

A**Standard Cooling Equipment Tables****A.1 Overview**

This document contains reference data for estimating demand and energy savings for cooling equipment in the C&I 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 C&I 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. The guidelines in Section III (M&V Guidelines), Chapter 3 (Guidelines for Cooling Equipment) describe the application of these equipment efficiency standards and coefficient tables 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 0.1 through Table 0.8 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
- Water- and air-cooled water chilling packages

Table 0.1 through Table 0.8 are based on American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standard 90.1-1989 and ASHRAE 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 equipment efficiencies.

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 energy consumption of the actual existing equipment.

Table 0.9 of this document presents the cooling degree-days (CDD) for a weather station located in the CenterPoint Energy distribution service territory. Cooling degree-day data are used to normalize metered energy consumption to a typical meteorological year (TMY2). M&V Guideline 3 describes the application of weather data for estimating baseline energy use and cooling equipment energy savings.

Table A.10 provides the coefficients necessary to complete the air-conditioning equipment *deemed savings* calculation described in Section III, Chapter 3.

A.2 Tables

Table 0.1: 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 & < 135,000	≥ 5.42 & < 11.25	95	Packaged and split	8.9 EER	10.3 EER [†]

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

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

Table 0.2: 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 0.3: 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	-	12.0 EER [†]
	≥ 65,000 and <135,000	80/67	85	10.5 EER	-
			86	-	12.0 EER
Ground water cooled heat pumps	< 135,000	80/67	70	11.0 EER	-
			59	-	16.2 EER
Water cooled unitary air conditioners	< 65,000	80/67	85	9.3 EER	-
			86	-	12.1 EER
	≥ 65,000 and <135,000	80/67	85	10.5 EER	-
			86	-	11.5 EER ^{††}

† For units with capacities less than 17,000 Btu/h, the minimum efficiency is 11.2 EER.

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

Table 0.4: 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	-

† 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.

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.

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

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

Table 0.5: 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

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

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

Table 0.6: 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
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.

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

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 0.7: 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 0.8: 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

Table 0.9: TMY2 Cooling Degree Days (base 65) for the CenterPoint Energy service territory

Weather Station	WBAN No.	CDD ₆₅ (°F day)
Houston	12960	2,810

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.

Table A.10: Deemed savings coefficients for the Houston, TX climate for various building types and equipment types.

Building Type	Demand Coefficient			Energy Coefficient		
	Air Cooled Chiller	Water Cooled Chiller	DX Air Cooled	Air Cooled Chiller	Water Cooled Chiller	DX Air Cooled
College	0.80	0.84	0.85	1,858	2,099	2,175
Convenience			0.88			4,168
Fast Food			0.87			3,365
Grocery		0.88	0.87		3,012	2,935
Hospital	1.05	0.85		2,781	3,172	
Hotel	0.80	0.88	0.84	1,831	1,981	2,266
Motel			0.84			2,404
Nursing Home	0.80	0.84	0.84	1,960	2,172	2,368
Large Office	0.81	0.90	0.85	2,501	2,786	2,750
Small Office	0.81	0.87	0.85	1,860	1,990	2,158
Public Assembly	0.81	0.86	0.86	2,264	2,482	2,559
Restaurant			0.86			2,548
Religious Worship	0.83	0.84	0.87	1,474	1,594	2,028
Retail	0.80	0.84	0.84	2,003	2,162	2,381
School	0.80	0.84	0.85	1,280	1,489	1,639
Service			0.87			2,429
Warehouse	0.84	0.87	0.88	1,534	1,673	2,248