

High Efficiency Specifications for Commercial Ice Machines

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Efficiency Requirements for Qualifying Products

Requirements are listed at the end of this document. Note on Tier 1: CEE Tier 1 efficiency levels are equivalent to U.S. federal standards effective January 1, 2010. CEE is in the process of revising the CEE ice machine specification. For details on the revision process, contact Kim Erickson at kerickson@cee1.org.

Definitions

- A. Ice Machine: A factory-made assembly (not necessarily shipped in one package) consisting of a condensing unit and ice-making section operating as an integrated unit, with means for making and harvesting ice. It is an assembly that makes up to 4,000 lbs of ice per day at Standard Ratings Conditions, as defined in Section 5.2.1 of ARI Standard 810-2006, and may also include means for storing or dispensing ice, or both.
- B. Ice Making Head (IMH): A model with the ice-making mechanism and the condensing unit in a single package, but with a separate ice storage bin.
- C. Remote Condensing Unit (RCU) or Split System Unit: A model in which the ice-making mechanism and condenser or condensing unit are in separate sections.
- D. Self-Contained (SCU): A model in which the ice-making mechanism and storage compartment are in an integral cabinet.
- E. Air-Cooled: An ice machine wherein motor driven fans or centrifugal blowers move air through the condenser to remove heat from the refrigerant.
- F. Cubed: Cubed ice machines have an alternate freezing and harvesting period. Water is circulated over an evaporator where it freezes until cubes are fully formed. The cubed ice is then harvested and moved to storage. The ice may be in cube shape, or in a variation of a solid shape.
- G. Flake: Flake ice machines produce ice continuously, usually in a barrel-shaped evaporator. An auger inside the evaporator scrapes ice off the sides into a storage bin.
- H. Nugget: Nugget ice machines use the same process as flake machines but compress the ice flakes into nuggets.

Qualifying Products

This specification covers air-cooled ice machines and water-cooled ice machines installed on a closed loop system or a system with a remote evaporative condenser, i.e. cooling tower. This specification does not include once-through or pass through cooling systems. This specification does not cover flake or nugget ice machines.

CEE plans to mine product information and performance data from the Air-Conditioning, Heating, and Refrigeration Institute's (AHRI) Directory of Certified Product Performance for Automatic Commercial Ice Cube machines and from Natural Resources Canada to develop a list of qualified products as long as these lists remain relevant to this specification and meet CEE member needs. Manufacturers should submit product information directly to these organizations for qualification.

Test Methods

Manufacturers are required to perform tests and self-qualify those product models that meet the CEE guidelines. In measuring energy and water consumption, the following test standard must be used:

- Air-Conditioning and Refrigeration Institute (ARI) Standard 810-2006, *Performance Rating of Automatic Commercial Ice-Makers*.

Future Specification Revisions

CEE reserves the right to revise the specification as appropriate. CEE plans include flake and nugget ice machines once a robust database is established that may be used to derive performance requirements.

Efficiency Requirements for Qualifying Products: Air-Cooled Ice Machines

Equipment Type	Harvest Rate (lbs ice/day)*	Specification	Corresponding Base Specification	Energy Use Limit (kWh/100lbs ice)**	Potable Water Use Limit (gal/100lbs ice)
Ice-Making Head	<450	CEE Tier 1	U.S. Federal Standard 1/1/2010	10.26 - 0.0086H	-
		CEE Tier 2	10% below Tier 1 / ENERGY STAR®	9.23 - 0.0077H	≤25
		CEE Tier 3	15% below Tier 1	8.72 - 0.0073H	≤20
	≥450	CEE Tier 1	U.S. Federal Standard 1/1/2010	6.89 - 0.0011H	-
		CEE Tier 2	10% below Tier 1 / ENERGY STAR	6.20 - 0.0010H	≤25
		CEE Tier 3	15% below Tier 1	5.86 - 0.0009H	≤20
Remote-Condensing without remote compressor	<1000	CEE Tier 1	U.S. Federal Standard 1/1/2010	8.85 - 0.0038H	-
		CEE Tier 2	9% below Tier 1 / ENERGY STAR	8.05 - 0.0035H	≤25
		CEE Tier 3	15% below Tier 1	7.52 - 0.0032H	≤20
	≥1000	CEE Tier 1	U.S. Federal Standard 1/1/2010	5.10	-
		CEE Tier 2	9% below Tier 1 / ENERGY STAR	4.64	≤25
		CEE Tier 3	15% below Tier 1	4.34	≤20
Remote-Condensing with remote compressor	<934	CEE Tier 1	U.S. Federal Standard 1/1/2010	8.85 - 0.0038H	-
		CEE Tier 2	9% below Tier 1 / ENERGY STAR	8.05 - 0.0035H	≤25
		CEE Tier 3	15% below Tier 1	7.52 - 0.0032H	≤20
	≥934	CEE Tier 1	U.S. Federal Standard 1/1/2010	5.30	-
		CEE Tier 2	9% below Tier 1 / ENERGY STAR	4.82	≤25
		CEE Tier 3	15% below Tier 1	4.51	≤20
Self-Contained	<175	CEE Tier 1	U.S. Federal Standard 1/1/2010	18.0 - 0.0469H	-
		CEE Tier 2	7% below Tier 1 / ENERGY STAR	16.7 - 0.0436H	≤35
		CEE Tier 3	15% below Tier 1	15.3 - 0.0399H	≤30
	≥175	CEE Tier 1	U.S. Federal Standard 1/1/2010	9.80	-
		CEE Tier 2	7% below Tier 1 / ENERGY STAR	9.11	≤35
		CEE Tier 3	15% below Tier 1	8.33	≤30

Efficiency Requirements for Qualifying Products: Water-Cooled Ice Machines

Note: This specification is valid only for water-cooled ice machines using a closed loop system or a system with a remote evaporative condenser, i.e. cooling tower. Once-through or pass through cooling systems are not promoted in this specification.

Equipment Type	Harvest Rate (lbs ice/day)*	Specification	Corresponding Base Specification	Energy Use Limit (kWh/100lbs ice)**	Potable Water Use Limit (gal/100lbs ice)	Condenser Use Limit (gal/100lbs ice)
Ice-Making Head	<500	CEE Tier 1	U.S. Federal Standard 1/1/2010	7.80 - 0.0055H	-	200 - 0.022H
		CEE Tier 2	10% below Tier 1	7.02 - 0.0049H	≤25	***
		CEE Tier 3	15% below Tier 1	6.63 - 0.0047H	≤20	***
	≥500 and <1436	CEE Tier 1	U.S. Federal Standard 1/1/2010	5.58 - 0.0011H	-	200 - 0.022H
		CEE Tier 2	8% below Tier 1	5.13 - 0.0010H	≤25	***
		CEE Tier 3	15% below Tier 1	4.74 - 0.0009H	≤20	***
	≥1436	CEE Tier 1	U.S. Federal Standard 1/1/2010	4.00	-	200 - 0.022H
		CEE Tier 2	8% below Tier 1	3.68	≤25	***
		CEE Tier 3	15% below Tier 1	3.40	≤20	***
Self-Contained	<200	CEE Tier 1	U.S. Federal Standard 1/1/2010	11.4 - 0.0190H	-	191 - 0.0315H
		CEE Tier 2	7% below Tier 1	10.6 - 0.0177H	≤35	***
		CEE Tier 3	15% below Tier 1	9.69 - 0.0162H	≤30	***
	≥200	CEE Tier 1	U.S. Federal Standard 1/1/2010	7.60	-	191 - 0.0315H
		CEE Tier 2	7% below Tier 1	7.07	≤35	***
		CEE Tier 3	15% below Tier 1	6.46	≤30	***

*Harvest rate is calculated using ARI Test Method 810-2008. Ambient temperature 90°F; water inlet temperature 70°F; water inlet pressure .30 ± 3 psig.

**H = Ice harvest rate (lbs ice/day) calculated as defined above.

***Condenser use is no longer limited since this specification only promotes water-cooled machines installed on a closed loop or remote evaporative condenser system.