TABLE 6.8.1-1 Electrically Operated Unitary Air Conditioners and Condensing Units—Minimum Efficiency Requirements

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Air conditioners, air cooled	<65,000 Btu/h[b]	All	Split system	13.0 SEER	AHRI 210/240
			Single package	13.0 SEER (before 1/20/15) 14 SEER (as of 1/1/2015)	
Through the wall, air cooled	≤30,000 Btu/h[b]	All	Split system	12.0 SEER	
			Single package	12.0 SEER	
Small duct high velocity, air cooled	<65,000 Btu/h[b]	All	Split System	11.0 SEER	
Air conditioners, air cooled	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	Split system and single package	11.2 EER 11.4 IEER (before 1/1/2016) 12.9 IEER (as of 1/1/2016)	AHRI 340/360
		All other	Split system and single package	11.0 EER 11.2 IEER (before 1/1/2016) 12.7 IEER (as of 1/1/2016)	
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	Split system and single package	11.0 EER 11.2 IEER (before 1/1/2016) 12.4 IEER (as of 1/1/2016)	
		All other	Split system and single package	10.8 EER 11.0 IEER (before 1/1/2016) 12.2 IEER (as of 1/1/2016)	
	≥240,000 Btu/h and <760,000 Btu/h	Electric resistance (or none)	Split system and single package	10.0 EER 10.1 IEER (before 1/1/2016) 11.6 IEER (as of 1/1/2016)	
		All other	Split system and single package	9.8 EER 9.9 IEER (before 1/1/2016) 11.4 IEER (as of 1/1/2016)	
	≥760,000 Btu/h	Electric resistance (or none)	Split system and single package	9.7 EER 9.8 IEER (before 1/1/2016) 11.2 IEER (as of 1/1/2016)	
		All other	Split system and single package	9.5 EER 9.6 IEER (before 1/1/2016) 11.0 IEER (as of 1/1/2016)	

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Single-phase, air-cooled air conditioners <65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE 6.8.1-1 Electrically Operated Unitary Air Conditioners and Condensing Units—Minimum Efficiency Requirements *(Continued)*

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Air conditioners, water cooled	<65,000 Btu/h	All	Split system and single package	12.1 EER 12.3 IEER	AHRI 210/240
	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	Split system and single package	12.1 EER 12.3 IEER (before 1/1/2016) 13.9 IEER (as of 1/1/2016)	AHRI 340/360
		All other	Split system and single package	11.9 EER 12.1 IEER (before 1/1/2016) 13.7 IEER (as of 1/1/2016)	
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	Split system and single package	12.5 EER 12.5 IEER (before 1/1/2016) 13.9 IEER (as of 1/1/2016)	
		All other	Split system and single package	12.3 EER 12.5 IEER (before 1/1/2016) 13.7 IEER (as of 1/1/2016)	
	≥240,000 Btu/h and <760,000 Btu/h	Electric resistance (or none)	Split system and single package	12.4 EER 12.6 IEER (before 1/1/2016) 13.6 IEER (as of 1/1/2016)	AHRI 340/360
		All other	Split system and single package	12.2 EER 12.4 IEER (before 1/1/2016) 13.4 IEER (as of 1/1/2016)	
	≥760,000 Btu/h	Electric resistance (or none)	Split system and single package	12.2 EER 12.4 IEER (before 1/1/2016) 13.5 IEER (as of 1/1/2016)	AHRI 340/360
		All other	Split system and single package	12.0 EER 12.2 IEER (before 1/1/2016) 13.3 IEER (as of 1/1/2016)	

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Single-phase, air-cooled air conditioners <65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE 6.8.1-1 Electrically Operated Unitary Air Conditioners and Condensing Units—Minimum Efficiency Requirements *(Continued)*

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Air conditioners, evaporatively cooled	<65,000 Btu/h[b]	All	Split system and single package	12.1 EER 12.3 IEER	AHRI 210/240
	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	Split system and single package	12.1 EER 12.3 IEER	AHRI 340/360
		All other	Split system and single package	11.9 EER 12.1 IEER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	Split system and single package	12.0 EER 12.2 IERR	
		All other	Split system and single package	11.8 EER 12.0 IEER	
	≥240,000 Btu/h and <760,000 Btu/h	Electric resistance (or none)	Split system and single package	11.9 EER 12.1 IEER	
		All other	Split system and single package	11.7 EER 11.9 IEER	
	≥760,000 Btu/h	Electric resistance (or none)	Split system and single package	11.7 EER 11.9 IEER	
		All other	Split system and single package	11.5 EER 11.7 IEER	
Condensing units, air cooled	≥135,000 Btu/h			10.5 EER 11.8 IEER	AHRI 365
Condensing units, water cooled	≥135,000 Btu/h			13.5 EER 14.0 IEER	
Condensing units, evaporatively cooled	≥135,000 Btu/h			13.5 EER 14.0 IEER	

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Single-phase, air-cooled air conditioners <65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE 6.8.1-2 Electrically Operated Unitary and Applied Heat Pumps—Minimum Efficiency Requirements

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Air cooled (cooling mode)	<65,000 Btu/h[b]	All	Split system	13.0 SEER (before 1/1/2015) 14 SEER (as of 1/1/2015)	AHRI 210/240
			Single package	13.0 SEER (before 1/1/2015) 14 SEER (as of 1/1/2015)	
Through the wall, air cooled (cooling mode)	≤30,000 Btu/h[b]	All	Split system	12.0 SEER	
			Single package	12.0 SEER	
Small duct high velocity, air cooled	<65,000 Btu/h[b]	All	Split System	11.0 SEER	
Air cooled (cooling mode)	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	Split system and single package	11.0 EER 11.2 IEER (before 1/1/2016) 12.2 IEER (as of 1/1/2016)	AHRI 340/360
		All other	Split system and single package	10.8 EER 11.0 IEER (before 1/1/2016) 12.0 IEER (as of 1/1/2016)	
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	Split system and single package	10.6 EER 10.7 IEER (before 1/1/2016) 11.6 IEER (as of 1/1/2016)	
		All other	Split system and single package	10.4 EER 10.5 IEER (before 1/1/2016) 11.4 IEER (as of 1/1/2016)	
	≥240,000 Btu/h	Electric resistance (or none)	Split system and single package	9.5 EER 9.6 IEER (before 1/1/2016) 10.6 IEER (as of 1/1/2016)	
		All other	Split system and single package	9.3 EER 9.4 IEER (before 1/1/2016) 0.4 IEER (as of 1/1/2016)	

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Single-phase, air-cooled air conditioners <65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE 6.8.1-2 Electrically Operated Unitary and Applied Heat Pumps—Minimum Efficiency Requirements *(Continued)*

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Water to air, water loop (cooling mode)	<17,000 Btu/h	All	86°F entering water	12.2 EER	ISO 13256-1
	≥17,000 Btu/h and <65,000 Btu/h	All	86°F entering water	13.0 EER	
	≥65,000 Btu/h and <135,000 Btu/h	All	86°F entering water	13.0 EER	
Water to air, groundwater (cooling mode)	<135,000 Btu/h	All	59°F entering water	18.0 EER	
Brine to air, ground loop (cooling mode)	<135,000 Btu/h	All	77°F entering water	14.1 EER	
Water to water, water loop (cooling mode)	<135,000 Btu/h	All	86°F entering water	10.6 EER	ISO 13256-2
Water to water, groundwater (cooling mode)	<135,000 Btu/h	All	59°F entering water	16.3 EER	
Brine to water, ground loop (cooling mode)	<135,000 Btu/h	All	77°F entering water	12.1 EER	
Air cooled (heating mode)	<65,000 Btu/h[b] (cooling capacity)	—	Split system	7.7 HSPF (before 1/1/2015) 8.2 HSPF (as of1/1/2015)	AHRI 210/240
			Single package	7.7 HSPF (before 1/1/2015) 8.0 HSPF (as of1/1/2015)	
Through the wall, air cooled (heating mode)	≤30,000 Btu/h[b] (cooling capacity)	—	Split system	7.4 HSPF	
			Single package	7.4 HSPF	
Small duct high velocity, air cooled (heating mode)	<65,000 Btu/h[b]	—	Split System	6.8 HSPF	
Air cooled (heating mode)	≥65,000 Btu/h[c] and <135,000 Btu/h (cooling capacity)	—	47°F db/43°F wb outdoor air	3.3 COP_H	AHRI 340/360
			17°F db/15°F wb outdoor air	2.25 COP_H	
	≥135,000 Btu/h[c] (cooling capacity)	—	47°F db/43°F wb outdoor air	3.2 COP_H	
			17°F db/15°F wb outdoor air	2.05 COP_H	

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Single-phase, air-cooled air conditioners <65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE 6.8.1-2 Electrically Operated Unitary and Applied Heat Pumps—Minimum Efficiency Requirements *(Continued)*

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Water to air, water loop (heating mode)	<135,000 Btu/h (cooling capacity)	—	68°F entering water	4.3 COP_H	ISO 13256-1
Water to air, groundwater (heating mode)	<135,000 Btu/h (cooling capacity)	—	50°F entering water	3.7 COP_H	
Brine to air, ground loop (heating mode)	<135,000 Btu/h (cooling capacity)	—	32°F entering water	3.2 COP_H	
Water to water, water loop (heating mode)	<135,000 Btu/h (cooling capacity)	—	68°F entering water	3.7 COP_H	ISO 13256-2
Water to water, groundwater (heating mode)	<135,000 Btu/h (cooling capacity)	—	50°F entering water	3.1 COP_H	
Brine to water, ground loop (heating mode)	<135,000 Btu/h (cooling capacity)	—	32°F entering water	2.5 COP_H	

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Single-phase, air-cooled air conditioners <65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE 6.8.1-3 Water-Chilling Packages—Efficiency Requirements[a,b,e]

Equipment Type	Size Category	Units	Effective 1/1/2010		Effective 1/1/2015		Test Procedure[c]
			Path A	Path B	Path A	Path B	
Air-cooled chillers	<150 tons	EER (Btu/W)	≥9.562 FL ≥12.500 IPLV	NA[d]	≥10.100 FL ≥13.700 IPLV	≥9.700 FL ≥15.800 IPLV	AHRI 550/590
	≥150 tons		≥9.562 FL ≥12.750 IPLV	NA[d]	≥10.100 FL ≥14.000 IPLV	≥9.700 FL ≥16.100 IPLV	
Air-cooled without condenser, electrically operated	All capacities	EER (Btu/W)	Air-cooled chillers without condenser must be rated with matching condensers and comply with air-cooled chiller efficiency requirements				
Water-cooled, electrically operated positive displacement	<75 tons	kW/ton	≤0.780 FL ≤0.630 IPLV	≤0.800 FL ≤0.600 IPLV	≤0.750 FL ≤0.600 IPLV	≤0.780 FL ≤0.500 IPLV	
	≥75 tons and <150 tons		≤0.775 FL ≤0.615 IPLV	≤0.790 FL ≤0.586 IPLV	≤0.720 FL ≤0.560 IPLV	≤0.750 FL ≤0.490 IPLV	
	≥150 tons and < 300 tons		≤0.680 FL ≤0.580 IPLV	≤0.718 FL ≤0.540 IPLV	≤0.660 FL ≤0.540 IPLV	≤0.680 FL ≤0.440 IPLV	
	≥300 tons and < 600 tons		≤0.620 FL ≤0.540 IPLV	≤0.639 FL ≤0.490 IPLV	≤0.610 FL ≤0.520 IPLV	≤0.625 FL ≤0.410 IPLV	
	≥600 tons		≤0.620 FL ≤0.540 IPLV	≤0.639 FL ≤0.490 IPLV	≤0.560 FL ≤0.500 IPLV	≤0.585 FL ≤0.380 IPLV	
Water cooled, electrically operated centrifugal	<150 tons	kW/ton	≤0.634 FL ≤0.596 IPLV	≤0.639 FL ≤0.450 IPLV	≤0.610 FL ≤0.550 IPLV	≤0.695 FL ≤0.440 IPLV	
	≥150 tons and <300 tons		≤0.634 FL ≤0.596 IPLV	≤0.639 FL ≤0.450 IPLV	≤0.610 FL ≤0.550 IPLV	≤0.635 FL ≤0.400 IPLV	
	≥300 tons and <400 tons		≤0.576 FL ≤0.549 IPLV	≤0.600 FL ≤0.400 IPLV	≤0.560 FL ≤0.520 IPLV	≤0.595 FL ≤0.390 IPLV	
	≥400 tons and <600 tons		≤0.576 FL ≤0.549 IPLV	≤0.600 FL ≤0.400 IPLV	≤0.560 FL ≤0.500 IPLV	≤0.585 FL ≤0.380 IPLV	
	≥600 tons		≤0.570 FL ≤0.539 IPLV	≤0.590 FL ≤0.400 IPLV	≤0.560 FL ≤0.500 IPLV	≤0.585 FL ≤0.380 IPLV	
Air-cooled absorption, single effect	All capacities	COP	≥0.600 FL	NA[d]	≥0.600 FL	NA[d]	AHRI 560
Water-cooled absorption, single effect	All capacities	COP	≥0.700 FL	NA[d]	≥0.700 FL	NA[d]	
Absorption double effect, indirect fired	All capacities	COP	≥1.000 FL ≥1.050 IPLV	NA[d]	≥1.000 FL ≥1.050 IPLV	NA[d]	
Absorption double effect, direct fired	All capacities	COP	≥1.000 FL ≥1.000 IPLV	NA[d]	≥1.000 FL ≥1.000 IPLV	NA[d]	

a. The requirements for centrifugal chillers shall be adjusted for nonstandard rating conditions per Section 6.4.1.2.1 and are only applicable for the range of conditions listed there. The requirements for air-cooled, water-cooled positive displacement and absorption chillers are at standard rating conditions defined in the reference test procedure.
b. Both the full-load and IPLV requirements must be met or exceeded to comply with this standard. When there is a Path B, compliance can be with either Path A or Path B for any application.
c. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
d. NA means the requirements are not applicable for Path B, and only Path A can be used for compliance.
e. FL is the full-load performance requirements, and IPLV is for the part-load performance requirements.

TABLE 6.8.1-4 Electrically Operated Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, Single-Package Vertical Heat Pumps, Room Air Conditioners, and Room Air-Conditioner Heat Pumps—Minimum Efficiency Requirements

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
PTAC (cooling mode) standard size	All capacities	95°F db outdoor air	13.8 – (0.300 × Cap/1000)[c] (before 1/1/2015) 14.0 – (0.300 × Cap/1000)[c] (as of 1/1/2015)	AHRI 310/380
PTAC (cooling mode) nonstandard size[a]	All capacities	95°F db outdoor air	10.9 – (0.213 × Cap/1000)[c] EER	
PTHP (cooling mode) standard size	All capacities	95°F db outdoor air	14.0 – (0.300 × Cap/1000)[c]	
PTHP (cooling mode) nonstandard size[b]	All capacities	95°F db outdoor air	10.8 – (0.213 × Cap/1000)[c] EER	
PTHP (heating mode) standard size	All capacities	—	3.7 – (0.052 × Cap/1000)[c] COP_H	
PTHP (heating mode) nonstandard size[b]	All capacities	—	2.9 – (0.026 × Cap/1000)[c] COP_H	
SPVAC (cooling mode)	<65,000 Btu/h	95°F db/75°F wb outdoor air	10.0 EER	AHRI 390
	≥65,000 Btu/h and <135,000 Btu/h	95°F db/75°F wb outdoor air	10.0 EER	
	≥135,000 Btu/h and <240,000 Btu/h	95°F db/75°F wb outdoor air	10.0 EER	
SPVHP (cooling mode)	<65,000 Btu/h	95°F db/75°F wb outdoor air	10.0 EER	
	≥65,000 Btu/h and <135,000 Btu/h	95°F db/75°F wb outdoor air	10.0 EER	
	≥135,000 Btu/h and <240,000 Btu/h	95°F db/75°F wb outdoor air	10.0 EER	
SPVHP (heating mode)	<65,000 Btu/h	47°F db/43°F wb outdoor air	3.0 COP_H	
	≥65,000 Btu/h and <135,000 Btu/h	47°F db/43°F wb outdoor air	3.0 COP_H	
	≥135,000 Btu/h and <240,000 Btu/h	47°F db/43°F wb outdoor air	3.0 COP_H	
Room air conditioners with louvered sides	<6000 Btu/h	—	9.7 SEER	ANSI/AHAM RAC-1
	≥6000 Btu/h and <8000 Btu/h		9.7 SEER	
	≥8000 Btu/h and <14,000 Btu/h		9.8 EER	
	≥14,000 Btu/h and <20,000 Btu/h		9.7 SEER	
	≥20,000 Btu/h		8.5 EER	

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

b. Nonstandard size units must be factory labeled as follows: "MANUFACTURED FOR NONSTANDARD SIZE APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW STANDARD PROJECTS." Nonstandard size efficiencies apply only to units being installed in existing sleeves having an external wall opening of less than 16 in. high or less than 42 in. wide and having a cross-sectional area less than 670 $in.^2$.

c. "Cap" means the rated cooling capacity of the product in Btu/h. If the unit's capacity is less than 7000 Btu/h, use 7000 Btu/h in the calculation. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculation.

TABLE 6.8.1-4 Electrically Operated Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, Single-Package Vertical Heat Pumps, Room Air Conditioners, and Room Air-Conditioner Heat Pumps—Minimum Efficiency Requirements *(Continued)*

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
SPVAC (cooling mode), nonweatherized space constrained	≤30,000 Btu/h	95°F db/75°F wb outdoor air	9.2 EER	AHRI 390
	>30,000 Btu/h and ≤36,000 Btu/h	95°F db/75°F wb outdoor air	9.0 EER	
SPVHP (cooling mode), nonweatherized space constrained	≤30,000 Btu/h	95°F db/75°F wb outdoor air	9.2 EER	
	>30,000 Btu/h and ≤36,000 Btu/h	95°F db/75°F wb outdoor air	9.0 EER	
SPVHP (heating mode), nonweatherized space constrained	≤30,000 Btu/h	47°F db/43°F wb outdoor air	3.0 COP_H	
	>30,000 Btu/h and ≤36,000 Btu/h	47°F db/43°F wb outdoor air	3.0 COP_H	
Room air conditioners without louvered sides	<8000 Btu/h	—	9.0 EER	ANSI/AHAM RAC-1
	≥8000 Btu/h and <20,000 Btu/h		8.5 EER	
	≥20,000 Btu/h		8.5 EER	
Room air-conditioner heat pumps with louvered sides	<20,000 Btu/h	—	9.0 EER	
	≥20,000 Btu/h		8.5 EER	
Room air-conditioner heat pumps without louvered sides	<14,000 Btu/h	—	8.5 EER	
	≥14,000 Btu/h		8.0 EER	
Room air conditioner, casement only	All capacities	—	8.7 EER	
Room air conditioner, casement slider	All capacities	—	9.5 EER	

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Nonstandard size units must be factory labeled as follows: "MANUFACTURED FOR NONSTANDARD SIZE APPLICATIONS ONLY; NOT TO BE INSTALLED IN NEW STANDARD PROJECTS." Nonstandard size efficiencies apply only to units being installed in existing sleeves having an external wall opening of less than 16 in. high or less than 42 in. wide and having a cross-sectional area less than 670 $in.^2$.
c. "Cap" means the rated cooling capacity of the product in Btu/h. If the unit's capacity is less than 7000 Btu/h, use 7000 Btu/h in the calculation. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculation.

TABLE 6.8.1-5 Warm-Air Furnaces and Combination Warm-Air Furnaces/Air-Conditioning Units, Warm-Air Duct Furnaces, and Unit Heaters

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure[a]
Warm-air furnace, gas fired	<225,000 Btu/h	Maximum capacity[c]	78% AFUE or 80% E_t [b,d]	DOE 10 CFR Part 430 or Section 2.39, Thermal Efficiency, ANSI Z21.47
	≥225,000 Btu/h	Maximum capacity[c]	80% E_t[d]	Section 2.39, Thermal Efficiency, ANSI Z21.47
Warm-air furnace, oil fired	<225,000 Btu/h	Maximum capacity[c]	78% AFUE or 80% E_t[b,d]	DOE 10 CFR Part 430 or Section 42, Combustion, UL 727
	≥225,000 Btu/h	Maximum capacity[c]	81% E_t[d]	Section 42, Combustion, UL 727
Warm-air duct furnaces, gas fired	All capacities	Maximum capacity[c]	80% E_c[e]	Section 2.10, Efficiency, ANSI Z83.8
Warm-air unit heaters, gas fired	All capacities	Maximum capacity[c]	80% E_c[e,f]	Section 2.10, Efficiency, ANSI Z83.8
Warm-air unit heaters, oil fired	All capacities	Maximum capacity[c]	80% E_c[e,f]	Section 40, Combustion, UL 731

a. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
b. Combination units not covered by NAECA (three-phase power or cooling capacity greater than or equal to 65,000 Btu/h) may comply with either rating.
c. Compliance of multiple firing rate units shall be at the maximum firing rate.
d. E_t = thermal efficiency. Units must also include an interrupted or intermittent ignition device (IID), have jacket losses not exceeding 0.75% of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.
e. E_c = combustion efficiency (100% less flue losses). See test procedure for detailed discussion.
f. As of August 8, 2008, according to the Energy Policy Act of 2005, units must also include an interrupted or intermittent ignition device (IID) and have either power venting or an automatic flue damper.

TABLE 6.8.1-6 Gas- and Oil-Fired Boilers—Minimum Efficiency Requirements

Equipment Type[a]	Subcategory or Rating Condition	Size Category (Input)	Minimum Efficiency	Efficiency as of 3/2/2020	Test Procedure
Boilers, hot water	Gas fired	<300,000 Btu/h[f,g]	82% AFUE	82% AFUE	10 CFR Part 430
		≥300,000 Btu/h and ≤2,500,000 Btu/h[d]	80% E_t	80% E_t	10 CFR Part 431
		>2,500,000 Btu/h[a]	82% E_c	82% E_c	
	Oil fired[e]	<300,000 Btu/h[g]	84% AFUE	84% AFUE	10 CFR Part 430
		≥300,000 Btu/h and ≤2,500,000 Btu/h[d]	82% E_t	82% E_t	10 CFR Part 431
		>2,500,000 Btu/h[a]	84% E_c	84% E_c	
Boilers, steam	Gas fired	<300,000 Btu/h[f]	80% AFUE	80% AFUE	10 CFR Part 430
	Gas fired—all, except natural draft	≥300,000 Btu/h and ≤2,500,000 Btu/h[d]	79% E_t	79% E_t	10 CFR Part 431
		>2,500,000 Btu/h[a]	79% E_t	79% E_t	
	Gas fired—natural draft	≥300,000 Btu/h and ≤2,500,000 Btu/h[d]	77% E_t	79% E_t	
		>2,500,000 Btu/h[a]	77% E_t	79% E_t	
	Oil fired[e]	<300,000 Btu/h	82% AFUE	82% AFUE	10 CFR Part 430
		≥300,000 Btu/h and ≤2,500,000 Btu/h[d]	81% E_t	81% E_t	10 CFR Part 431
		>2,500,000 Btu/h[a]	81% E_t	81% E_t	

a. These requirements apply to boilers with rated input of 8,000,000 Btu/h or less that are not packaged boilers and to all packaged boilers. Minimum efficiency requirements for boilers cover all capacities of packaged boilers.
b. E_c = combustion efficiency (100% less flue losses). See reference document for detailed information.
c. E_t = thermal efficiency. See reference document for detailed information.
d. Maximum capacity—minimum and maximum ratings as provided for and allowed by the unit's controls.
e. Includes oil-fired (residual).
f. Boilers shall not be equipped with a constant burning pilot light.
g. A boiler not equipped with a tankless domestic water heating coil shall be equipped with an automatic means for adjusting the temperature of the water such that an incremental change in inferred heat load produces a corresponding incremental change in the temperature of the water supplied.

TABLE 6.8.1-7 Performance Requirements for Heat Rejection Equipment

Equipment Type	Total System Heat Rejection Capacity at Rated Conditions	Subcategory or Rating Condition[h]	Performance Required[a,b,c,d,f,g]	Test Procedure[e]
Propeller or axial fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥40.2 gpm/hp	CTI ATC-105 and CTI STD-201
Centrifugal fan open-circuit cooling towers	All	95°F entering water 85°F leaving water 75°F entering wb	≥20.0 gpm/hp	CTI ATC-105 and CTI STD-201
Propeller or axial fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥14.0 gpm/hp	CTI ATC-105S and CTI STD-201
Centrifugal closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75°F entering wb	≥7.0 gpm/hp	CTI ATC-105S and CTI STD-201
Propeller or axial fan evaporative condensers	All	R-507A test fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥157,000 Btu/h·hp	CTI ATC-106
Propeller or axial fan evaporative condensers	All	Ammonia test fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥134,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	R-507A test fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wb	≥135,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	Ammonia test fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wb	≥110,000 Btu/h·hp	CTI ATC-106
Air cooled condensers	All	125°F condensing temperature 190°F entering gas temperature 15°F subcooling 95°F entering db	≥176,000 Btu/h·hp	AHRI 460

a. For purposes of this table, open-circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 6.8.1-7 divided by the fan motor nameplate power.
b. For purposes of this table, closed-circuit cooling tower performance is defined as the process water flow rating of the tower at the thermal rating condition listed in Table 6.8.1-7 divided by the sum of the fan motor nameplate power and the integral spray pump motor nameplate power.
c. For purposes of this table, air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan motor nameplate power.
d. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.
e. The efficiencies and test procedures for both open- and closed-circuit cooling towers are not applicable to hybrid cooling towers that contain a combination of separate wet and dry heat exchange sections. The certification requirements do not apply to field-erected cooling towers.
f. All cooling towers shall comply with the minimum efficiency listed in the table for that specific type of tower with the capacity effect of any project-specific accessories and/or options included in the capacity of the cooling tower.
g. For purposes of this table, evaporative condenser performance is defined as the heat rejected at the specified rating condition in the table, divided by the sum of the fan motor nameplate power and the integral spray pump nameplate power.
h. Requirements for evaporative condensers are listed with ammonia (R-717) and R-507A as test fluids in the table. Evaporative condensers intended for use with halocarbon refrigerants other than R-507A must meet the minimum efficiency requirements listed above with R-507A as the test fluid.

TABLE 6.8.1-8 Heat Transfer Equipment

Equipment Type	Subcategory	Minimum Efficiency[a]	Test Procedure[b]
Liquid-to-liquid heat exchangers	Plate type	NR	AHRI 400

a. NR = No requirement
b. Section 12 contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

TABLE 6.8.1-9 Electrically Operated Variable-Refrigerant-Flow Air Conditioners—Minimum Efficiency Requirements

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
VRF air conditioners, air cooled	<65,000 Btu/h	All	VRF multisplit system	13.0 SEER	AHRI 1230
	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	VRF multisplit system	11.2 EER 12.5 IEER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	VRF multisplit system	11.0 EER 12.3 IEER	
	≥240,000 Btu/h	Electric resistance (or none)	VRF multisplit system	10.0 EER 11.1 IEER	

TABLE 6.8.1-10 Electrically Operated Variable-Refrigerant-Flow Air-to-Air and Applied Heat Pumps—Minimum Efficiency Requirements

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
VRF air cooled (cooling mode)	<65,000 Btu/h	All	VRF multisplit system	13.0 SEER	AHRI 1230
	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	VRF multisplit system	11.0 EER 12.3 IEER	
	≥65,000 Btu/h and <135,000 Btu/h	Electric resistance (or none)	VRF multisplit system with heat recovery	10.8 EER 12.1 IEER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	VRF multisplit system	10.6 EER 11.8 IEER	
	≥135,000 Btu/h and <240,000 Btu/h	Electric resistance (or none)	VRF multisplit system with heat recovery	10.4 EER 11.6 IEER	
	≥240,000 Btu/h	Electric resistance (or none)	VRF multisplit system	9.5 EER 10.6 IEER	
	≥240,000 Btu/h	Electric resistance (or none)	VRF multisplit system with heat recovery	9.3 EER 10.4 IEER	
VRF water source (cooling mode)	<65,000 Btu/h	All	VRF multisplit systems 86°F entering water	12.0 EER	AHRI 1230
	<65,000 Btu/h	All	VRF multisplit systems with heat recovery 86°F entering water	11.8 EER	
	≥65,000 Btu/h and <135,000 Btu/h	All	VRF multisplit system 86°F entering water	12.0 EER	
	≥65,000 Btu/h and <135,000 Btu/h	All	VRF multisplit system with heat recovery 86°F entering water	11.8 EER	
	≥135,000 Btu/h	All	VRF multisplit system 86°F entering water	10.0 EER	
	≥135,000 Btu/h	All	VRF multisplit system with heat recovery 86°F entering water	9.8 EER	
VRF groundwater source (cooling mode)	<135,000 Btu/h	All	VRF multisplit system 59°F entering water	16.2 EER	AHRI 1230
	<135,000 Btu/h	All	VRF multisplit system with heat recovery 59°F entering water	16.0 EER	
	≥135,000 Btu/h	All	VRF multisplit system 59°F entering water	13.8 EER	
	≥135,000 Btu/h	All	VRF multisplit system with heat recovery 59°F entering water	13.6 EER	

TABLE 6.8.1-10 Electrically Operated Variable-Refrigerant-Flow Air-to-Air and Applied Heat Pumps—Minimum Efficiency Requirements *(Continued)*

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure
VRF ground source (cooling mode)	<135,000 Btu/h	All	VRF multisplit system 77°F entering water	13.4 EER	AHRI 1230
	<135,000 Btu/h	All	VRF multisplit system with heat recovery 77°F entering water	13.2 EER	
	≥135,000 Btu/h	All	VRF multisplit system 77°F entering water	11.0 EER	
	≥135,000 Btu/h	All	VRF multisplit system with heat recovery 77°F entering water	10.8 EER	
VRF air cooled (heating mode)	<65,000 Btu/h (cooling capacity)	—	VRF multisplit system	7.7 HSPF	AHRI 1230
	≥65,000 Btu/h and <135,000 Btu/h	—	VRF multisplit system 47°F db/43°F wb outdoor air	3.3 COP_H	
			17°F db/15°F wb outdoor air	2.25 COP_H	
	≥135,000 Btu/h (cooling capacity)	—	VRF multisplit system 47°F db/43°F wb outdoor air	3.2 COP_H	
			17°F db/15°F wb outdoor air	2.05 COP_H	
VRF water source (heating mode)	<135,000 Btu/h (cooling capacity)	—	VRF multisplit system 68°F entering water	4.2 COP_H	AHRI 1230
	≥135,000 Btu/h (cooling capacity)	—	VRF multisplit system 68°F entering water	3.9 COP_H	
VRF groundwater source (heating mode)	<135,000 Btu/h (cooling capacity)	—	VRF multisplit system 50°F entering water	3.6 COP_H	AHRI 1230
	≥135,000 Btu/h (cooling capacity)	—	VRF multisplit system 50°F entering water	3.3 COP_H	
VRF ground source (heating mode)	<135,000 Btu/h (cooling capacity)	—	VRF multisplit system 32°F entering water	3.1 COP_H	AHRI 1230
	≥135,000 Btu/h (cooling capacity)	—	VRF multisplit system 32°F entering water	2.8 COP_H	

TABLE 6.8.1-11 Air Conditioners and Condensing Units Serving Computer Rooms

Equipment Type	Net Sensible Cooling Capacity[a]	Minimum SCOP-127[b] Efficiency Downflow Units/Upflow Units	Test Procedure
Air conditioners, air cooled	<65,000 Btu/h	2.20/2.09	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h	2.10/1.99	
	≥ 240,000 Btu/h	1.90/1.79	
Air conditioners, water cooled	<65,000 Btu/h	2.60/2.49	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h	2.50/2.39	
	≥ 240,000 Btu/h	2.40 /2.29	
Air conditioners, water cooled with fluid economizer	<65,000 Btu/h	2.55 /2.44	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h	2.45/2.34	
	≥ 240,000 Btu/h	2.35/2.24	
Air conditioners, glycol cooled (rated at 40% propylene glycol)	<65,000 Btu/h	2.50/2.39	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h	2.15/2.04	
	≥ 240,000 Btu/h	2.10/1.99	
Air conditioners, glycol cooled (rated at 40% propylene glycol) with fluid economizer	<65,000 Btu/h	2.45/2.34	ANSI/ASHRAE 127
	≥ 65,000 Btu/h and < 240,000 Btu/h	2.10/1.99	
	≥ 240,000 Btu/h	2.05/1.94	

a. Net sensible cooling capacity: The total gross cooling capacity less the latent cooling less the energy to the air movement system. (Total Gross – Latent – Fan Power)
b. Sensible coefficient of performance (SCOP-127): A ratio calculated by dividing the net sensible cooling capacity in watts by the total power input in watts (excluding reheaters and humidifiers) at conditions defined in ASHRAE Standard 127. The net sensible cooling capacity is the gross sensible capacity minus the energy dissipated into the cooled space by the fan system.

TABLE 6.8.1-12 Commercial Refrigerator and Freezers

Equipment Type	Application	Energy Use Limits, kWh/day	Test Procedure
Refrigerator with solid doors	Holding temperature	$0.10 \times V + 2.04$	AHRI 1200
Refrigerator with transparent doors		$0.12 \times V + 3.34$	
Freezers with solid doors		$0.40 \times V + 1.38$	
Freezers with transparent doors		$0.75 \times V + 4.10$	
Refrigerators/freezers with solid doors		the greater of $0.12 \times V + 3.34$ or 0.70	
Commercial refrigerators	Pulldown	$0.126 \times V + 3.51$	

V = the chiller or frozen compartment volume (ft^3) as defined in Association of Home Appliance Manufacturers Standard HRF-1.

TABLE 6.8.1-13 Commercial Refrigeration—Minimum Efficiency Requirements

Equipment Type				Energy Use Limits as of 1/1/2012,[b,c] kWh/day	Test Procedure
Equipment Class[a]	Family Code	Operating Mode	Rating Temperature		
VOP.RC.M	Vertical open	Remote condensing	Medium temperature	0.82 × TDA + 4.07	AHRI 1200
SVO.RC.M	Semivertical open	Remote condensing	Medium temperature	0.83 × TDA + 3.18	
HZO.RC.M	Horizontal open	Remote condensing	Medium temperature	0.35 × TDA + 2.88	
VOP.RC.L	Vertical open	Remote condensing	Low temperature	2.27 × TDA + 6.85	
HZO.RC.L	Horizontal open	Remote condensing	Low temperature	0.57 × TDA + 6.88	
VCT.RC.M	Vertical transparent door	Remote condensing	Medium temperature	0.22 × TDA + 1.95	
VCT.RC.L	Vertical transparent door	Remote condensing	Low temperature	0.56 × TDA + 2.61	
SOC.RC.M	Service over counter	Remote condensing	Medium temperature	0.51 × TDA + 0.11	
VOP.SC.M	Vertical open	Self contained	Medium temperature	1.74 × TDA + 4.71	
SVO.SC.M	Semivertical open	Self contained	Medium temperature	1.73 × TDA + 4.59	
HZO.SC.M	Horizontal open	Self contained	Medium temperature	0.77 × TDA + 5.55	
HZO.SC.L	Horizontal open	Self contained	Low temperature	1.92 × TDA + 7.08	
VCT.SC.I	Vertical transparent door	Self contained	Ice cream	0.67 × TDA + 3.29	
VCS.SC.I	Vertical solid door	Self contained	Ice cream	0.38 × V + 0.88	
HCT.SC.I	Horizontal transparent door	Self contained	Ice cream	0.56 × TDA + 0.43	
SVO.RC.L	Semivertical open	Remote condensing	Low temperature	2.27 × TDA + 6.85	
VOP.RC.I	Vertical open	Remote condensing	Ice cream	2.89 × TDA + 8.7	
SVO.RC.I	Semivertical open	Remote condensing	Ice cream	2.89 × TDA + 8.7	
HZO.RC.I	Horizontal open	Remote condensing	Ice cream	0.72 × TDA + 8.74	
VCT.RC.I	Vertical transparent door	Remote condensing	Ice cream	0.66 × TDA + 3.05	

a. Equipment class designations consist of a combination (in sequential order separated by periods (AAA).(BB).(C)) of the following:
(AAA)—An equipment family code (VOP = vertical open, SVO = semivertical open, HZO = horizontal open, VCT = vertical transparent doors, VCS = vertical solid doors, HCT = horizontal transparent doors, HCS = horizontal solid doors, and SOC = service over counter); (BB)—An operating mode code (RC = remote condensing and SC = self contained); and (C)—A rating temperature code (M = medium temperature [38°F], L = low temperature [0°F], or I = ice cream temperature [15°F]). For example, "VOP.RC.M" refers to the "vertical open, remote condensing, medium temperature" equipment class.

b. V is the volume of the case (ft) as measured in AHRI Standard 1200, Appendix C.

c. TDA is the total display area of the case (ft) as measured in AHRI Standard 1200, Appendix D.

TABLE 6.8.1-13 Commercial Refrigeration—Minimum Efficiency Requirements *(Continued)*

Equipment Type				Energy Use Limits as of 1/1/2012,[b,c] kWh/day	Test Procedure
Equipment Class[a]	Family Code	Operating Mode	Rating Temperature		
HCT.RC.M	Horizontal transparent door	Remote condensing	Medium temperature	0.16 × TDA + 0.13	
HCT.RC.L	Horizontal transparent door	Remote condensing	Low temperature	0.34 × TDA + 0.26	
HCT.RC.I	Horizontal transparent door	Remote condensing	Ice cream	0.4 × TDA + 0.31	
VCS.RC.M	Vertical solid door	Remote condensing	Medium temperature	0.11 × *V* + 0.26	
VCS.RC.L	Vertical solid door	Remote condensing	Low temperature	0.23 × *V* + 0.54	
VCS.RC.I	Vertical solid door	Remote condensing	Ice cream	0.27 × *V* + 0.63	
HCS.RC.M	Horizontal solid door	Remote condensing	Medium temperature	0.11 × *V* + 0.26	
HCS.RC.L	Horizontal solid door	Remote condensing	Low temperature	0.23 × *V* + 0.54	
HCS.RC.I	Horizontal solid door	Remote condensing	Ice cream	0.27 × *V* + 0.63	
HCS.RC.I	Horizontal solid door	Remote condensing	Ice cream	0.27 × *V* + 0.63	AHRI 1200
SOC.RC.L	Service over counter	Remote condensing	Low temperature	1.08 × TDA + 0.22	
SOC.RC.I	Service over counter	Remote condensing	Ice cream	1.26 × TDA + 0.26	
VOP.SC.L	Vertical open	Self contained	Low temperature	4.37 × TDA + 11.82	
VOP.SC.I	Vertical open	Self contained	Ice cream	5.55 × TDA + 15.02	
SVO.SC.L	Semivertical open	Self contained	Low temperature	4.34 × TDA + 11.51	
SVO.SC.I	Semivertical open	Self contained	Ice cream	5.52 × TDA + 14.63	
HZO.SC.I	Horizontal open	Self contained	Ice cream	2.44 × TDA + 9.0	
SOC.SC.I	Service over counter	Self contained	Ice cream	1.76 × TDA + 0.36	
HCS.SC.I	Horizontal solid door	Self contained	Ice cream	0.38 × *V* + 0.88	

a. Equipment class designations consist of a combination (in sequential order separated by periods (AAA).(BB).(C)) of the following:
(AAA)—An equipment family code (VOP = vertical open, SVO = semivertical open, HZO = horizontal open, VCT = vertical transparent doors, VCS = vertical solid doors, HCT = horizontal transparent doors, HCS = horizontal solid doors, and SOC = service over counter); (BB)—An operating mode code (RC = remote condensing and SC = self contained); and (C)—A rating temperature code (M = medium temperature [38°F], L = low temperature [0°F], or I = ice cream temperature [15°F]). For example, "VOP.RC.M" refers to the "vertical open, remote condensing, medium temperature" equipment class.

b. *V* is the volume of the case (ft) as measured in AHRI Standard 1200, Appendix C.

c. TDA is the total display area of the case (ft) as measured in AHRI Standard 1200, Appendix D.