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

And, $\bar{x}$ is the sample mean; n is the number of samples; and x_i is the measured value for the i^{th} sample; Or,

(ii) The upper 90 percent confidence limit (UCL) of the true mean divided by 1.05, where:

$$UCL = \bar{x} + t_{0.90}\left(\frac{s}{\sqrt{n}}\right)$$

And $\bar{x}$ is the sample mean; s is the sample standard deviation; n is the number of samples; and $t_{0.90}$ is the t statistic for a 90% one-tailed confidence interval with n-1 degrees of freedom (from Appendix A).

(b) *Certification reports.* (1) The requirements of § 429.12 are applicable to residential furnace fans; and

(2) Pursuant to § 429.12(b)(13), a certification report shall include the following public product-specific information: The fan energy rating (FER) in watts per thousand cubic feet per minute (W/1000 cfm); the calculated maximum airflow at the reference system external static pressure (ESP) in cubic feet per minute (cfm); the control system configuration for achieving the heating and constant-circulation airflow-control settings required for determining FER as specified in the furnace fan test procedure (10 CFR part 430, subpart B, appendix AA); the measured steady-state gas, oil, or electric heat input rate (Q_{IN}) in the heating setting required for determining FER; and for modular blowers, the manufacturer and model number of the electric heat resistance kit with which it is equipped for certification testing.

[79 FR 520, Jan. 3, 2014, as amended at 79 FR 38208, July 3, 2014]

§ 429.59 Pumps.

NOTE 1 TO § 429.59: Prior to February 17, 2023, certification reports must be submitted as required either in this section or 10 CFR 429.59 as it appears in the 10 CFR parts 200 through 499 edition revised as of January 1, 2022. On or after February 17, 2023, certification reports must be submitted as required in this section.

(a) *Determination of represented value.* Manufacturers must determine the represented value, which includes the certified rating, for each basic model of general purpose pump either by testing (which includes the calculation-based methods in the test procedure), in conjunction with the following sampling provisions, or by application of an AEDM that meets the requirements of § 429.70 and the provisions of this section. Manufacturers must determine the represented value, which includes the certified rating, for each basic model of dedicated-purpose pool pump by testing, in conjunction with the following sampling provisions. Manufacturers must update represented values to account for any change in the applicable motor standards in subpart B of part 431 of this chapter and certify amended values as of the next annual certification.

(1) Units to be tested. The requirements of § 429.11 are applicable to pumps; and for each basic model, a sample of sufficient size shall be randomly selected and tested to ensure that—

(i) Any representation of the constant load pump energy index (PEI_{CL}), variable load pump energy index (PEI_{VL}), circulator energy index (CEI), or other measure of energy consumption of a basic model for which consumers would favor lower values shall be greater than or equal to the higher of:

(A) 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 maximum of the ith sample;

Or,

(B) The upper 95 percent confidence limit (UCL) of the true mean divided by 1.05,

where:

$$UCL = \bar{x} \mp t_{0.95}\left(\frac{s}{\sqrt{n}}\right)$$

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 of subpart B of part 429).

(ii) Any representation of weighted energy factor of a basic model must be less than or equal to the lower of:

(A) 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 maximum of the ith sample; or,

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

$$LCL = \bar{x} - t_{0.95}\left(\frac{s}{\sqrt{n}}\right)$$

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 of this subpart).

(2) *Other representations*—(i) *Rated hydraulic horsepower.* The representative value of rated hydraulic horsepower of a basic model of dedicated-purpose pool pump or circulator pump must be the mean of the rated hydraulic horsepower for each tested unit.

(ii) *Dedicated-purpose pool pump motor total horsepower.* The representative value of dedicated-purpose pool pump motor total horsepower of a basic model of dedicated-purpose pool pump must be the mean of the dedicated-purpose pool pump motor total horsepower for each tested unit.

(iii) *True power factor (PF_i).* The representative value of true power factor at each load point i of a basic model of dedicated-purpose pool pump must be the mean of the true power factors at that load point for each tested unit of dedicated-purpose pool pump.

(iv) *General pumps.* The representative values for pump total head in feet at BEP and nominal speed, volume per

unit time in gallons per minute at BEP and nominal speed, and calculated driver power input at each load point must be the arithmetic mean of the value determined for each tested unit of general pump.

(v) *Input power*. The representative value(s) of input power of a basic model of circulator pump at a load point(s) used in the calculation of CEI must be determined based on the mean of the input power at measured data point(s) for each tested unit.

(vi) *Flow at BEP and maximum speed*. The representative value of flow at BEP and maximum speed of a basic model of circulator pump must be determined based on the mean of the flow at BEP and maximum speed for each tested unit.

(vii) *Head at BEP and maximum speed*. The representative value of head at BEP and maximum speed of a basic model of circulator pump must be determined based on the mean of the head at BEP and maximum speed for each tested unit.

(viii) *Other reported values*. The representative value of any other reported value of a basic model of circulator pump must be determined based on the mean of that value for each tested unit.

(3) *Alternative efficiency determination methods*. In lieu of testing, a represented value of efficiency or consumption for a basic model of pump 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 shall 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 shall be less than or equal to the output of the AEDM and greater than or equal to the Federal standard for that basic model.

(b) *Certification reports*. (1) The requirements of § 429.12 are applicable to pumps; and

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

(i) For a pump subject to the test methods prescribed in section III of appendix A to subpart Y of part 431 of this chapter: PEI_{CL}; pump total head in feet (ft.) at BEP and nominal speed; volume per unit time (flow rate) in gallons per minute (gpm) at BEP and nominal speed; the nominal speed of rotation in revolutions per minute (rpm); calculated driver power input at each load point i (P^{in}_i), corrected to nominal speed, in horsepower (hp); full impeller diameter in inches (in.); and for RSV and ST pumps, the number of stages tested.

(ii) For a pump subject to the test methods prescribed in section IV or V of appendix A to subpart Y of part 431 of this chapter: PEI_{CL}; pump total head in feet (ft.) at BEP and nominal speed; volume per unit time (flow rate) in gallons per minute (gpm) at BEP and nominal speed; the nominal speed of rotation in revolutions per minute (rpm); driver power input at each load point i (P^{in}_i), corrected to nominal speed, in horsepower (hp); full impeller diameter in inches (in.); whether the PEI_{CL} is calculated or tested; and for RSV and ST pumps, number of stages tested.

(iii) For a pump subject to the test methods prescribed in section VI or VII of appendix A to subpart Y of part 431 of this chapter: PEI_{VL}; pump total head in feet (ft.) at BEP and nominal speed; volume per unit time (flow rate) in gallons per minute (gpm) at BEP and nominal speed; the nominal speed of rotation in revolutions per minute (rpm); driver power input (measured as the input power to the driver and controls) at each load point i (P^{in}_i), corrected to nominal speed, in horsepower (hp); full impeller diameter in inches (in.); whether the PEI_{VL} is calculated or tested; and for RSV and ST pumps, the number of stages tested.

(iv) For a dedicated-purpose pool pump (other than an integral cartridge-filter or sand-filter pool pump): weighted energy factor (WEF) in

kilogallons per kilowatt-hour (kgal/kWh); rated hydraulic horsepower in horsepower (hp); the speed configuration for which the pump is being rated (*i.e.*, single-speed, two-speed, multi-speed, or variable-speed); true power factor at all applicable test procedure load points i (dimensionless), as specified in Table 1 of appendix B or C to subpart Y of part 431 of this chapter, as applicable; dedicated-purpose pool pump nominal motor horsepower in horsepower (hp); dedicated-purpose pool pump motor total horsepower in horsepower (hp); dedicated-purpose pool pump service factor (dimensionless); for self-priming pool filter pumps and non-self-priming pool filter pumps: the maximum head (in feet) which is based on the mean of the units in the tested sample; a statement regarding whether freeze protection is shipped enabled or disabled; for dedicated-purpose pool pumps (DPPPs) distributed in commerce with freeze protection controls enabled: the default dry-bulb air temperature setting (in °F), default run time setting (in minutes), and default motor speed (in rpm); for self-priming pool filter pumps a statement regarding whether the pump is certified with NSF/ANSI 50–2015 (incorporated by reference, see § 429.4) as self-priming; and, for self-priming pool filter pumps that are not certified with NSF/ANSI 50–2015 as self-priming: the vertical lift (in feet) and true priming time (in minutes) for the DPPP model.

(v) For integral cartridge-filter and sand-filter pool pumps, the maximum run-time (in hours) of the pool pump control with which the integral cartridge-filter or sand-filter pump is distributed in commerce.

(3) Pursuant to § 429.12(b)(13), a certification report may include the following public product-specific information:

(i) For a pump subject to the test methods prescribed in section III of appendix A to subpart Y of part 431 of this chapter: Pump efficiency at BEP in percent (%) and PER_{CL}.

(ii) For a pump subject to the test methods prescribed in section IV or V of appendix A to subpart Y of part 431 of this chapter: Pump efficiency at BEP in percent (%) and PER_{CL}.

(iii) For a pump subject to the test methods prescribed in section VI or VII of appendix A to subpart Y of part 431 of this chapter: Pump efficiency at BEP in percent (%) and PER_{VL}.

(iv) For a dedicated-purpose pool pump (other than an integral cartridge-filter or sand-filter pool pump): Calculated driver power input and flow rate at each load point i (P_i and Q_i), in horsepower (hp) and gallons per minute (gpm), respectively.

(4) Pursuant to § 429.12(b)(13), a certification report will include the following product-specific information:

(i) For a pump subject to the test methods prescribed in section III of appendix A to subpart Y of part 431 of this chapter: The pump configuration (*i.e.*, bare pump); and for ST pumps, the bowl diameter in inches (in.).

(ii) For a pump subject to the test methods prescribed in section IV or V of appendix A to subpart Y of part 431 of this chapter: The pump configuration (*i.e.*, pump sold with an electric motor); for pumps sold with electric motors regulated by DOE's energy conservation standards for electric motors at § 431.25, the nominal motor efficiency in percent (%) and the motor horsepower (hp) for the motor with which the pump is being rated; and for ST pumps, the bowl diameter in inches (in.).

(iii) For a pump subject to the test methods prescribed in section VI or VII of appendix A to subpart Y of part 431 of this chapter: The pump configuration (*i.e.*, pump sold with a motor and continuous or non-continuous controls); for pumps sold with electric motors regulated by DOE's energy conservation standards for electric motors at § 431.25, the nominal motor efficiency in percent (%) and the motor horsepower (hp) for the motor with which the pump is being rated; and for ST pumps, the bowl diameter in inches (in.).

(c) *Individual model numbers.* (1) For a pump subject to the test methods prescribed in appendix A to subpart Y of part 431 of this chapter, each individual model number required to be reported pursuant to § 429.12(b)(6) must consist of the following:

Equipment configuration (as distributed in commerce)	Basic model number	Individual model number(s)		
		1	2	3
Bare pump	Number unique to the basic model	Bare pump	N/A	N/A.
Bare pump with driver	Number unique to the basic model	Bare pump	Driver	N/A.
Bare pump with driver and controls	Number unique to the basic model	Bare pump	Driver	Controls.

(2) Or must otherwise provide sufficient information to identify the specific driver model and/or controls model(s) with which a bare pump is distributed.

[81 FR 4144, Jan. 25, 2016, as amended at 81 FR 4430, Jan. 26, 2016; 82 FR 36918, Aug. 7, 2017; 87 FR 43979, July 22, 2022; 87 FR 57297, Sept. 19, 2022; 88 FR 17973, Mar. 24, 2023; 88 FR 24471, Apr. 21, 2023]

§ 429.60 Commercial packaged boilers.

(a) *Determination of represented value.* Manufacturers must determine the represented value, which includes the certified rating, for each basic model of commercial packaged boilers either by testing in accordance with § 431.86 of this chapter, in conjunction with the applicable sampling provisions, or by applying an AEDM.

(1) *Units to be tested.* (i) If the represented value is determined through testing, the general requirements of § 429.11 are applicable, except that, if the represented value is determined through testing pursuant to § 431.86(c) of this chapter, the number of units selected for testing may be one; and

(ii) For each basic model selected for testing, a sample of sufficient size shall 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 shall 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:

$$UCL = \bar{x} + t_{0.95}\left(\frac{s}{\sqrt{n}}\right)$$

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% one-tailed confidence interval with n − 1 degrees of freedom (from Appendix A to subpart B of part 429). 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 shall be less than or equal to the lower of:

(*1*) The mean of the sample, where: