comply with the requirements necessary to certify to each equipment class that the basic model is capable of operating within.

(i) *Customer order storage cabinets.* For customer order storage cabinets that have individual-secured compartments that are convertible between the ≥32 °F and <32 °F operating temperatures, the customer order storage cabinets must determine the represented values, which includes the certified ratings, either by testing, in conjunction with the applicable sampling provisions, or by applying an AEDM, with all convertible compartments operating either as medium temperature refrigerators or all convertible compartments as low-temperature freezers, or at the lowest application product temperature for each equipment class as specified in § 431.64 of this chapter, to comply with the requirements necessary to certify to each equipment class that the basic model is capable of operating within.

(ii) [Reserved]

(b) *Certification reports.* (1) The requirements of § 429.12 are applicable to commercial refrigerators, freezers, and refrigerator-freezers; and

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

(i) The daily energy consumption in kilowatt hours per day (kWh/day);

(ii) The rating temperature (e.g. lowest product application temperature, if applicable) in degrees Fahrenheit (°F); and

(iii) The chilled or frozen compartment volume in cubic feet (ft^3), the adjusted volume in cubic feet (ft^3), or the total display area (TDA) in feet squared (ft^2) (as appropriate for the equipment class).

(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% of AEDM-rated basic models.

(4) Pursuant to § 429.12(b)(13), a certification report must include supplemental information submitted in PDF format. The equipment-specific, supplemental information must include any additional testing and testing set up instructions (*e.g.*, charging instructions) for the basic model; identification of all special features that were included in rating the basic model; and all other information (*e.g.*, any specific settings or controls) 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 (*e.g.*, manuals) for DOE to consider when performing testing under subpart C of this part.

[76 FR 12451, Mar. 7, 2011; 76 FR 24775, May 2, 2011, as amended at 76 FR 38292, June 30, 2011; 78 FR 79593, Dec. 31, 2013; 79 FR 22307, Apr. 21, 2014; 79 FR 25501, May 5, 2014; 80 FR 151, Jan. 5, 2015; 88 FR 66221, Sept. 26, 2023]

§ 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).

(a) Determination of represented values. Manufacturers must determine the represented values, which include the certified ratings, for each basic model of commercial HVAC equipment either by testing, 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; 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, or of a tested

combination for variable refrigerant flow multi-split air conditioners and heat pumps certified to standards in terms of IEER as provided at paragraph (a)(3)(ii)(C) of this section, 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:

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

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, or of a tested combination for variable refrigerant flow multi-split air conditioners and heat pumps certified to standards in terms of IEER as provided at paragraph (a)(3)(ii)(C) of this section, for which consumers would favor higher values shall be less than or equal to the lower of:

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

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

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% one-tailed confidence interval with n-1 degrees of freedom (from Appendix A to subpart B of part 429).

(iii) For packaged terminal air conditioners and packaged terminal heat pumps, the represented value of cooling capacity shall be the average of the capacities measured for the sample selected as described in (a)(1)(ii) of this section, rounded to the nearest 100 Btu/h.

(iv) For air-cooled commercial package air-conditioning and heating equipment, the represented value of cooling capacity must be a self-declared value corresponding to the nearest appropriate Btu/h multiple according to Table 4 of ANSI/AHRI 340/360–2007 (incorporated by reference; see § 429.4) that is no less than 95 percent of the mean of the capacities measured for the units in the sample selected as described in paragraph (a)(1)(ii) of this section.

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

(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 output of the AEDM and less than or equal to the Federal standard for that basic model; 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 output of the AEDM and greater than or equal to the Federal standard for that basic model.

(ii) For air-cooled commercial package air-conditioning and heating equipment, the represented value of cooling capacity must be the cooling capacity output simulated by the AEDM as described in paragraph (a)(2) of this section.

(3) *Product-specific provisions for determination of represented values.* (i) Direct-expansion-dedicated outdoor air systems (DX–DOASes):

(A) Individual model selection:

(*1*) Representations for a basic model must be based on the least efficient individual model(s) distributed in commerce among all otherwise comparable model groups comprising the basic model, considering only individual models as provided in paragraph (a)(3)(i)(A)(*2*) of this section. For the purpose of this paragraph (a)(3), an ''otherwise comparable model group'' means a group of individual models distributed in commerce within the basic model that do not differ in components that affect energy consumption as measured according to the applicable test procedure specified at 10 CFR 431.96 other than those listed in table 1 to paragraph (a)(3)(i)(A) of this section. An otherwise comparable model group may include individual models distributed in commerce with any combination of the components listed in table 1 (or none of the components listed in table 1). An otherwise comparable model group may consist of only one individual model.

(*2*) For a basic model that includes individual models distributed in commerce with components listed in table 1 to paragraph (a)(3)(i)(A) of this section, the requirements for determining representations apply only to the individual model(s) of a specific otherwise comparable model group distributed in commerce with the least number (which could be zero) of components listed in table 1 included in individual models of the group. Testing under this paragraph shall be consistent with any component-specific test provisions specified in section 2.2.2 of appendix B to subpart F of part 431.

TABLE 1 TO PARAGRAPH (a)(3)(i)(A)

Component	Description
Furnaces and Steam/Hydronic Heat Coils	Furnaces and steam/hydronic heat coils used to provide primary or supplementary heating.
Ducted Condenser Fans	A condenser fan/motor assembly designed for optional external ducting of condenser air that provides greater pressure rise and has a higher rated motor horsepower than the condenser fan provided as a standard component with the equipment.
Sound Traps/Sound Attenuators	An assembly of structures through which the supply air passes before leaving the equipment or through which the return air from the building passes immediately after entering the equipment, for which the sound insertion loss is at least 6 dB for the 125 Hz octave band frequency range.

TABLE 1 TO PARAGRAPH (a)(3)(i)(A)—Continued

Component	Description
VERS Preheat	Electric resistance, hydronic, or steam heating coils used for preheating outdoor air entering a VERS.

(B) When certifying, the following provisions apply.

(*1*) For ratings based on tested samples, the represented value of moisture removal capacity shall be between 95 and 100 percent of the mean of the moisture removal capacities measured for the units in the sample selected, as described in paragraph (a)(1)(ii) of this section, rounded to the nearest lb/hr multiple specified in table 2 to paragraph (a)(3)(i)(B) of this section.

(*2*) For ratings based on an AEDM, the represented value of moisture removal capacity shall be the moisture removal capacity output simulated by the AEDM, as described in paragraph (a)(2) of this section, rounded to the nearest lb/hr multiple specified in table 2 to paragraph (a)(3)(i)(B) of this section.

TABLE 2 PARAGRAPH (a)(3)(i)(B)—ROUNDING REQUIREMENTS FOR RATED MOISTURE REMOVAL CAPACITY

Moisture removal capacity (MRC), lb/hr	Rounding multiples, lb/hr
0 < MRC ≤ 30	0.2
30 < MRC ≤ 60	0.5
60 < MRC ≤ 180	1
180 < MRC	2

(ii) *Variable refrigerant flow multi-split air conditioners and heat pumps (other than air-cooled with cooling capacity less than 65,000 btu/h).* When certifying to standards in terms of IEER, the following provisions apply.

(A) *Outdoor Unit Model Selection.* All representations for basic models of VRF multi-split systems must be based on the least-efficient outdoor unit model(s) distributed in commerce within the basic model.

(B) *Indoor Unit Model Selection.* A manufacturer must determine represented values for basic models of VRF multi-split systems based on the following provisions regarding selection of indoor units:

(*1*) The combination of indoor unit models shall be selected per the certified tested combination in the STI, subject to the provisions in paragraph (a)(3)(ii)(B)(*2*) of this section.

(*2*) For each indoor unit model identified in the tested combination for which the model number certified in the STI does not fully specify the presence or absence of all components, a fully-specified indoor unit model shall be selected that meets the following qualifications:

(*i*) Is distributed in commerce; and

(*ii*) Has a model number consistent with the certified indoor unit model number (*i.e.*, shares all digits of the model number that are specified in the certified indoor unit model number); and

(*iii*) Among the group of all indoor models meeting the criteria from paragraphs (a)(3)(ii)(B)(*2*)(*i*) and (*ii*) of this section, has the least number (which could be zero) of components listed in Table 2 to paragraph (a)(3)(ii)(B)(*2*) of this section.

TABLE 3 TO PARAGRAPH (a)(3)(ii)(B)(*2*)—SPECIFIC COMPONENTS FOR VARIABLE REFRIGERANT FLOW MULTI-SPLIT SYSTEMS

Component	Description
Air economizers	An automatic system that enables a cooling system to supply and use outdoor air to reduce or eliminate the need for mechanical cooling during mild or cold weather.
Dehumidification Components.	An assembly that reduced the moisture content of the supply air through moisture transfer with solid or liquid desiccants.

(C) *Represented Values for Different Indoor Unit Combinations.* (*1*) If a basic model includes only one type of indoor unit combination (*i.e.*, ducted, non-

ducted, or SDHV), a manufacturer must determine the represented values for the basic model in accordance with the sampling plan set forth in § 429.11 and paragraph (a)(1) of this section if the represented values are determined through testing, or in accordance with the provisions for applying an AEDM set forth in paragraph (a)(2) of this section and § 429.70. Indoor unit models must be selected in accordance with paragraph (a)(3)(ii)(B) of this section.

(*2*) If a basic model includes more than one type of indoor unit combination (*i.e.*, ducted, non-ducted, and/or SDHV):

(*i*) A manufacturer must determine separate represented values for each type of indoor unit combination. If the represented values are determined through testing, a manufacturer must test, at a minimum, a single tested combination that represents each type of indoor unit combination included in that basic model. A manufacturer may alternatively determine separate represented values through application of an AEDM as set forth in paragraph (a)(2) of this section and § 429.70. Indoor unit models within the indoor unit combination must be selected in accordance with paragraph (a)(3)(ii)(B) of this section.

(*ii*) A manufacturer may also determine optional ''mixed'' representations by calculating the mean value across any two required representations described in the paragraph (a)(3)(ii)(C)(*2*)(*i*) of this section (*i.e.*, a representation for ''mixed ducted/non-ducted'' would be determined by averaging the ducted representation and the non-ducted representation; a representation for ''mixed ducted/SDHV'' would be determined by averaging the ducted representation and the SDHV representation, and a representation for ''mixed non-ducted/SDHV'' would be determined by averaging the non-ducted representation and the SDHV representation).

(iii) *Single package vertical units.* When certifying to standards in terms of IEER, the following provisions apply.

(A) For individual model selection:

(*1*) Representations for a basic model must be based on the least efficient individual model(s) distributed in commerce among all otherwise comparable model groups comprising the basic model, except as provided in paragraph (a)(3)(iii)(A)(*2*) of this section for individual models that include components listed in table 4 to this paragraph (a)(3)(iii)(A). For the purpose of this paragraph (a)(3)(iii)(A)(*1*), ''otherwise comparable model group'' means a group of individual models distributed in commerce within the basic model that do not differ in components that affect energy consumption as measured according to the applicable test procedure specified at 10 CFR 431.96 other than those listed in table 4 to this paragraph (a)(3)(iii)(A). An otherwise comparable model group may include individual models distributed in commerce with any combination of the components listed in table 4 (or none of the components listed in table 4). An otherwise comparable model group may consist of only one individual model.

(*2*) For a basic model that includes individual models distributed in commerce with components listed in table 4 to this paragraph (a)(3)(iii)(A), the requirements for determining representations apply only to the individual model(s) of a specific otherwise comparable model group distributed in commerce with the least number (which could be zero) of components listed in table 4 included in individual models of the group. Testing under this paragraph (a)(3)(iii)(A)(*2*) shall be consistent with any component-specific test provisions specified in section 4 of appendix G1 to subpart F of 10 CFR part 431.

TABLE 4 TO PARAGRAPH (a)(3)(iii)(A)—SPECIFIC COMPONENTS FOR SINGLE PACKAGE VERTICAL UNITS

Component	Description
Desiccant Dehumidification Components.	An assembly that reduces the moisture content of the supply air through moisture transfer with solid or liquid desiccants.
Air Economizers	An automatic system that enables a cooling system to supply outdoor air to reduce or eliminate the need for mechanical cooling during mid or cold weather.

TABLE 4 TO PARAGRAPH (a)(3)(iii)(A)—SPECIFIC COMPONENTS FOR SINGLE PACKAGE VERTICAL UNITS—Continued

Component	Description
Ventilation Energy Recovery System (VERS).	An assembly that preconditions outdoor air entering the equipment through direct or indirect thermal and/or moisture exchange with the exhaust air, which is defined as the building air being exhausted to the outside from the equipment.
Steam/Hydronic Heat Coils	Coils used to provide supplemental heating.
Hot Gas Reheat	A heat exchanger located downstream of the indoor coil that heats the Supply Air during cooling operation using high pressure refrigerant in order to increase the ratio of moisture removal to Cooling Capacity provided by the equipment.
Fire/Smoke/Isolation Dampers	A damper assembly including means to open and close the damper mounted at the supply or return duct opening of the equipment.
Powered Exhaust/Powered Return Air Fans.	A powered exhaust fan is a fan that transfers directly to the outside a portion of the building air that is returning to the unit, rather than allowing it to recirculate to the indoor coil and back to the building. A powered return fan is a fan that draws building air into the equipment.
Sound Traps/Sound Attenuators.	An assembly of structures through which the supply air passes before leaving the equipment or through which the return air from the building passes immediately after entering the equipment for which the sound insertion loss is at least 6 dB for the 125 Hz octave band frequency range.
Hot Gas Bypass	A method to adjust the cooling delivered by the equipment in which some portion of the hot high-pressure refrigerant from the discharge of the compressor(s) is diverted from its normal flow to the outdoor coil and is instead allowed to enter the indoor coil to modulate the capacity of a refrigeration circuit or to prevent evaporator coil freezing.

(B) The represented value of cooling capacity must be between 95 percent and 100 percent of the mean of the capacities measured for the units in the sample selected as described in paragraph (a)(1)(ii) of this section, or between 95 percent and 100 percent of the net sensible cooling capacity output simulated by the alternative energy-efficiency determination method (AEDM) as described in paragraph (a)(2) of this section.

(C) Represented values must be based on performance (either through testing or by applying an AEDM) of individual models with components and features that are selected in accordance with section 4 of appendix G1 to subpart F of 10 CFR part 431.

(iv) *Computer room air conditioners.* When certifying to standards in terms of net sensible coefficient of performance (NSenCOP), the following provisions apply.

(A) For individual model selection:

(*1*) Representations for a basic model must be based on the least-efficient individual model(s) distributed in commerce among all otherwise comparable model groups comprising the basic model, except as provided in paragraph (a)(3)(iv)(A)(*2*) of this section for individual models that include components listed in table 5 to paragraph (a)(3)(iv)(A) of this section. For the purpose of this paragraph (a)(3)(iv)(A)(*1*), *otherwise comparable model group* means a group of individual models distributed in commerce within the basic model that do not differ in components that affect energy consumption as measured according to the applicable test procedure specified at 10 CFR 431.96 other than those listed in table 5 to paragraph (a)(3)(iv)(A) of this section. An otherwise comparable model group may include individual models distributed in commerce with any combination of the components listed in table 5 (or none of the components listed in table 5). An otherwise comparable model group may consist of only one individual model.

(*2*) For a basic model that includes individual models distributed in commerce, with components listed in table 5 to paragraph (a)(3)(iv)(A) of this section, the requirements for determining representations apply only to the individual model(s) of a specific otherwise comparable model group distributed in commerce with the least number (which could be zero) of components listed in table 5 to paragraph (a)(3)(iv)(A) included in individual models of the group. Testing under this paragraph (a)(3)(iv)(A)(*2*) shall be consistent with any component-specific test provisions specified in section 4 of appendix E1 to subpart F of 10 CFR part 431.

TABLE 5 TO PARAGRAPH (a)(3)(iv)(A)—SPECIFIC COMPONENTS FOR COMPUTER ROOM AIR CONDITIONERS

Component	Description
Air Economizers	An automatic system that enables a cooling system to supply and use outdoor air to reduce or eliminate the need for mechanical cooling during mild or cold weather.
Process Heat Recovery/Reclaim Coils/ Thermal Storage.	A heat exchanger located inside the unit that conditions the equipment's supply air using energy transferred from an external source using a vapor, gas, or liquid.
Evaporative Pre-cooling of Air-cooled Condenser Intake Air.	Water is evaporated into the air entering the air-cooled condenser to lower the dry-bulb temperature and thereby increase efficiency of the refrigeration cycle.
Steam/Hydronic Heat Coils	Coils used to provide supplemental heat.
Refrigerant Reheat Coils	A heat exchanger located downstream of the indoor coil that heats the supply air during cooling operation using high pressure refrigerant in order to increase the ratio of moisture removal to cooling capacity provided by the equipment.
Powered Exhaust/Powered Return Air Fans.	A powered exhaust fan is a fan that transfers directly to the outside a portion of the building air that is returning to the unit, rather than allowing it to recirculate to the indoor coil and back to the building. A powered return air fan is a fan that draws building air into the equipment.
Compressor Variable Frequency Drive (VFD).	A device connected electrically between the equipment's power supply connection and the compressor that can vary the frequency of power supplied to the compressor in order to allow variation of the compressor's rotational speed. If the manufacturer chooses to make representations for performance at part-load and/or low-ambient conditions, compressor VFDs must be treated consistently for all cooling capacity tests for the basic model (*i.e.,* if the compressor VFD is installed and active for the part-load and/or low-ambient tests, it must also be installed and active for the NSenCOP test).
Fire/Smoke/Isolation Dampers	A damper assembly including means to open and close the damper mounted at the supply or return duct opening of the equipment.
Non-Standard Indoor Fan Motors	The standard indoor fan motor is the motor specified in the manufacturer's installation instructions for testing and shall be distributed in commerce as part of a particular model. A non-standard motor is an indoor fan motor that is not the standard indoor fan motor and that is distributed in commerce as part of an individual model within the same basic model. For a non-standard indoor fan motor(s) to be considered a specific component for a basic model (and thus subject to the provisions of paragraph (a)(3)(iv)(A) of this section), the following provisions must be met: 1. Non-standard indoor fan motor(s) must meet the minimum allowable efficiency determined per section D.2.1 of AHRI 1360–2022 (incorporated by reference, see § 429.4) (*i.e.,* for non-standard indoor fan motors) or per section D.2.2 of AHRI 1360–2022 for non-standard indoor integrated fan and motor combinations). If the standard indoor fan motor can vary fan speed through control system adjustment of motor speed, all non-standard indoor fan motors must also allow speed control (including with the use of VFD).
Humidifiers	A device placed in the supply air stream for moisture evaporation and distribution. The device may require building steam or water, hot water, electricity, or gas to operate.
Flooded Condenser Head Pressure Controls.	An assembly, including a receiver and head pressure control valve, used to allow for unit operation at lower outdoor ambient temperatures than the standard operating control system.
Chilled Water Dual Cooling Coils	A secondary chilled water coil added in the indoor air stream for use as the primary or secondary cooling circuit in conjunction with a separate chiller.
Condensate Pump	A device used to pump condensate and/or humidifier drain water from inside the unit to a customer drain outside the unit.

(B) The represented value of net sensible cooling capacity must be between 95 percent and 100 percent of the mean of the capacities measured for the units in the sample selected as described in paragraph (a)(1)(ii) of this section, or between 95 percent and 100 percent of the net sensible cooling capacity output simulated by the AEDM as described in paragraph (a)(2) of this section.

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

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

(i) Commercial package air-conditioning equipment (except commercial package air conditioning equipment that is air-cooled with a cooling capacity less than 65,000 Btu/h):

(A) When certifying compliance with an EER standard: the energy efficiency ratio (EER in British thermal units per Watt-hour (Btu/Wh)), the rated cooling capacity in British thermal units per hour (Btu/h), and the type(s) of heating used by the basic model (*e.g.*, electric, gas, hydronic, none).

(B) When certifying compliance with an IEER standard: the integrated energy efficiency ratio (IEER in British thermal units per Watt-hour (Btu/Wh)), the rated cooling capacity in British thermal units per hour (Btu/h), and the type(s) of heating used by the basic model (*e.g.*, electric, gas, hydronic, none).

(ii) Commercial package heating equipment (except commercial package heating equipment that is air-cooled with a cooling capacity less than 65,000 Btu/h):

(A) When certifying compliance with an EER standard: the energy efficiency ratio (EER in British thermal units per Watt-hour (Btu/Wh)), the coefficient of performance (COP), the rated cooling capacity in British thermal units per hour (Btu/h), and the type(s) of heating used by the basic model (*e.g.*, electric, gas, hydronic, none).

(B) When certifying compliance an IEER standard: the integrated energy efficiency ratio (IEER in British thermal units per Watt-hour (Btu/Wh)), the coefficient of performance (COP), the rated cooling capacity in British thermal units per hour (Btu/h), and the type(s) of heating used by the basic model (*e.g.*, electric, gas, hydronic, none).

(iii) Packaged terminal air conditioners: The energy efficiency ratio (EER in British thermal units per Watt-hour (Btu/Wh)), the rated cooling capacity in British thermal units per hour (Btu/h), the wall sleeve dimensions in inches (in), and the duration of the break-in period (hours).

(iv) Packaged terminal heat pumps: The energy efficiency ratio (EER in British thermal units per Watt-hour (Btu/W-h)), the coefficient of performance (COP), the rated cooling capacity in British thermal units per hour (Btu/h), the wall sleeve dimensions in inches (in), and the duration of the break-in period (hours).

(v) Single package vertical air conditioners: The energy efficiency ratio (EER in British thermal units per Watt-hour (Btu/Wh)) and the rated cooling capacity in British thermal units per hour (Btu/h).

(vi) Single package vertical heat pumps: The energy efficiency ratio (EER in British thermal units per Watt-hour (Btu/Wh)), the coefficient of performance (COP), and the rated cooling capacity in British thermal units per hour (Btu/h).

(vii) Variable refrigerant flow multi-split air-cooled air conditioners (other than air-cooled with rated cooling capacity less than 65,000 btu/h):

(A) When certifying compliance with an EER standard: The energy efficiency ratio (EER in British thermal units per Watt-hour (Btu/Wh)), rated cooling capacity in British thermal units per hour (Btu/h), and the type(s) of heating used by the basic model (e.g., electric, gas, hydronic, none).

(B) When certifying compliance with an IEER standard, the following must be certified for each tested combination as required under paragraph (a)(3)(ii)(C) of this section: The integrated energy efficiency ratio (IEER) in British thermal units per Watt-hour (Btu/Wh)); the rated cooling capacity in British thermal units per hour (Btu/h); whether the represented values are for a non-ducted, ducted, or SDHV tested combination, or for a mixed representation of any two of the tested combinations; and the outdoor unit(s) and indoor units identified in the tested combination. The following must be certified for each basic model: the type(s) of heating used (*i.e.*, electric, gas, hydronic, none); and the refrigerant used to determine the represented values.

(viii) Variable refrigerant flow multi-split heat pumps (other than air-cooled with rated cooling capacity less than 65,000 btu/h):

(A) When certifying compliance with an EER standard: The energy efficiency ratio (EER in British thermal units per Watt-hour (Btu/Wh)), the coefficient of performance (COP), rated cooling capacity in British thermal units per hour (Btu/h), and the type(s) of heating used by the basic model (e.g., electric, gas, hydronic, none).

(B) When certifying compliance with an IEER standard, the following must be certified for each tested combination as required under paragraph (a)(3)(ii)(C) of this section: The integrated energy efficiency ratio (IEER) in British thermal units per Watt-hour (Btu/Wh); the coefficient of performance (COP); the rated cooling capacity in British thermal units per hour (Btu/h); the rated heating capacity (Btu/h); whether the represented values are for a non-ducted, ducted, or SDHV tested combination, or for a mixed representation of any two of the tested combinations; and the outdoor unit(s) and indoor units identified in the tested combination. The following must be certified for each basic model: the type(s) of heating used (*i.e.*, electric, gas, hydronic, none); and the refrigerant used to determine the represented values.

(ix) Computer room air-conditioners: The net sensible cooling capacity in British thermal units per hour (Btu/h), the net cooling capacity in British thermal units per hour (Btu/h), the configuration (upflow/downflow), economizer presence (yes or no), condenser medium (air, water, or glycol-cooled), sensible coefficient of performance (SCOP), and rated airflow in standard cubic feet per minute (SCFM).

(x) Water source heat pumps (other than variable refrigerant flow): The energy efficiency ratio (EER in British thermal units per Watt-hour (Btu/Wh)), the coefficient of performance (COP), the rated cooling capacity in British thermal units per hour (Btu/h), and the type(s) of heating used by the basic model (e.g., electric, gas, hydronic, none).

(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% of AEDM-rated basic models.

(4) Pursuant to § 429.12(b)(13), a certification report must include supplemental information submitted in PDF format. The equipment-specific, supplemental information must include any additional testing and testing set up instructions (*e.g.*, charging instructions) for the basic model; identification of all special features that were included in rating the basic model; and all other information (*e.g.*, operational codes or component 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 (*e.g.*, manuals) for DOE consideration in performing testing under subpart C of this part. The equipment-specific, supplemental information must include at least the following:

(i) Commercial package air-conditioning equipment (except commercial package air conditioning equipment that is air-cooled with a cooling capacity less than 65,000 Btu/h): rated indoor airflow in standard cubic feet per minute (SCFM) for each fan coil; water flow rate in gallons per minute (gpm) for water-cooled units only; rated external static pressure in inches of water; frequency or control set points for variable speed components (*e.g.*, compressors, VFDs); required dip switch/control settings for step or variable components; a statement whether the model will operate at test conditions without manufacturer programming; any additional testing instructions, if applicable; and if a variety of motors/drive kits are offered for sale as options in the basic model to account for varying installation requirements, the model number and specifications of the motor (to include efficiency, horsepower, open/closed, and number of poles) and the drive kit, including settings, associated with that specific motor that were used to determine the certified rating. When certifying compliance with an IEER standard, rated indoor airflow in SCFM for each part-load point used in the IEER calculation and any special instructions required to obtain operation at each part-load point, such as frequency or control set points for variable speed components (*e.g.*, compressors, VFDs), dip switch/control settings for step or variable

components, or any additional applicable testing instructions, are also required.

(ii) Commercial package heating equipment (except commercial package heating equipment that is air-cooled with a cooling capacity less than 65,000 Btu/h): The rated heating capacity in British thermal units per hour (Btu/h); rated indoor airflow in standard cubic feet per minute (SCFM) for each fan coil (in cooling mode); rated airflow in SCFM for each fan coil in heating mode if the unit is designed to operate with different airflow rates for cooling and heating mode; water flow rate in gallons per minute (gpm) for water cooled units only; rated external static pressure in inches of water; frequency or control set points for variable speed components (*e.g.*, compressors, VFDs); required dip switch/control settings for step or variable components; a statement whether the model will operate at test conditions without manufacturer programming; any additional testing instructions, if applicable; and if a variety of motors/drive kits are offered for sale as options in the basic model to account for varying installation requirements, the model number and specifications of the motor (to include efficiency, horsepower, open/closed, and number of poles) and the drive kit, including settings, associated with that specific motor that were used to determine the certified rating. When certifying compliance with an IEER standard, rated indoor airflow in SCFM for each part-load point used in the IEER calculation and any special instructions required to obtain operation at each part-load point, such as frequency or control set points for variable speed components (*e.g.*, compressors, VFDs), dip switch/control settings for step or variable components, or any additional applicable testing instructions, are also required.

(iii) Variable refrigerant flow multi-split air-cooled air conditioners (other than air-cooled with rated cooling capacity less than 65,000 btu/h):

(A) When certifying compliance with an EER standard: The nominal cooling capacity in British thermal units per hour (Btu/h); outdoor unit(s) and indoor units identified in the tested combination; components needed for heat recovery, if applicable; rated airflow in standard cubic feet per minute (scfm) for each indoor unit; rated static pressure in inches of water; compressor frequency setpoints; required dip switch/control settings for step or variable components; a statement whether the model will operate at test conditions without manufacturer programming; any additional testing instructions if applicable; if a variety of motors/drive kits are offered for sale as options in the basic model to account for varying installation requirements, the model number and specifications of the motor (to include efficiency, horsepower, open/closed, and number of poles) and the drive kit, including settings, associated with that specific motor that were used to determine the certified rating; and which, if any, special features were included in rating the basic model. Additionally, upon DOE request, the manufacturer must provide a layout of the system set-up for testing including charging instructions consistent with the installation manual.

(B) When certifying compliance with an IEER standard (for requirements in this list pertaining to or affected by indoor units, the requirements must be certified for each tested combination as required under paragraph (a)(3)(ii)(C) of this section): The nominal cooling capacity in British thermal units per hour (Btu/h) for each indoor and outdoor unit; identification of the indoor units to be thermally active for each IEER test point; the rated indoor airflow for the full-load cooling and all part-load cooling tests (for each indoor unit) in standard cubic feet per minute (scfm); the indoor airflow-control setting to be used in the full-load cooling test (for each indoor unit); system start-up or initialization procedures, including conditions and duration; compressor break-in period duration of 20 hours or less; the frequency of oil recovery cycles; operational settings for all critical parameters to be controlled at each of the four IEER cooling test conditions; all dip switch/control settings used for the full-load cooling test; identification of any system control device required for testing; a hierarchy

of instructions for adjustment of critical parameters to reduce cooling capacity during IEER cooling tests (to be used if, using initial critical parameter settings, the measured cooling capacity is more than 3 percent above the target cooling capacity); any additional testing instructions if applicable; and if a variety of motors/drive kits are offered for sale as options in the basic model to account for varying installation requirements, the model number and specifications of the motor (to include efficiency, horsepower, open/closed, and number of poles) and the drive kit, including settings, associated with that specific motor that were used to determine the certified rating. Instructions for conducting a controls verification procedure (as described in Appendix C of AHRI 1230–2021, (incorporated by reference, *see* § 429.4) at each of the four IEER cooling test conditions must also be provided, including: the required thermostat setpoints to ensure control for 80 °F dry-bulb temperature when accounting for setpoint bias, the starting indoor dry-bulb temperature, and the indoor dry-bulb temperature ramp rate (R2). Additionally, the manufacturer must provide a layout of the system set-up for testing (including a piping diagram, a power wiring diagram, a control wiring diagram, and identification of the location of the component(s) corresponding to each critical parameter to be controlled), set-up instructions for indoor units and outdoor units, and charging instructions consistent with the installation manual.

(iv) Variable refrigerant flow multi-split heat pumps (other than air-cooled with rated cooling capacity less than 65,000 btu/h):

(A) When certifying compliance with an EER standard: The nominal cooling capacity in British thermal units per hour (Btu/h); rated heating capacity in British thermal units per hour (Btu/h); outdoor unit(s) and indoor units identified in the tested combination; components needed for heat recovery, if applicable; rated airflow in standard cubic feet per minute (scfm) for each indoor unit; water flow rate in gallons per minute (gpm) for water-cooled units only; rated static pressure in inches of water; compressor frequency setpoints; required dip switch/control settings for step or variable components; a statement whether the model will operate at test conditions without manufacturer programming; any additional testing instructions if applicable; if a variety of motors/drive kits are offered for sale as options in the basic model to account for varying installation requirements, the model number and specifications of the motor (to include efficiency, horsepower, open/closed, and number of poles) and the drive kit, including settings, associated with that specific motor that were used to determine the certified rating; and which, if any, special features were included in rating the basic model. Additionally, upon DOE request, the manufacturer must provide a layout of the system set-up for testing including charging instructions consistent with the installation manual.

(B) When certifying compliance with an IEER standard (for requirements in this list pertaining to or affected by indoor units, the requirements must be certified for each tested combination as required under paragraph (a)(3)(ii)(C) of this section): The nominal cooling capacity in British thermal units per hour (Btu/h) for each indoor and outdoor unit; the nominal heating capacity (Btu/h) for each indoor and outdoor unit; components needed for heat recovery, if applicable; identification of the indoor units to be thermally active for each IEER test point; the rated indoor airflow for the full-load cooling, full-load heating, and all part-load cooling tests (for each indoor unit) in standard cubic feet per minute (scfm); the indoor airflow-control setting to be used in the full-load cooling test (for each indoor unit); the airflow-control setting to be used in the full-load heating test (for each indoor unit); for water-cooled units—the rated water flow rate in gallons per minute (gpm); system start-up or initialization procedures, including conditions and duration; compressor break-in period duration of 20 hours or less; the frequency of oil-recovery cycles; operational settings for all critical parameters to be controlled at each of the four IEER cooling test conditions; operational settings for all critical parameters to be controlled for the heating test; all

dip switch/control settings used for the full-load cooling and full-load heating tests; identification of any system control device required for testing; a hierarchy of instructions for adjustment of critical parameters to reduce cooling capacity during IEER cooling tests (to be used if, using initial critical parameter settings, the measured cooling capacity is more than 3 percent above the target cooling capacity); any additional testing instructions if applicable; and if a variety of motors/drive kits are offered for sale as options in the basic model to account for varying installation requirements, the model number and specifications of the motor (to include efficiency, horsepower, open/closed, and number of poles) and the drive kit, including settings, associated with that specific motor that were used to determine the certified rating. Instructions for conducting a controls verification procedure (as described in Appendix C of AHRI 1230–2021) at each of the four IEER cooling test conditions must also be provided, including the required thermostat setpoints to ensure control for 80 °F dry-bulb temperature when accounting for setpoint bias, the starting indoor dry-bulb temperature, and the indoor dry-bulb temperature ramp rate (R2). Additionally, the manufacturer must provide a layout of the system set-up for testing (including a piping diagram, a power wiring diagram, a control wiring diagram, and identification of the location of the component(s) corresponding to each critical parameter to be adjusted), set-up instructions for indoor units and outdoor units, and charging instructions consistent with the installation manual.

(v) Water source heat pumps: The nominal cooling capacity in British thermal units per hour (Btu/h); rated heating capacity in British thermal units per hour (Btu/h); rated airflow in standard cubic feet per minute (SCFM) for each indoor unit; water flow rate in gallons per minute (gpm); rated static pressure in inches of water; refrigerant charging instructions, (e.g., refrigerant charge, superheat and/or subcooling temperatures); frequency set points for variable speed components (e.g., compressors, VFDs), including the required dip switch/control settings for step or variable components; a statement whether the model will operate at test conditions without manufacturer programming; any additional testing instructions if applicable; if a variety of motors/drive kits are offered for sale as options in the basic model to account for varying installation requirements, the model number and specifications of the motor (to include efficiency, horsepower, open/closed, and number of poles) and the drive kit, including settings, associated with that specific motor that were used to determine the certified rating; and which, if any, special features were included in rating the basic model.

(vi) Single package vertical air conditioners: Any additional testing instructions, if applicable; if a variety of motors/drive kits are offered for sale as options in the basic model to account for varying installation requirements, the model number and specifications of the motor (to include efficiency, horsepower, open/closed, and number of poles) and the drive kit, including settings, associated with that specific motor that were used to determine the certified rating; and which, if any, special features were included in rating the basic model.

(vii) Single package vertical heat pumps: Any additional testing instructions, if applicable; if a variety of motors/drive kits are offered for sale as options in the basic model to account for varying installation requirements, the model number and specifications of the motor (to include efficiency, horsepower, open/closed, and number of poles) and the drive kit, including settings, associated with that specific motor that were used to determine the certified rating; and which, if any, special features were included in rating the basic model.

(viii) Computer room air-conditioners: Any additional testing instructions, if applicable; and which, if any, special features were included in rating the basic model.

(ix) Package terminal air conditioners and package terminal heat pumps: Any additional testing instructions, if applicable.

(5) For variable refrigerant flow multi-split air conditioners and heat pumps (other than air-cooled with

rated cooling capacity less than 65,000 btu/h), if a manufacturer has knowledge that any of its certified operational settings for critical parameters to be controlled during IEER tests (per paragraph (b)(4)(vii)(B) or (b)(4)(viii)(B) of this section) are invalid according to the results of a controls verification procedure conducted according to § 429.134(v)(3), then the manufacturer must re-rate and re-certify using valid operational settings for critical parameters for all affected basic models.

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

[76 FR 12451, Mar. 7, 2011; 76 FR 24775, May 2, 2011, as amended at 78 FR 79594, Dec. 31, 2013; 79 FR 25501, May 5, 2014; 80 FR 151, Jan. 5, 2015; 80 FR 37147, June 30, 2015; 80 FR 79668, Dec. 23, 2015; 87 FR 45195, July 27, 2022; 87 FR 63892, Oct. 20, 2022; 87 FR 65667, Nov. 1, 2022; 87 FR 75166, Dec. 7, 2022; 87 FR 77317, Dec. 16, 2022; 88 FR 21836, Apr. 11, 2023]

EFFECTIVE DATE NOTE: At 88 FR 84226, Dec. 4, 2023, § 429.43 was amended by adding paragraph (a)(3)(v), effective Jan. 3, 2024. For the convenience of the user, the added text is set forth as follows:

§ 429.43 Commercial heating, ventilating, air conditioning (HVAC) equipment.

(a) * * *

(3) * * *

(v) Water-Source Heat Pumps. When certifying to standards in terms of IEER and ACOP, the following provisions apply.

(A) Individual model selection:

(1) Representations for a basic model must be based on the least efficient individual model(s) distributed in commerce among all otherwise comparable model groups comprising the basic model, except as provided in paragraph (a)(3)(v)(A)*(2)* of this section for individual models that include components listed in table 6 to paragraph (a)(3)(v)(A) of this section. For the purpose of this paragraph (a)(3)(v)(A)*(1)*, ''otherwise comparable model group'' means a group of individual models distributed in commerce within the basic model that do not differ in components that affect energy consumption as measured according to the applicable test procedure specified at 10 CFR 431.96 other than those listed in table 6 to paragraph (a)(3)(v)(A) of this section. An otherwise comparable model group may include individual models distributed in commerce with any combination of the components listed in table 6 (or none of the components listed in table 6) to paragraph (a)(3)(v)(A) of this section. An otherwise comparable model group may consist of only one individual model.

(2) For a basic model that includes individual models distributed in commerce with components listed in table 6 to paragraph (a)(3)(v)(A) of this section, the requirements for determining representations apply only to the individual model(s) of a specific otherwise comparable model group distributed in commerce with the least number (which could be zero) of components listed in table 6 to paragraph (a)(3)(v)(A) of this section included in individual models of the group. Testing under this paragraph shall be consistent with any component-specific test provisions specified in section 3 of appendix C1 to subpart F of 10 CFR part 431.

TABLE 6 TO PARAGRAPH (a)(3)(v)(A)—SPECIFIC COMPONENTS FOR WATER SOURCE HEAT PUMPS

Component	Description
Air Economizers	An automatic system that enables a cooling system to supply outdoor air to reduce or eliminate the need for mechanical cooling during mild or cold weather.
Condenser Pumps/Valves/Fittings.	Additional components in the water circuit for water control or filtering.
Condenser Water Reheat	A heat exchanger located downstream of the indoor coil that heats the supply air during cooling operation using water from the condenser coil in order to increase the ratio of moisture removal to cooling capacity provided by the equipment.
Desiccant Dehumidification Components.	An assembly that reduces the moisture content of the supply air through moisture transfer with solid or liquid desiccants.
Desuperheater	A heat exchanger located downstream of the compressor on the high-pressure vapor line that moves heat to an external source, such as potable water.
Fire/Smoke/Isolation Dampers	A damper assembly including means to open and close the damper mounted at the supply or return duct opening of the equipment.
Grill Options	Special grills used to direct airflow in unique applications (such as up and away from a rear wall).
Indirect/Direct Evaporative Cooling of Ventilation Air.	Water is used indirectly or directly to cool ventilation air. In a direct system the water is introduced directly into the ventilation air and in an indirect system the water is evaporated in secondary air stream and the heat is removed through a heat exchanger.

TABLE 6 TO PARAGRAPH (a)(3)(v)(A)—SPECIFIC COMPONENTS FOR WATER SOURCE HEAT PUMPS—Continued

Component	Description
Non-Standard High-Static Indoor Fan Motors.	The standard indoor fan motor is the motor specified in the manufacturer's installation instructions for testing and shall be distributed in commerce as part of a particular model. A non-standard high-static motor is an indoor fan motor that is not the standard indoor fan motor and that is distributed in commerce as part of an individual model within the same basic model. For a non-standard high-static indoor fan motor(s) to be considered a specific component for a basic model (and thus subject to the provisions of paragraph (a)(3)(v)(A)(*2*) of this section), the following 2 provisions must be met: 1. Non-standard high-static indoor fan motor(s) must meet the minimum allowable efficiency determined per section D.4.1 of AHRI 600–2023 (incorporated by reference, see § 429.4) for non-standard high-static indoor fan motors, or per section D.4.2 of AHRI 600–2023 for non-standard high-static indoor integrated fan and motor combinations. 2. If the standard indoor fan motor can vary fan speed through control system adjustment of motor speed, all non-standard high-static indoor fan motors must also allow speed control (including with the use of a variable-frequency drive).
Powered Exhaust/Powered Return Air Fans.	A powered exhaust fan is a fan that transfers directly to the outside a portion of the building air that is returning to the unit, rather than allowing it to recirculate to the indoor coil and back to the building. A powered return fan is a fan that draws building air into the equipment.
Process Heat Recovery/Reclaim Coils/Thermal Storage.	A heat exchanger located inside the unit that conditions the equipment's supply air using energy transferred from an external source using a vapor, gas, or liquid.
Refrigerant Reheat Coils	A heat exchanger located downstream of the indoor coil that heats the supply air during cooling operation using high-pressure refrigerant in order to increase the ratio of moisture removal to cooling capacity provided by the equipment.
Sound Traps/Sound Attenuators.	An assembly of structures through which the supply air passes before leaving the equipment or through which the return air from the building passes immediately after entering the equipment for which the sound insertion loss is at least 6 dB for the 125 Hz octave band frequency range.
Steam/Hydronic Heat Coils	Coils used to provide supplemental heating.
Ventilation Energy Recovery System (VERS).	An assembly that preconditions outdoor air entering the equipment through direct or indirect thermal and/or moisture exchange with the exhaust air, which is defined as the building air being exhausted to the outside from the equipment.
Waterside Economizer	A heat exchanger located upstream of the indoor coil that conditions the supply air when system water loop conditions are favorable so as not to utilize compressor operation.

(B) The represented value of cooling capacity must be between 95 percent and 100 percent of the mean of the cooling capacities measured for the units in the sample selected as described in paragraph (a)(1)(ii) of this section, or between 95 percent and 100 percent of the cooling capacity output simulated by the AEDM as described in paragraph (a)(2) of this section.

§ 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: