

Department of Energy

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§ 429.43 Commercial heating, ventilating, air conditioning (HVAC) equipment (excluding air-cooled, three-phase, small commercial package air conditioning and heating equipment with a cooling capacity of less than 65,000 British thermal units per hour and air-cooled, three-phase, variable refrigerant flow multi-split air conditioners and heat pumps with less than 65,000 British thermal units per hour cooling capacity).

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§ 429.44 Commercial water heating equipment.

(a) For residential-duty commercial water heaters, all represented values must be determined in accordance with § 429.17.

(b) *Determination of represented values for all types of commercial water heaters except residential-duty commercial water heaters.* Manufacturers must determine the represented values, which includes

the certified ratings, for each basic model of commercial water heating equipment except residential-duty commercial water heaters, either by testing, in conjunction with the applicable sampling provisions, or by applying an AEDM as set forth in § 429.70.

(1) *Units to be tested.* If the represented value for a given basic model is determined through testing:

(i) The general requirements of § 429.11 apply; and

(ii) A sample of sufficient size must be randomly selected and tested to ensure that:

(A) Any represented value of energy consumption or other measure of energy use of a basic model for which consumers would favor lower values must be greater than or equal to the higher of:

(1) The mean of the sample, where:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

And, \bar{x} is the sample mean; n is the number of samples; and x_i is the i th sample; or,

(2) The upper 95-percent confidence limit (UCL) of the true mean divided by 1.05, where:

$$UCL = \bar{x} + t_{.95} \left(\frac{s}{\sqrt{n}} \right)$$

And \bar{x} is the sample mean; s is the sample standard deviation; n is the number of samples; and $t_{0.95}$ is the t statistic for a 95-percent one-tailed confidence interval with $n-1$ degrees of freedom (from appendix A to subpart B of this part). And,

(B) Any represented value of energy efficiency or other measure of energy consumption of a basic model for which consumers would favor higher values must be less than or equal to the lower of:

(1) The mean of the sample, where:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i$$

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And, \bar{x} is the sample mean; n is the number of samples; and x_i is the i th sample; or,

(2) The lower 95-percent confidence limit (LCL) of the true mean divided by 0.95, where:

$$LCL = \bar{x} - t_{.95} \left(\frac{s}{\sqrt{n}} \right)$$

And \bar{x} is the sample mean; s is the sample standard deviation; n is the number of samples; and $t_{0.95}$ is the t statistic for a 95-percent one-tailed confidence interval with $n-1$ degrees of freedom (from appendix A to subpart B of this part).

(2) *Alternative efficiency determination methods.* In lieu of testing, a represented value of efficiency or consumption for a basic model must be determined through the application of an AEDM pursuant to the requirements of § 429.70 and the provisions of this section, where:

(i) Any represented value of energy consumption or other measure of energy use of a basic model for which consumers would favor lower values must be greater than or equal to the output of the AEDM and less than or equal to the Federal standard for that basic model; and

(ii) Any represented value of energy efficiency or other measure of energy consumption of a basic model for which consumers would favor higher values must be less than or equal to the output of the AEDM and greater than or equal to the Federal standard for that basic model.

(3) *Rated input.* The rated input for a basic model reported in accordance with paragraph (c)(2) of this section must be the maximum rated input listed on the nameplate for that basic model.

(c) *Certification reports.* For commercial water heating equipment other than residential-duty commercial water heaters:

(1) The requirements of § 429.12 apply; and

(2) Pursuant to § 429.12(b)(13), a certification report must include the following public equipment-specific information:

(i) Commercial electric storage water heaters with storage capacity less than

or equal to 140 gallons: The standby loss in percent per hour (%/h) and the measured storage volume in gallons (gal).

(ii) Commercial gas-fired and oil-fired storage water heaters with storage capacity less than or equal to 140 gallons: The thermal efficiency in percent (%), the standby loss in British thermal units per hour (Btu/h), the rated storage volume in gallons (gal), and the rated input in British thermal units per hour (Btu/h).

(iii) Commercial water heaters and hot water supply boilers with storage capacity greater than 140 gallons: The thermal efficiency in percent (%); whether the storage volume is greater than 140 gallons (Yes/No); whether the tank surface area is insulated with at least R-12.5 (Yes/No); whether a standing pilot light is used (Yes/No); for gas or oil-fired water heaters, whether the basic model has a fire damper or fan-assisted combustion (Yes/No); and, if applicable, pursuant to § 431.110 of this chapter, the standby loss in British thermal units per hour (Btu/h); the measured storage volume in gallons (gal); and the rated input in British thermal units per hour (Btu/h).

(iv) Commercial gas-fired and oil-fired instantaneous water heaters with storage capacity greater than or equal to 10 gallons and gas-fired and oil-fired hot water supply boilers with storage capacity greater than or equal to 10 gallons: The thermal efficiency in percent (%); the standby loss in British thermal units per hour (Btu/h); the rated storage volume in gallons (gal); the rated input in British thermal units per hour (Btu/h); whether the water heater includes a storage tank with a storage volume greater than or equal to 10 gallons (Yes/No). For equipment that does not meet the definition of storage-type instantaneous water heaters (as set forth in 10 CFR 431.102),

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in addition to the requirements discussed previously in this paragraph (c)(2)(iv), the following must also be included in the certification report: whether the measured storage volume is determined using weight-based test in accordance with § 431.106 of this chapter or the calculation-based method in accordance with § 429.72; whether the water heater will initiate main burner operation based on a temperature-controlled call for heating that is internal to the water heater (Yes/No); whether the water heater is equipped with an integral pump purge functionality (Yes/No); if the water heater is equipped with integral pump purge, the default duration of the pump off delay (minutes).

(v) Commercial gas-fired and oil-fired instantaneous water heaters with storage capacity less than 10 gallons and gas-fired and oil-fired hot water supply boilers with storage capacity less than 10 gallons: The thermal efficiency in percent (%); the rated storage volume in gallons (gal), the rated input in British thermal units per hour (Btu/h); and whether the measured storage volume is determined using weight-based test in accordance with § 431.106 of this chapter or the calculation-based method in accordance with § 429.72.

(vi) Commercial unfired hot water storage tanks: The thermal insulation (i.e., R-value) and stored volume in gallons (gal).

(3) Pursuant to § 429.12(b)(13), a certification report must include the following additional, equipment-specific information:

(i) Whether the basic model is engineered-to-order; and

(ii) For any basic model rated with an AEDM, whether the manufacturer elects the witness test option for verification testing. (See § 429.70(c)(5)(iii) for options.) However, the manufacturer may not select more than 10 percent of AEDM-rated basic models to be eligible for witness testing.

(4) Pursuant to § 429.12(b)(13), a certification report may include supplemental testing instructions in PDF format. If necessary to run a valid test, the equipment-specific, supplemental information must include any additional testing and testing set-up in-

structions (e.g., whether a bypass loop was used for testing) for the basic model and all other information (e.g., operational codes or overrides for the control settings) necessary to operate the basic model under the required conditions specified by the relevant test procedure. A manufacturer may also include with a certification report other supplementary items in PDF format for DOE's consideration in performing testing under subpart C of this part. For example, for oil-fired commercial water heating equipment (other than residential-duty commercial water heaters): The allowable range for CO₂ reading in percent (%) and the fuel pump pressure in pounds per square inch gauge (psig).

(d) *Certification reports for residential-duty commercial water heaters.* (1) The requirements of § 429.12 apply; and

(2) Pursuant to § 429.12(b)(13), a certification report for equipment must include the following public, equipment-specific information:

(i) Residential-duty commercial gas-fired and oil-fired storage water heaters: The uniform energy factor (UEF, rounded to the nearest 0.01), the rated storage volume in gallons (gal, rounded to the nearest 1 gal), the first-hour rating in gallons (gal, rounded to the nearest 1 gal), and the recovery efficiency in percent (% , rounded to the nearest 1%).

(ii) Residential-duty commercial electric instantaneous water heaters: The uniform energy factor (UEF, rounded to the nearest 0.01), the rated storage volume in gallons (gal, rounded to the nearest 1 gal), the maximum gallons per minute (gpm, rounded to the nearest 0.1 gpm), and the recovery efficiency in percent (% , rounded to the nearest 1%).

(e) Alternative methods for determining efficiency or energy use for commercial water heating equipment can be found in § 429.70 of this subpart.

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