

TABLE 7.8 Performance Requirements for Water-Heating Equipment

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	Resistance ≥20 gal	$20 + 35 \sqrt{V}$ SL, Btu/h	Section G.2 of ANSI Z21.10.3
Gas storage water heaters	≤24 Amps and ≤250 Volts	Heat Pump	0.93–0.00132V EF	DOE 10 CFR Part 430
	≤75,000 Btu/h	≥20 gal	0.67–0.0019V EF	DOE 10 CFR Part 430
Gas instantaneous water heaters	>75,000 Btu/h	<4000 (Btu/h)/gal	$80\% E_t (Q/800 + 110 \sqrt{V})$ SL, Btu/h	Sections G.1 and G.2 of ANSI Z21.10.3
	>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
Gas instantaneous water heaters	≥200,000 Btu/h ^d	≥4000 (Btu/h)/gal and <10 gal	80% E_t	Sections G.1 and G.2 of ANSI Z21.10.3
	≥200,000 Btu/h	≥4000 (Btu/h)/gal and ≥10 gal	$80\% E_t (Q/800 + 110 \sqrt{V})$ SL, Btu/h	Sections G.1 and G.2 of ANSI Z21.10.3
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	$78\% E_t (Q/800 + 110 \sqrt{V})$ SL, Btu/h	Sections 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	Sections G.1 and G.2 of ANSI Z21.10.3
Oil instantaneous water heaters	>210,000 Btu/h	≥4000 (Btu/h)/gal and ≥10 gal	$78\% E_t (Q/800 + 110 \sqrt{V})$ SL, Btu/h	Sections G.1 and G.2 of ANSI Z21.10.3
	Hot-water supply boilers, gas and oil	≥300,000 Btu/h and <12,500,000 Btu/h	≥4000 (Btu/h)/gal and <10 gal	80% E_t
Hot-water supply boilers, gas		≥4000 (Btu/h)/gal and ≥10 gal	$80\% E_t (Q/800 + 110 \sqrt{V})$ SL, Btu/h	Sections G.1 and G.2 of ANSI Z21.10.3
Hot-water supply boilers, oil		≥4000 (Btu/h)/gal and ≥10 gal	$78\% E_t (Q/800 + 110 \sqrt{V})$ SL, Btu/h	Sections G.1 and G.2 of ANSI Z21.10.3
Pool heaters, oil and gas	All		78% E_t	ASHRAE 146
Heat pump pool heaters	All	50.0°F db 44.2°F wb Outdoor air 80.0°F Entering water	4.0 COP	AHRI 1160
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.

^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.

Service Water Heating Compliance Documentation

Project Name:		
Project Address:		Date:
Designer of Record:	Email:	Telephone:
Contact Person:	Email:	Telephone:
City:		

Mandatory Provisions Checklist

- Load calculations have been provided for sizing of systems and equipment (7.4.1).
- Equipment efficiencies meet or exceed the requirements of Table 7.8 (7.4.2).
- Circulating systems are fully insulated (per Table 6.8.3) and have automatic pump controls (7.4.3 and 7.4.4.2).
- Non-circulating systems have insulated heat traps and outlet piping insulated (per Table 6.8.3) for 8 ft (2.44 m) from the storage tank (7.4.6).
- Tanks with remote heaters have circulation pump controls (7.4.4.4).
- All water heating systems have temperature controls that are adjustable down to 120°F (48.9°C) or lower (7.4.4.1).
- Systems designed with pipe heating systems such as heat trace have temperature or time controls (7.4.4.2).
- Public lavatories have outlet temperature controls that limit the discharge temperature to 110°F (43.3°C) (7.4.4.3).
- Pool heaters have readily accessible controls and gas-fired heaters do not have standing pilot lights (7.4.5.1).
- Heated swimming pools have vapor retardant covers (7.4.5.2).
- Pool heaters and circulation pumps have time switches (7.4.5.3).

Equipment Efficiency Worksheet (7.4.1)

System Tag	Equipment Type (From Table 7.8)	Sub-Category or Rating Condition (From Table 7.8)	Input Rating (Btu/h or kW)	Volume (gal or l)	Energy Factor or Et Rated ≥ Required	Standby Loss Specified ≤ Nameplate
					≥	≤
					≥	≤
					≥	≤
					≥	≤

Combination Space and Water Heating Worksheet (7.5.1)

System Tag	Standby Loss Method	or Energy Use Exception (attach calculations)	or Size Exception
	Equipment ≤ Requirement	Equipment < Requirement	Equipment < Requirement
	≤	<	< 150,000 Btu/h (44 kW)
	≤	<	< 150,000 Btu/h (44 kW)
	≤	<	< 150,000 Btu/h (44 kW)
	≤	<	< 150,000 Btu/h (44 kW)