≥4000 (Btu/h)/gal and ≥10 gal	78% E_t (Q/800 + 110 √V) SL, Btu/h	
Hot-water supply boilers, gas and oil[f]	≥300,000 Btu/h and <12,500,000 Btu/h	≥4000 (Btu/h)/gal and <10 gal	80% E_t	Section G.1 and G.2 of ANSI Z21.10.3
Hot-water supply boilers, gas[f]		≥4000 (Btu/h)/gal and ≥10 gal	80% E_t (Q/800 + 110 √V) SL, Btu/h	
Hot-water supply boilers, oil		≥4000 (Btu/h)/gal and ≥10 gal	78% E_t (Q/800 + 110 √V) SL, Btu/h	
Pool heaters, oil and gas	All		78% E_t	ASHRAE 146
Heat-pump pool heaters	All	50°F db 44.2°F wb Outdoor Air 80.0°F Entering Water	4.0 COP	AHRI 1160

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Unfired storage tanks	All		R-12.5	(none)

[a] Energy factor (EF) and thermal *efficiency* (E_t) are minimum requirements, while standby loss (SL) is maximum Btu/h based on a 70°F temperature difference between stored water and ambient requirements. In the EF equation, V is the rated volume in gallons. In the SL equation, V is the rated volume in gallons and Q is the nameplate input rate in Btu/h. V_m is the measured volume in the tank in gallons.

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

[c] Section G.1 is titled "Test Method for Measuring Thermal Efficiency" and Section G.2 is titled "Test Method for Measuring Standby Loss."

[d] Instantaneous water heaters with input rates below 200,000 Btu/h must comply with these requirements if the water heater is designed to heat water to temperatures of 180°F or higher.

[e] Electric water heaters with input rates below 12kW must comply with these requirements if the water heater is designed to heat water to temperatures of 180°F or higher.

[f] Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot water supply boilers.

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Table 7.8 Performance Requirements for Water Heating Equipment (SI Units)

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Performance Required [a]	Test Procedure[b,c]
Electric Table-top Water Heaters	≤ 12 kW	Resistance ≥75.7 L	0.93–0.00035V EF	DOE 10 CFR Part 430
Electric Water Heaters	≤ 12 kW	Resistance ≥75.7 L	0.97- 0.00035V EF	DOE 10 CFR Part 430
	>12 kW[e]	Resistance ≥75.7 L	5.9 + 5.3 √V SL, W	Section G.2 of ANSI Z21.10.3
	≤ 24 Amps and ≤ 250 Volts	Heat Pump	0.93- 0.00035V EF	DOE 10 CFR Part 430
Gas Storage Water Heaters	≤ 22.98 kW	≥75.7 L	0.67-0.0005V EF	DOE 10 CFR Part 430
	>22.98 kW[f]	<309.75 W/L	80% E_t (Q/799 + 16.6 √V) SL, W	Section G.1 and G.2 of ANSI Z21.10.3
Gas Instantaneous Water Heaters	>14.66 kW and <58.62 kW[e]	≥309.75 W/L and <7.57 L	0.62- 0.0005V EF	DOE 10 CFR Part 430
	≥58.62 kW[df]	≥309.75 W/L and <37.85	80% E_t	Section G.1 and G.2 of ANSI Z21.10.3
	≥58.62 kW[f]	≥309.75 W/L and ≥37.85	80% E_t (Q/799 + 16.6 √V) SL, W	
Oil Storage Water Heaters	≤ 30.78 kW	≥75.7 L	0.59- 0.0005V EF	DOE 10 CFR Part 430
	>30.78 kW	<309.75 W/L	80% E_t (Q/799 + 16.6 √V) SL, W	Section G.1 and G.2 of ANSI Z21.10.3
Oil Instantaneous Water Heaters	≤ 61.55 kW	≥309.75 W/L and <7.57 L	0.59- 0.0005V EF	DOE 10 CFR Part 430
	>61.55 kW	≥309.75 W/L and <37.85	80% E_t	Section G.1 and G.2 of ANSI Z21.10.3
	>61.55 kW	≥309.75 W/L and ≥37.85	80% E_t (Q/799 + 16.6 √V) SL, W	
Hot Water Supply Boilers, Gas and Oil	≥61.55 kW and <3663.8 kW[f]	≥309.75 W/L and <37.85	80% E_t	Section G.1 and G.2 of ANSI Z21.10.3
Hot Water Supply Boilers, Gas		≥309.75 W/L and ≥37.85	80% E_t (Q/799 + 16.6 √V) SL, W	
Hot Water Supply Boilers, Oil		≥309.75 W/L and ≥37.85	78% E_t (Q/799 + 16.6 √V) SL,W	

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Pool Heaters Oil and Gas	All		78% E_t	ASHRAE 146
Heat Pump Pool Heaters	All	10ºC db 6.8ºC wb Outdoor Air 26.7ºC Entering Water	4.0 COP	AHRI 1160 ~~ASHRAE146~~
Unfired Storage Tanks	All		R-2.2	(none)

a Energy factor (EF) and thermal efficiency (E_t) 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, V is the rated volume in liters. In the SL equation, V is the rated volume in liters and Q is the nameplate input rate in W. V_m is the measured volume in litres in the tank.

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

c Section G.1 is titled "Test Method for Measuring Thermal Efficiency" and Section G.2 is titled "Test Method for Measuring Standby Loss."

~~e~~d 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.

e Electric water heaters with input rates below 12 kW must comply with these requirements if the water heater is designed to heat water to temperatures of 82.2°C or higher.

f Refer to Section 7.5.3 for additional requirements for gas storage and instantaneous water heaters and gas hot water supply boilers.

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.

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