

## § 431.106

## 10 CFR Ch. II (1–1–23 Edition)

(B) Section 8.7—Water Temperature Control;

(vi) Section 9—Test Procedures: 9.1—Input Rating, Heating Capacity, Thermal Efficiency, Coefficient of Performance (COP), and Recovery Rating; 9.1.1—Full Input Rating;

(vii) Section 10—Calculation of Results: Section 10.3—Heat-Pump Water Heater Water-Heating Capacity, Coefficient of Performance (COP), and Recovery Rating; Section 10.3.1—Type IV and Type V Full-Capacity Test Method.

(2) [Reserved]

(c) ASTM. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428–2959, (610) 832–9585, or go to <http://www.astm.org>.

(1) ASTM C177–13, “Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus,” approved September 15, 2013, IBR approved for § 431.102.

(2) ASTM C518–15, “Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus,” approved September 1, 2015, IBR approved for § 431.102t.

(3) ASTM D2156–09 (Reapproved 2013), “Standard Test Method for Smoke Density in Flue Gases from Burning Distillate Fuels,” approved October 1, 2013, IBR approved for appendices A and C to this subpart.

(d) CSA Group, 5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6, 800–463–6727, or go to <http://www.csagroup.org/>.

(1) ANSI Z21.10.3–2015 \* CSA 4.3–2015 (“ANSI Z21.10.3–2015”), “Gas-fired water heaters, volume III, storage water heaters with input ratings above 75,000 Btu per hour, circulating and instantaneous,” approved by ANSI on October 5, 2015, IBR approved for appendices A, B, and C to this subpart, as follows:

(i) Annex E (normative) Efficiency test procedures—E.1—Method of test for measuring thermal efficiency, paragraph c—Vent requirements; and

(ii) Annex E (normative) Efficiency test procedures—E.1—Method of test for measuring thermal efficiency, paragraph f—Installation of temperature sensing means.

(2) [Reserved]

[77 FR 28996, May 16, 2012, as amended at 81 FR 79322, Nov. 10, 2016]

### § 431.106 Uniform test method for the measurement of energy efficiency of commercial water heating equipment.

(a) *Scope*. This section contains test procedures for measuring, pursuant to EPCA, the energy efficiency of commercial water heating equipment.

(b) *Testing and calculations*. Determine the energy efficiency of commercial water heating equipment by conducting the applicable test procedure(s):

(1) *Residential-duty commercial water heaters*. Test in accordance with appendix E to subpart B of part 430 of this chapter.

(2) *Commercial water heating equipment other than residential-duty commercial water heaters*. Test in accordance with the appropriate test procedures in appendices to subpart G of this part.

(i) *Gas-fired and oil-fired storage water heaters and storage-type instantaneous water heaters*. Test according to appendix A to subpart G of this part.

(ii) *Electric storage water heaters and storage-type instantaneous water heaters*. Test according to appendix B to subpart G of this part.

(iii) *Gas-fired and oil-fired instantaneous water heaters and hot water supply boilers (other than storage-type instantaneous water heaters)*. Test according to appendix C to subpart G of this part.

(iv) *Electric instantaneous water heaters (other than storage-type instantaneous water heaters)*. Test according to appendix D to subpart G of this part.

(v) *Commercial heat pump water heaters*. Test according to appendix E to subpart G of this part.

[81 FR 79322, Nov. 10, 2016]

### ENERGY CONSERVATION STANDARDS

### § 431.110 Energy conservation standards and their effective dates.

(a) Each commercial storage water heater, instantaneous water heater, unfired hot water storage tank and hot water supply boiler (excluding residential-duty commercial water heaters) must meet the applicable energy conservation standard level(s) as specified

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in the table in this paragraph. Any packaged boiler that provides service water that meets the definition of “commercial packaged boiler” in subpart E of this part, but does not meet

the definition of “hot water supply boiler” in subpart G, must meet the requirements that apply to it under subpart E.

Equipment category	Size	Energy conservation standard <sup>a</sup>		
		Maximum standby loss <sup>c</sup> (equipment manufactured on and after October 29, 2003) <sup>b</sup>	Minimum thermal efficiency (equipment manufactured on and after October 29, 2003 and before October 9, 2015) <sup>b</sup> (%)	Minimum thermal efficiency (equipment manufactured on and after October 9, 2015) <sup>b</sup> (%)
Electric storage water heaters	All .....	$0.30 + 27/V_m$ (%/hr) .....	N/A	N/A
Gas-fired storage water heaters.	$\leq 155,000$ Btu/hr .....	$Q/800 + 110(V_r)^{1/2}$ (Btu/hr) ....	80	80
	$> 155,000$ Btu/hr .....	$Q/800 + 110(V_r)^{1/2}$ (Btu/hr) ....	80	80
Oil-fired storage water heaters.	$\leq 155,000$ Btu/hr .....	$Q/800 + 110(V_r)^{1/2}$ (Btu/hr) ....	78	80
	$> 155,000$ Btu/hr .....	$Q/800 + 110(V_r)^{1/2}$ (Btu/hr) ....	78	80
Gas-fired instantaneous water heaters and hot water supply boilers.	$< 10$ gal .....	N/A .....	80	80
	$\geq 10$ gal .....	$Q/800 + 110(V_r)^{1/2}$ (Btu/hr) ....	80	80
Oil-fired instantaneous water heaters and hot water supply boilers.	$< 10$ gal .....	N/A .....	80	80
	$\geq 10$ gal .....	$Q/800 + 110(V_r)^{1/2}$ (Btu/hr) ....	78	78
Equipment category		Size	Minimum thermal insulation	
Unfired hot water storage tank		All .....	R–12.5	

<sup>a</sup>  $V_m$  is the measured storage volume (in gallons), and  $V_r$  is the rated volume (in gallons). Q is the nameplate input rate in Btu/hr.

<sup>b</sup> For hot water supply boilers with a capacity of less than 10 gallons: (1) The standards are mandatory for products manufactured on and after October 21, 2005, and (2) products manufactured prior to that date, and on or after October 23, 2003, must meet either the standards listed in this table or the applicable standards in subpart E of this part for a “commercial packaged boiler.”

<sup>c</sup> Water heaters and hot water supply boilers having more than 140 gallons of storage capacity need not meet the standby loss requirement if: (1) The tank surface area is thermally insulated to R–12.5 or more; (2) a standing pilot light is not used; and (3) for gas or oil-fired storage water heaters, they have a fire damper or fan-assisted combustion.

(b) Each residential-duty commercial water heater must meet the applicable energy conservation standard level(s) as follows:

Product class	Specifications <sup>a</sup>	Draw pattern	Uniform energy factor <sup>b</sup>
Gas-fired Storage .....	$> 75$ kBtu/hr and $\leq 105$ kBtu/hr and $\leq 120$ gal.	Very Small .....	$0.2674 - (0.0009 \times V_r)$
		Low .....	$0.5362 - (0.0012 \times V_r)$
		Medium .....	$0.6002 - (0.0011 \times V_r)$
		High .....	$0.6597 - (0.0009 \times V_r)$
Oil-fired Storage .....	$> 105$ kBtu/hr and $\leq 140$ kBtu/hr and $\leq 120$ gal.	Very Small .....	$0.2932 - (0.0015 \times V_r)$
		Low .....	$0.5596 - (0.0018 \times V_r)$
		Medium .....	$0.6194 - (0.0016 \times V_r)$
		High .....	$0.6740 - (0.0013 \times V_r)$
Electric Instantaneous .....	$> 12$ kW and $\leq 58.6$ kW and $\leq 2$ gal.	Very Small .....	0.80
		Low .....	0.80
		Medium .....	0.80
		High .....	0.80

<sup>a</sup> Additionally, to be classified as a residential-duty commercial water heater, a commercial water heater must meet the following conditions: (1) if the water heater requires electricity, it must use a single-phase external power supply; and (2) the water heater must not be designed to heat water to temperatures greater than 180 °F.

<sup>b</sup>  $V_r$  is the rated storage volume (in gallons), as determined pursuant to 10 CFR 429.44.

[81 FR 96238, Dec. 29, 2016]