

Quick Start Programs

Standard Cooling Equipment Tables

Overview

This document contains reference data for estimating demand and energy savings in the Standard Offer Program. The data are equipment efficiency standards or climate data that will be used to develop the baseline system models and to evaluate savings for all projects under the Standard Offer Program.

Cooling equipment installed under the program must exceed the minimum new equipment efficiency standards shown in the tables. In addition, the minimum baseline efficiencies define the baseline for calculating energy savings. M&V Guideline for Cooling Equipment Retrofits describes the application of these equipment efficiency standards for estimating baseline demand and energy use and cooling equipment demand and energy savings.

For the following types of cooling equipment, baseline efficiency ratings are provided in Table 1 through Table 8 below:

- Unitary air conditioners and heat pumps (air cooled, evaporatively cooled, or water cooled);
- Packaged-terminal air conditioners and heat pumps;
- Room air conditioners and heat pumps;
- Water-source and ground-water source heat pumps; and
- Water- and air-cooled water chilling packages.

Table 1 through Table 8 are based on American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 90.1-1989 and Standard 90.1-1999. The tables present the minimum efficiencies of particular types of cooling equipment. The performance standard data in these tables should be used to determine the rated baseline and new equipment efficiencies.

All equipment installed under the Standard Offer Program must be more efficient than the 1999 standard in order to be eligible for incentives. The baseline efficiency for existing equipment shall be established as the 1989 standard efficiency. The baseline for equipment for which rating conditions are not provided shall be defined as the actual demand and energy consumption based upon the performance of the existing equipment.

Cooling degree-day data are used to normalize metered energy consumption to a typical meteorological year (TMY). The M&V Guideline for Cooling Equipment Retrofits describes the application of weather data for estimating baseline energy use and cooling equipment energy savings.

Tables

Table 1: Standard rating conditions and minimum performance for unitary air conditioners and heat pumps, air cooled, electric, <135,000 Btu/hr (< 11.25 tons) capacity, - Except packaged terminal and room air conditioners.

Mode	Cooling Capacity		Rating Condition, °F db	Type	Baseline Performance Standard ¹	Minimum Performance Standard ²
	Btu/hr	tons				
Cooling mode	< 65,000	< 5.42	Seasonal	Split	10.0 SEER	10.0 SEER
	< 65,000	< 5.42	Seasonal	Packaged	9.7 SEER	9.7 SEER
	< 65,000	< 5.42	95	Packaged and split	9.5 EER	9.5 EER
	≥ 65,000 & < 135,000	≥ 5.42 & < 11.25	95	Packaged and split	8.9 EER	10.3 EER
Heating mode (heat pumps)	< 65,000	< 5.42	Seasonal	Split	6.8 HSPF	6.8 HSPF
	< 65,000	< 5.42	Seasonal	Packaged	6.6 HSPF	6.6 HSPF
	< 65,000	< 5.42	47 db/43 wb	Packaged and split	3.0 COP	3.2 COP
	≥ 65,000 & < 135,000	≥ 5.42 & < 11.25	47 db/43 wb	Packaged and split	3.0 COP	3.2 COP

$$Performance \left(\frac{kW}{ton} \right) = \frac{1}{EER} \left(\frac{Watt \cdot hr}{Btu_{out}} \right) * 12,000 \left(\frac{Btu_{out}}{ton \cdot hr} \right) * \frac{1}{1,000} \left(\frac{kW}{Watt} \right) = \frac{12}{EER} \left(\frac{kW}{ton} \right)$$

Table 2: Standard rating conditions and minimum performance for unitary air conditioners and heat pumps - evaporatively cooled, electric, <135,000 Btuh (< 11.25 tons) cooling capacity.

Cooling Capacity		Rating indoor air °F db / °F wb	Rating outdoor air °F db/°F wb	Baseline Performance Standard ³	Minimum Performance Standard ⁴
Btuh	tons				
< 65,000	< 5.42	80/67	95/75	9.3 EER	12.1 EER
≥ 65,000 & < 135,000	≥ 5.42 & < 11.25	80/67	95/75	10.5 EER [†]	11.5 EER [†]

† Deduct 0.2 from the required EERs for units with a heating section other than electric resistance heat.

¹ Reference: ASHRAE Standard 90.1-1989, Table 10-1.

² Reference: ASHRAE Standard 90.1-1999, Table 6.2.1.A and Table 6.2.1.B.

³ Reference: ASHRAE Standard 90.1-1989, Table 10-2.

⁴ Reference: ASHRAE Standard 90.1-1999, Table 6.2.1.A.

Table 3: Standard rating conditions and minimum performance for water-cooled air conditioners and heat pumps, electric, <135,000 Btuh (< 11.25 tons) capacity.

Equipment	Cooling capacity, BTU/h	Rating Condition, air °F db / °F wb	Rating Condition, entering water °F†	Baseline Performance Standard ⁵	Minimum Performance Standard ⁶
Water cooled heat pumps	< 65,000	80/67	85	9.3 EER	-
			86	-	11.2 EER
	< 65,000	80/67	75	10.2 EER	-
			85	10.5 EER	-
	≥ 65,000 and <135,000	80/67	85	10.5 EER	-
			86	-	12.0 EER
< 135,000, heating	70/60	70	3.8 COP	-	
		68	-	4.2 COP	
Ground water cooled heat pumps	< 135,000	80/67	70	11.0 EER	-
			59	-	16.2 EER
	< 135,000	80/67	50	11.5 EER	-
	< 135,000, heating	70/60	70	3.4 COP	-
	< 135,000, heating	70/60	50	3.0 COP	3.6 COP
Water cooled unitary air conditioners	< 65,000	80/67	85	9.3 EER	-
			86	-	11.2 EER
	≥ 65,000 and <135,000	80/67	85	10.5 EER	-
			86	-	12.0 EER

⁵ Reference: ASHRAE Standard 90.1-1989, Table 10-3 and Table 10-5.

⁶ Reference: ASHRAE Standard 90.1-1999, Table 6.2.1.B.

Table 4: Standard rating conditions and minimum performance for packaged terminal air conditioners and heat pumps, air-cooled, electric

Mode	Rating condition, outside air °F db	Baseline Performance Standard ^{†7}	Minimum Performance Standard ⁸
Cooling	95	10-(0.16 * Cap/1000) EER	12.5-(0.213 * Cap/1000) EER
Cooling	82	12.2-(0.20 * Cap/1000) EER	-
Heating (heat pump)	47 db/43 wb	2.9 - (0.026 * Cap/1000), COP	2.9 - (0.026 * Cap/1000) COP

† Cap is the rated cooling capacity of the unit in Btu/h. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculation.

Table 5: Standard rating conditions and minimum performance for room air conditioners and room air conditioner heat pumps, electric

Category	Capacity, BTUH	Baseline performance standard (EER) ⁹	Minimum Performance Standard (EER) ¹⁰
Without reverse cycle and with louvered sides	< 6,000	8.0	9.7
	≥ 6,000 and <8,000	8.5	9.7
	≥ 8,000 and <14,000	9.0	9.8
	≥ 14,000 and <20,000	8.8	9.7
	≥ 20,000	8.2	8.5
Without reverse cycle and without louvered sides	< 6,000	8.0	9.0
	≥ 6,000 and <20,000	8.5	8.5
	≥ 20,000	8.2	8.5
With reverse cycle and with louvered sides	< 20,000	8.5	9.0
	≥ 20,000	8.5	8.5
With reverse cycle and without louvered sides	< 14,000	8.0	8.5
	≥ 14,000	8.0	8.0

⁷ Reference: ASHRAE Standard 90.1-1989, Table 10-4A.

⁸ Reference: ASHRAE Standard 90.1-1999, Table 6.2.1.D.

⁹ Reference: ASHRAE Standard 90.1-1989, Table 10-4B.

¹⁰ Reference: ASHRAE Standard 90.1-1999, Table 6.2.1.D.

Table 6: Baseline and minimum performance standards for large unitary air conditioners and heat pumps, electric, ≥ 135,000 Btuh (≥ 11.25 tons) capacity.

Equipment Type	Cooling Capacity		Baseline Performance Standard ¹¹		Minimum Performance Standard ¹²	
	Btuh	tons	EER	kW/ton	EER	kW/ton
Air cooled air conditioners	≥ 135,000 & <240,000	≥ 11.25 & < 20.00	8.5	1.412	9.7	1.237
	≥ 240,000 & <760,000	≥ 20.00 & < 63.33	8.5	1.412	9.5	1.263
	≥ 760,000	≥ 63.33	8.2	1.463	9.2	1.304
Water or evaporatively cooled air conditioners	≥ 135,000	≥ 11.25	9.6	1.250	11.0	1.091
Air cooled heat pumps	≥ 135,000 & <240,000	≥ 11.25 & < 20.00	8.5 [†]	1.412	9.3 [†]	1.290
	≥ 240,000 & <760,000	≥ 20.00 & < 63.33	8.5 [†]	1.412	9.0 [†]	1.333
	≥ 760,000	≥ 63.33	8.7 [†]	1.379	9.0 [†]	1.333
	≥ 135,000	≥ 11.25	2.9 ^{††}	N/A	3.2 ^{††}	N/A
Air cooled condensing units	≥ 135,000	≥ 11.25	9.9	1.212	10.1	1.188
Water or evaporatively cooled condensing units	≥ 135,000	≥ 11.25	12.9	0.930	13.1	0.916

† Deduct 0.2 from the required EERs for units with a heating section other than electric resistance heat.

†† Coefficient of Performance (COP) for heating mode rated at 47 °F dry bulb, 43 °F wet bulb outdoor conditions.

$$Performance \left(\frac{kW}{ton} \right) = \frac{1}{EER} \left(\frac{Watt \cdot hr}{Btu_{out}} \right) * 12,000 \left(\frac{Btu_{out}}{ton \cdot hr} \right) * \frac{1}{1,000} \left(\frac{kW}{Watt} \right) = \frac{12}{EER} \left(\frac{kW}{ton} \right)$$

¹¹ Reference: ASHRAE Standard 90.1-1989, Table 10-6.

¹² Reference: ASHRAE Standard 90.1-1999, Table 6.2.1.A and Table 6.2.1.B.

Table 7: Baseline and minimum performance standards for water chilling packages, electric.

Equipment Type	Cooling Capacity (tons)	Baseline Performance Standard ¹³		Minimum Performance Standard ¹⁴	
		COP	kW/ton	COP	kW/ton
Water cooled, positive displacement (rotary screw, scroll)	< 150	3.80	0.926	4.45	0.790
	≥ 150 and <300	4.20	0.837	4.90	0.718
	≥ 300	4.70	0.748	5.50	0.639
Water cooled, centrifugal	< 150	3.80	0.926	5.00	0.703
	≥ 150 and <300	4.20	0.837	5.55	0.634
	≥ 300	4.70	0.748	6.10	0.577
Air cooled with condenser	< 150	2.70	1.303	2.80	1.256
	≥ 150	2.50	1.407	2.80	1.256
Air cooled without condenser	All	3.10	1.135	3.10	1.135

$$Performance \left(\frac{kW}{ton} \right) = \frac{1}{COP} \left(\frac{Btu_{in}}{Btu_{out}} \right) * 12,000 \left(\frac{Btu_{out}}{ton \cdot hr} \right) * \frac{1}{3,412} \left(\frac{kWh}{Btu_{in}} \right) = \frac{3.517}{COP} \left(\frac{kW}{ton} \right)$$

Table 8: Standard rating conditions and minimum performance for water chilling packages, gas absorption

Equipment Type	Cooling Capacity	Baseline Performance Standard ¹⁵ (COP)	Minimum Performance Standard ¹⁶ (COP)
Air-cooled absorption, single-effect	All capacities	0.48	0.60
Water-cooled absorption, single-effect	All capacities	0.60	0.70
Absorption double effect, indirect-fired	All capacities	0.95	1.00
Absorption double effect, direct-fired	All capacities	0.95	1.00

¹³ Reference: ASHRAE Standard 90.1-1989, Table 10-7.

¹⁴ Reference: ASHRAE Standard 90.1-1999, Table 6.2.1.C.

¹⁵ Reference: ASHRAE Standard 90.1-1999, Table 6.2.1.C.

¹⁶ Reference: ASHRAE Standard 90.1-1999, Table 6.2.1.C.