3.4.1. *General.* To determine the combustion efficiency of commercial packaged boilers, use the variables in Section C6 and calculation procedure for the combustion efficiency test specified in Section C7.3 of Appendix C (including the specified subsections of C7.2) of ANSI/AHRI Standard 1500–2015 (incorporated by reference, see § 431.85).

3.4.2. *Rounding.* Round the final combustion efficiency value to nearest one tenth of a percent.

[81 FR 89306, Dec. 9, 2016]

Subpart F—Commercial Air Conditioners and Heat Pumps

SOURCE: 69 FR 61969, Oct. 21, 2004, unless otherwise noted.

§ 431.91 Purpose and scope.

This subpart specifies test procedures and energy conservation standards for certain commercial air conditioners and heat pumps, pursuant to Part C of Title III of the Energy Policy and Conservation Act, as amended, 42 U.S.C. 6311–6317.

[69 FR 61969, Oct. 21, 2004, as amended at 70 FR 60415, Oct. 18, 2005]

§ 431.92 Definitions concerning commercial air conditioners and heat pumps.

The following definitions apply for purposes of this subpart F, and of subparts J through M of this part. Any words or terms not defined in this section or elsewhere in this part shall be defined as provided in 42 U.S.C. 6311.

Basic model includes:

(1) *Computer room air conditioners* means all units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.*, electric or gas), and which have the same or comparably performing compressor(s), heat exchangers, and air moving system(s) that have a common ''nominal'' cooling capacity.

(2) *Direct expansion-dedicated outdoor air system* means all units manufactured by one manufacturer, having the same primary energy source (*e.g.*, electric or gas), within a single equipment class; with the same or comparably performing compressor(s), heat exchangers, ventilation energy recovery system(s) (if present), and air moving system(s) that have a common ''nominal'' moisture removal capacity.

(3) *Packaged terminal air conditioner (PTAC) or packaged terminal heat pump (PTHP)* means all units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.*, electric or gas), and which have the same or comparable compressors, same or comparable heat exchangers, and same or comparable air moving systems that have a cooling capacity within 300 Btu/h of one another.

(4) *Single package vertical units* means all units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.*, electric or gas), and which have the same or comparably performing compressor(s), heat exchangers, and air moving system(s) that have a rated cooling capacity within 1500 Btu/h of one another.

(5) *Small, large, and very large air-cooled or water-cooled commercial package air conditioning and heating equipment* means all units manufactured by one manufacturer within a single equipment class, having the same or comparably performing compressor(s), heat exchangers, and air moving system(s) that have a common ''nominal'' cooling capacity.

(6) *Small, large, and very large water source heat pump* means all units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.*, electric or gas), and which have the same or comparable compressors, same or comparable heat exchangers, and same or comparable ''nominal'' capacity.

(7) *Variable refrigerant flow systems* means all units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.*, electric or gas), and which have the same or comparably performing compressor(s) that have a common ''nominal'' cooling capacity and the same heat rejection medium (*e.g.*, air or water) (includes VRF water source heat pumps).

Coefficient of Performance, or *COP* means the ratio of the produced cooling effect of an air conditioner or heat pump (or its produced heating effect, depending on the mode of operation) to

its net work input, when both the cooling (or heating) effect and the net work input are expressed in identical units of measurement.

Commercial package air-conditioning and heating equipment means air-cooled, water-cooled, evaporatively-cooled, or water source (not including ground water source) electrically operated, unitary central air conditioners and central air-conditioning heat pumps for commercial application.

Computer Room Air Conditioner means a basic model of commercial package air-conditioning and heating equipment (packaged or split) that is: Used in computer rooms, data processing rooms, or other information technology cooling applications; rated for sensible coefficient of performance (SCOP) and tested in accordance with 10 CFR 431.96, and is not a covered consumer product under 42 U.S.C. 6291(1)–(2) and 6292. A computer room air conditioner may be provided with, or have as available options, an integrated humidifier, temperature, and/or humidity control of the supplied air, and reheating function.

Direct expansion-dedicated outdoor air system, or *DX–DOAS*, means a unitary dedicated outdoor air system that is capable of dehumidifying air to a 55 °F dew point—when operating under Standard Rating Condition A as specified in Table 4 or Table 5 of AHRI 920–2020 (incorporated by reference, see § 431.95) with a barometric pressure of 29.92 in Hg—for any part of the range of airflow rates advertised in manufacturer materials, and has a moisture removal capacity of less than 324 lb/h.

Double-duct air conditioner or heat pump means air-cooled commercial package air conditioning and heating equipment that—

(1) Is either a horizontal single package or split-system unit; or a vertical unit that consists of two components that may be shipped or installed either connected or split;

(2) Is intended for indoor installation with ducting of outdoor air from the building exterior to and from the unit, as evidenced by the unit and/or all of its components being non-weatherized, including the absence of any marking (or listing) indicating compliance with UL 1995, ''Heating and Cooling Equipment,'' or any other equivalent requirements for outdoor use;

(3)(i) If it is a horizontal unit, a complete unit has a maximum height of 35 inches; (ii) If it is a vertical unit, a complete unit has a maximum depth of 35 inches; and

(4) Has a rated cooling capacity greater than or equal to 65,000 Btu/h and up to 300,000 Btu/h.

Energy Efficiency Ratio, or *EER* means the ratio of the produced cooling effect of an air conditioner or heat pump to its net work input, expressed in Btu/watt-hour.

Heat Recovery (in the context of variable refrigerant flow multi-split air conditioners or variable refrigerant flow multi-split heat pumps) means that the air conditioner or heat pump is also capable of providing simultaneous heating and cooling operation, where recovered energy from the indoor units operating in one mode can be transferred to one or more other indoor units operating in the other mode. A variable refrigerant flow multi-split heat recovery heat pump is a variable refrigerant flow multi-split heat pump with the addition of heat recovery capability.

Heating seasonal performance factor, or *HSPF* means the total heating output of a central air-conditioning heat pump during its normal annual usage period for heating, expressed in Btu's and divided by the total electric power input, expressed in watt-hours, during the same period.

Integrated energy efficiency ratio, or IEER, means a weighted average calculation of mechanical cooling EERs determined for four load levels and corresponding rating conditions, expressed in Btu/watt-hour. IEER is measured per appendix A to this subpart for air-cooled small (≥65,000 Btu/h), large, and very large commercial package air conditioning and heating equipment and measured per appendix D1 to this subpart 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).

Integrated seasonal coefficient of performance 2 or *ISCOP2*, means a seasonal weighted-average heating efficiency for

heat pump dedicated outdoor air systems, expressed in W/W, as measured according to appendix B of this subpart.

Integrated seasonal moisture removal efficiency 2, or *ISMRE2*, means a seasonal weighted average dehumidification efficiency for dedicated outdoor air systems, expressed in lbs. of moisture/kWh, as measured according to appendix B of this subpart.

Large commercial package air-conditioning and heating equipment means commercial package air-conditioning and heating equipment that is rated—

(1) At or above 135,000 Btu per hour; and

(2) Below 240,000 Btu per hour (cooling capacity).

Non-standard size means a packaged terminal air conditioner or packaged terminal heat pump with existing wall sleeve dimensions having an external wall opening of less than 16 inches high or less than 42 inches wide, and a cross-sectional area less than 670 square inches.

Packaged terminal air conditioner means a wall sleeve and a separate unencased combination of heating and cooling assemblies specified by the builder and intended for mounting through the wall, and that is industrial equipment. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability by builder's choice of hot water, steam, or electricity.

Packaged terminal heat pump means a packaged terminal air conditioner that utilizes reverse cycle refrigeration as its prime heat source, that has a supplementary heat source available, with the choice of hot water, steam, or electric resistant heat, and that is industrial equipment.

Seasonal energy efficiency ratio or *SEER* means the total cooling output of a central air conditioner or central air-conditioning heat pump, expressed in Btu's, during its normal annual usage period for cooling and divided by the total electric power input, expressed in watt-hours, during the same period.

Sensible Coefficient of Performance, or *SCOP* means the net sensible cooling capacity in watts divided by the total power input in watts (excluding reheaters and humidifiers).

Single package unit means any central air conditioner or central air-conditioning heat pump in which all the major assemblies are enclosed in one cabinet.

Single package vertical air conditioner means air-cooled commercial package air conditioning and heating equipment that—

(1) Is factory-assembled as a single package that—

(i) Has major components that are arranged vertically;

(ii) Is an encased combination of cooling and optional heating components; and

(iii) Is intended for exterior mounting on, adjacent interior to, or through an outside wall;

(2) Is powered by a single-or 3-phase current;

(3) May contain 1 or more separate indoor grilles, outdoor louvers, various ventilation options, indoor free air discharges, ductwork, well plenum, or sleeves; and

(4) Has heating components that may include electrical resistance, steam, hot water, or gas, but may not include reverse cycle refrigeration as a heating means.

Single package vertical heat pump means a single package vertical air conditioner that—

(1) Uses reverse cycle refrigeration as its primary heat source; and

(2) May include secondary supplemental heating by means of electrical resistance, steam, hot water, or gas.

Small commercial package air-conditioning and heating equipment means commercial package air-conditioning and heating equipment that is rated below 135,000 Btu per hour (cooling capacity).

Split system means any central air conditioner or central air conditioning heat pump in which one or more of the major assemblies are separate from the others.

Standard size means a packaged terminal air conditioner or packaged terminal heat pump with wall sleeve dimensions having an external wall opening of greater than or equal to 16 inches high or greater than or equal to 42 inches wide, and a cross-sectional area greater than or equal to 670 square inches.

Unitary dedicated outdoor air system, or *unitary DOAS*, means a category of small, large, or very large commercial package air-conditioning and heating equipment that is capable of providing ventilation and conditioning of 100-percent outdoor air and is marketed in materials (including but not limited to, specification sheets, insert sheets, and online materials) as having such capability.

Variable Refrigerant Flow Multi-Split Air Conditioner means a unit of commercial package air-conditioning and heating equipment that is configured as a split system air conditioner incorporating a single refrigerant circuit, with one or more outdoor units, at least one variable-speed compressor or an alternate compressor combination for varying the capacity of the system by three or more steps, and multiple indoor fan coil units, each of which is individually metered and individually controlled by an integral control device and common communications network and which can operate independently in response to multiple indoor thermostats. Variable refrigerant flow implies three or more steps of capacity control on common, inter-connecting piping.

Variable Refrigerant Flow Multi-Split Heat Pump means a unit of commercial package air-conditioning and heating equipment that is configured as a split system heat pump that uses reverse cycle refrigeration as its primary heating source and which may include secondary supplemental heating by means of electrical resistance, steam, hot water, or gas. The equipment incorporates a single refrigerant circuit, with one or more outdoor units, at least one variable-speed compressor or an alternate compressor combination for varying the capacity of the system by three or more steps, and multiple indoor fan coil units, each of which is individually metered and individually controlled by a control device and common communications network and which can operate independently in response to multiple indoor thermostats. Variable refrigerant flow implies three or more steps of capacity control on common, inter-connecting piping.

Ventilation energy recovery system, or *VERS*, means a system that preconditions outdoor ventilation 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.

Very large commercial package air-conditioning and heating equipment means commercial package air-conditioning and heating equipment that is rated—

(1) At or above 240,000 Btu per hour; and

(2) Below 760,000 Btu per hour (cooling capacity).

Water-source heat pump means a single-phase or three-phase reverse-cycle heat pump that uses a circulating water loop as the heat source for heating and as the heat sink for cooling. The main components are a compressor, refrigerant-to-water heat exchanger, refrigerant-to-air heat exchanger, refrigerant expansion devices, refrigerant reversing valve, and indoor fan. Such equipment includes, but is not limited to, water-to-air water-loop heat pumps.

[69 FR 61969, Oct. 21, 2004, as amended at 70 FR 60415, Oct. 18, 2005; 73 FR 58828, Oct. 7, 2008; 74 FR 12073, Mar. 23, 2009; 76 FR 12503, Mar. 7, 2011; 77 FR 28988, May 16, 2012; 78 FR 79598, Dec. 31, 2013; 80 FR 42664, July 17, 2015; 80 FR 79669, Dec. 23, 2015; 81 FR 2529, Jan. 15, 2016; 87 FR 45197, July 27, 2022; 87 FR 63896, Oct. 20, 2022]

EFFECTIVE DATE NOTES: 1. At 87 FR 75167, Dec. 7, 2022, § 431.92 was amended by revising the definitions for ''Integrated energy efficiency ratio, or IEER,'' ''Single package vertical air conditioner,'' and ''Single package vertical heat pump''; and adding definitions for ''Single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h'' and ''Single-phase single package vertical heat pump with cooling capacity less than 65,000 Btu/h'' in alphabetical order, effective Jan. 6, 2023. For the convenience of the user, the added and revised text is set forth as follows:

§ 431.92 Definitions concerning commercial air conditioners and heat pumps.

* * * * *

Integrated energy efficiency ratio, or IEER, means a weighted average calculation of mechanical cooling EERs determined for four load levels and corresponding rating conditions, expressed in Btu/watt-hour. IEER is measured per appendix A to this subpart for

air-cooled small (≥65,000 Btu/h), large, and very large commercial package air conditioning and heating equipment, measured per appendix D1 to this subpart 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), and measured per appendix G1 to this subpart for single package vertical air conditioners and single package vertical heat pumps.

* * * * *

Single package vertical air conditioner means:

(1) Air-cooled commercial package air conditioning and heating equipment that—

(i) Is factory-assembled as a single package that—

(A) Has major components that are arranged vertically;

(B) Is an encased combination of cooling and optional heating components; and

(C) Is intended for exterior mounting on, adjacent interior to, or through an outside wall;

(ii) Is powered by a single-or 3-phase current;

(iii) May contain 1 or more separate indoor grilles, outdoor louvers, various ventilation options, indoor free air discharges, ductwork, well plenum, or sleeves; and

(iv) Has heating components that may include electrical resistance, steam, hot water, or gas, but may not include reverse-cycle refrigeration as a heating means; and

(2) Includes single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h, as defined in this section.

Single package vertical heat pump means:

(1) A single package vertical air conditioner that—

(i) Uses reverse-cycle refrigeration as its primary heat source; and

(ii) May include secondary supplemental heating by means of electrical resistance, steam, hot water, or gas; and

(2) Includes single-phase single package vertical heat pump with cooling capacity less than 65,000 Btu/h, as defined in this section.

Single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h means air-cooled commercial package air conditioning and heating equipment that meets the criteria in paragraphs (1)(i) through (iv) of the definition for a single package vertical air conditioner in this section; that is single-phase; has a cooling capacity less than 65,000 Btu/h, and that:

(1) Is weatherized, determined by a model being denoted for ''Outdoor Use'' or marked as ''Suitable for Outdoor Use'' on the equipment nameplate; or

(2) Is non-weatherized and is a model that has optional ventilation air provisions available. When such ventilation air provisions are present on the unit, the unit must be capable of drawing in and conditioning outdoor air for delivery to the conditioned space at a rate of at least 400 cubic feet per minute, as determined in accordance with §429.134(x)(3) of this chapter, while the equipment is operating with the same drive kit and motor settings used to determine the certified efficiency rating of the equipment (as required for submittal to DOE by §429.43(b)(4)(xi) of this chapter).

Single-phase single package vertical heat pump with cooling capacity less than 65,000 Btu/h means air-cooled commercial package air conditioning and heating equipment that meets the criteria in paragraphs (1)(i) and (ii) of the definition for a single package vertical heat pump in this section; that is single-phase; has a cooling capacity less than 65,000 Btu/h, and that:

(1) Is weatherized, determined by a model being denoted for ''Outdoor Use'' or marked as ''Suitable for Outdoor Use'' on the equipment nameplate; or

(2) Is non-weatherized and is a model that has optional ventilation air provisions available. When such ventilation air provisions are present on the unit, the unit must be capable of drawing in and conditioning outdoor air for delivery to the conditioned space at a rate of at least 400 cubic feet per minute, as determined in accordance with §429.134(x)(3) of this chapter, while the equipment is operating with the same drive kit and motor settings used to determine the certified efficiency rating of the equipment (as required for submittal to DOE by §429.43(b)(4)(xii) of this chapter).

* * * * *

2. At 87 FR 77325, Dec. 16, 2022, §431.92 was amended in the definition of *Basic model*, by revising paragraphs (5) and (7), and adding paragraph (8), effective Jan. 17, 2023. For the convenience of the user, the added and revised text is set forth as follows:

§431.92 Definitions concerning commercial air conditioners and heat pumps.

* * * * *

Basic model includes:

* * * * *

(5) *Small, large, and very large air-cooled or water-cooled commercial package air conditioning and heating equipment (excluding air-cooled, three-phase, small commercial package air conditioning and heating equipment with a cooling capacity of less than 65,000 Btu/h cooling capacity)* means all units manufactured

by one manufacturer within a single equipment class, having the same or comparably performing compressor(s), heat exchangers, and air moving system(s) that have a common ''nominal'' cooling capacity.

* * * * *

(7) *Variable refrigerant flow systems (excluding air-cooled, three-phase, variable refrigerant flow air conditioners and heat pumps with a cooling capacity of less than 65,000 Btu/h)* means all units manufactured by one manufacturer within a single equipment class, having the same primary energy source (e.g., electric or gas), and which have the same or comparably performing compressor(s) that have a common ''nominal'' cooling capacity and the same heat rejection medium (e.g., air or water) (includes VRF water source heat pumps).

(8) *Air-cooled, three-phase, small commercial package air conditioning and heating equipment with a cooling capacity of less than 65,000 Btu/h* and *air-cooled, three-phase, variable refrigerant flow multi-split air conditioners and heat pumps with a cooling capacity of less than 65,000 Btu/h* means all units manufactured by one manufacturer, having the same primary energy source, and, which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency; where essentially identical electrical, physical, and functional (or hydraulic) characteristics means:

(i) For split systems manufactured by outdoor unit manufacturers (OUMs): all individual combinations having the same model of outdoor unit, which means comparably performing compressor(s) [a variation of no more than five percent in displacement rate (volume per time) as rated by the compressor manufacturer, and no more than five percent in capacity and power input for the same operating conditions as rated by the compressor manufacturer], outdoor coil(s) [no more than five percent variation in face area and total fin surface area; same fin material; same tube material], and outdoor fan(s) [no more than ten percent variation in airflow and no more than twenty percent variation in power input];

(ii) For split systems having indoor units manufactured by independent coil manufacturers (ICMs): all individual combinations having comparably performing indoor coil(s) [plus or minus one square foot face area, plus or minus one fin per inch fin density, and the same fin material, tube material, number of tube rows, tube pattern, and tube size]; and

(iii) For single-package systems: all individual models having comparably performing compressor(s) [no more than five percent variation in displacement rate (volume per time) rated by the compressor manufacturer, and no more than five percent variations in capacity and power input rated by the compressor manufacturer corresponding to the same compressor rating conditions], outdoor coil(s) and indoor coil(s) [no more than five percent variation in face area and total fin surface area; same fin material; same tube material], outdoor fan(s) [no more than ten percent variation in outdoor airflow], and indoor blower(s) [no more than ten percent variation in indoor airflow, with no more than twenty percent variation in fan motor power input];

(iv) Except that,

(A) For single-package systems and single-split systems, manufacturers may instead choose to make each individual model/combination its own basic model provided the testing and represented value requirements in 10 CFR 429.67 of this chapter are met; and

(B) For multi-split, multi-circuit, and multi-head mini-split combinations, a basic model may not include both individual small-duct, high velocity (SDHV) combinations and non-SDHV combinations even when they include the same model of outdoor unit. The manufacturer may choose to identify specific individual combinations as additional basic models.

* * * * *

TEST PROCEDURES

§ 431.95 Materials incorporated by reference.

(a) Certain material is incorporated by reference into this subpart with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, DOE must publish a document in the FEDERAL REGISTER and the material must be available to the public. All approved incorporation by reference (IBR) material is available for inspection at DOE, and at the National Archives and Records Administration (NARA). Contact DOE at: the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Sixth Floor, 950 L'Enfant Plaza SW, Washington, DC 20024, (202) 586–9127, *Buildings@ee.doe.gov*, *https://www.energy.gov/eere/buildings/building-technologies-office*. For information on the availability of this material at NARA, email: *fr.inspection@nara.gov*, or go to: *www.archives.gov/federal-register/cfr/ibr-locations.html*. The material may