ENERGY STAR® Program Requirements For Automatic Commercial Ice Makers

Partner Commitments

Following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacture and labeling of ENERGY STAR certified products. The ENERGY STAR Partner must adhere to the following partner commitments:

Qualifying Products

1. Comply with current ENERGY STAR Eligibility Criteria, which define performance requirements and test procedures for automatic commercial ice makers. A list of eligible products and their corresponding Eligibility Criteria can be found at www.energystar.gov/specifications.
2. **Prior to associating the ENERGY STAR name or mark with any product**, obtain written certification of ENERGY STAR qualification from a Certification Body recognized by EPA for automatic commercial ice makers. As part of this certification process, products must be tested in a laboratory recognized by EPA to perform automatic commercial ice maker testing. A list of EPA-recognized laboratories and Certification Bodies can be found at www.energystar.gov/testingandverification.

Using the ENERGY STAR Name and Marks

3. Comply with current ENERGY STAR Identity Guidelines, which define how the ENERGY STAR name and marks may be used. Partner is responsible for adhering to these guidelines and ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance. The ENERGY STAR Identity Guidelines are available at www.energystar.gov/logouse.
4. Use the ENERGY STAR name and marks only in association with certified products. Partner may not refer to itself as an ENERGY STAR Partner unless at least one product is certified and offered for sale in the U.S. and/or ENERGY STAR partner countries.
5. Provide clear and consistent labeling of ENERGY STAR certified automatic commercial ice makers.

    5.1. The ENERGY STAR mark must be clearly displayed on the top/front of the product (on product labels and/or as a permanent mark), in product literature (i.e., user manuals, spec sheets, etc.) and on the manufacturer's Internet site where information about ENERGY STAR certified models is displayed.

    5.2. It is also recommended that the mark appear on the product packaging.

Verifying Ongoing Product Certification

6. Participate in third-party verification testing through a Certification Body recognized by EPA for automatic commercial ice makers, providing full cooperation and timely responses. EPA/DOE may also, at its discretion, conduct tests on products that are referred to as ENERGY STAR certified. These products may be obtained on the open market, or voluntarily supplied by Partner at the government's request.

Providing Information to EPA

7. Provide unit shipment data or other market indicators to EPA annually to assist with creation of ENERGY STAR market penetration estimates, as follows:

   7.1. Partner must submit the total number of ENERGY STAR certified automatic commercial ice makers shipped in the calendar year or an equivalent measurement as agreed to in advance by EPA and Partner. Partner shall exclude shipments to organizations that rebrand and resell the shipments (unaffiliated private labelers).

   7.2. Partner must provide unit shipment data segmented by meaningful product characteristics (e.g., type, capacity, presence of additional functions) as prescribed by EPA.

   7.3. Partner must submit unit shipment data for each calendar year to EPA or an EPA-authorized third party, preferably in electronic format, no later than March 1 of the following year.

   Submitted unit shipment data will be used by EPA only for program evaluation purposes and will be closely controlled. If requested under the Freedom of Information Act (FOIA), EPA will argue that the data is exempt. Any information used will be masked by EPA so as to protect the confidentiality of the Partner.

8. Report to EPA any attempts by recognized laboratories or Certification Bodies to influence testing or certification results or to engage in discriminatory practices.

9. Notify EPA of a change in the designated responsible party or contacts within 30 days using the My ENERGY STAR Account tool (MESA) available at www.energystar.gov/mesa.

Performance for Special Distinction

In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the ENERGY STAR Partner may consider the following voluntary measures, and should keep EPA informed on the progress of these efforts:

- Provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase availability of ENERGY STAR certified products, and to promote awareness of ENERGY STAR and its message.
- Consider energy efficiency improvements in company facilities and pursue benchmarking buildings through the ENERGY STAR Buildings program.
- Purchase ENERGY STAR certified products. Revise the company purchasing or procurement specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA for periodic updates and coordination. Circulate general ENERGY STAR certified product information to employees for use when purchasing products for their homes.
- Feature the ENERGY STAR mark(s) on Partner website and other promotional materials. If information concerning ENERGY STAR is provided on the Partner website as specified by the ENERGY STAR Web Linking Policy (available in the Partner Resources section of the ENERGY STAR website), EPA may provide links where appropriate to the Partner website.
- Ensure the power management feature is enabled on all ENERGY STAR certified displays and computers in use in company facilities, particularly upon installation and after service is performed.
- Provide general information about the ENERGY STAR program to employees whose jobs are relevant to the development, marketing, sales, and service of current ENERGY STAR certified products.
- Provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the program requirements listed above. By doing so, EPA may be able to coordinate, and communicate Partner's activities, provide an EPA representative, or include news about the event in the ENERGY STAR newsletter, on the ENERGY STAR website, etc. The plan may be as simple as providing a list of planned activities or milestones of which Partner would like EPA to be aware. For example, activities may include: (1) increasing the availability of ENERGY STAR certified products by converting the entire product line within two years to meet ENERGY STAR guidelines; (2)

demonstrating the economic and environmental benefits of energy efficiency through special in-store displays twice a year; (3) providing information to users (via the website and user's manual) about energy-saving features and operating characteristics of ENERGY STAR certified products; and (4) building awareness of the ENERGY STAR Partnership and brand identity by collaborating with EPA on one print advertorial and one live press event.

- Join EPA's SmartWay Transport Partnership to improve the environmental performance of the company's shipping operations. The SmartWay Transport Partnership works with freight carriers, shippers, and other stakeholders in the goods movement industry to reduce fuel consumption, greenhouse gases, and air pollution. For more information on SmartWay, visit www.epa.gov/smartway.
- Join EPA's Green Power Partnership. EPA's Green Power Partnership encourages organizations to buy green power as a way to reduce the environmental impacts associated with traditional fossil fuel-based electricity use. The partnership includes a diverse set of organizations including Fortune 500 companies, small and medium businesses, government institutions as well as a growing number of colleges and universities. For more information on Green Power, visit www.epa.gov/greenpower.

ENERGY STAR® Program Requirements Product Specification for Automatic Commercial Ice Makers

Eligibility Criteria Version 3.0

Following is the **Version 3.0** product specification for ENERGY STAR certified Automatic Commercial Ice Makers. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

1) Definitions: Provided below are definitions of the relevant terms in this document.

A. Automatic Commercial Ice Maker[1]: A factory-made assembly (not necessarily shipped in 1 package) that: 1) consists of a condensing unit and ice-making section operating as an integrated unit, with means for making and harvesting ice; and 2) May include means for storing ice, dispensing ice, or storing and dispensing ice.

B. Air-Cooled: An ice maker wherein motor driven fans or centrifugal blowers move air through the condenser to remove heat from the refrigerant.

C. Water-Cooled: An ice maker that utilizes water running through the condenser to remove heat from the refrigerant.

D. Batch-Type Ice Maker[1]: An ice maker having alternate freezing and harvesting periods. This includes automatic commercial ice makers that produce cube type ice and other batch technologies.[2]

E. Cube Type Ice[1]: Ice that is fairly uniform, hard, solid, usually clear, and generally weighs less than two ounces (60 grams) per piece, as distinguished from flake, crushed, or fragmented ice.[3]

F. Continuous-Type Ice Maker[1]: An ice maker that continually freezes and harvests ice at the same time. The following ice types are produced by continuous machines:

a. Flake: typically used for cooling food, commercial and industrial process cooling, and special medical and scientific cooling applications.

b. Nugget: typically used for cooling water and beverage drinks, and for a chewable ice with a softer consistency than cube ice.

Ice Maker Categories

G. Ice Making Head (IMH)[1]: Automatic commercial ice makers that do not contain integral storage bins, but are generally designed to accommodate a variety of bin capacities. Storage bins entail additional energy use not included in the reported energy consumption figures for these units.

[1] Based on definitions in 10 CFR Part 431.132. When in conflict, the definitions in 10 CFR Part 431.132 take precedence.
[2] Referred to as cube type ice maker in AHRI Standard 810-2007 with Addendum 1 (incorporated by reference, see § 431.133).
[3] Note that this conflicts and takes precedence over the definition established in AHRI 810-2007 with Addendum 1 (incorporated by reference, see § 431.133), which indicates that "cube" does not reference a specific size or shape.

H. Remote Condensing Unit (RCU)[1] or Split System Unit: A type of automatic commercial ice maker in which the ice-making mechanism and condenser or condensing unit are in separate sections. This includes ice makers with and without remote compressor.

I. Self-Contained Unit (SCU)[1]: A type of automatic commercial ice maker in which the ice-making mechanism and storage compartment are in an integral cabinet.

Metric Definitions

J. Energy Use[1]: The total energy consumed, stated in kilowatt hours per one-hundred pounds (kWh/100 lb) of ice, stated in multiples of 0.1. For remote condensing (but not remote compressor) automatic commercial ice makers and remote condensing and remote compressor automatic commercial ice makers, total energy consumed shall include the energy use of the ice-making mechanism, the compressor, and the remote condenser or condensing unit.

K. Harvest Rate[1]: The amount of ice (at 32 degrees F) in pounds produced per 24 hours.

L. Ice Hardness Factor[1]: The latent heat capacity of harvested ice, in British thermal units per pound of ice (Btu/lb) divided by 144 Btu/lb expressed as a percent.

M. Potable Water Use: The amount of potable water used in making ice, which is equal to the sum of the ice harvested, Dump or Purge Water, and the Harvest Water expressed in gal/100 lb [L/45.0 kg] of ice, stated in multiples of 0.1. Alternatively, the amount of water entering the icemaker per cycle can be measured.

N. Dump or Purge Water: The water from the ice making process that is not frozen at the end of the freeze cycle and is discharged from a batch and continuous type Automatic Commercial Ice-Maker.

O. Harvest Water: The water that has been collected with the ice used to measure the machine's capacity.

P. Basic Model[1]: All units of a given type of covered product (or class thereof) 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.

Connected ACIM Definitions

Q. Communication Link: The mechanism for bi-directional data transfers between the ACIM and one or more external applications, devices or systems.

R. Demand Response (DR): Changes in electric usage by demand-side resources from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized.[4]

S. Demand Response Management System (DRMS): The system operated by a program administrator, such as the utility or third party, which dispatches signals with DR instructions and/or price signals to the ENERGY STAR ACIM products and receives messages from the ACIM product.

T. Interface Specification: A document or collection of documents that contains detailed technical information to facilitate access to relevant data and product capabilities over a communications interface.

U. Load Management Entity: Device, service or system that interacts with the product to shift, control or manage ice maker electrical usage, e.g. a DRMS or energy management system.

V. Open Standards: Communication with entities outside the ACIM that use, for all communication layers, standards:

- Included in the Smart Grid Interoperability Panel (SGIP) Catalog of Standards,[5] and/or
- Included in the NIST Smart Grid Framework Tables 4.1 and 4.2, and/or
- Adopted by the American National Standards Institute (ANSI) or another well-established international standards organization such as the International Organization for Standardization (ISO), International Electrotechnical Commission (IEC), International Telecommunication Union (ITU), Institute of Electrical and Electronics Engineers (IEEE) or Internet Engineering Task Force (IETF).

2) Scope:

A. Included Products: Products that meet the definition of an Automatic Commercial Ice Maker as specified herein that are air-cooled batch or continuous type, and of IMH, RCU, or SCU design, are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2.B. Air-cooled RCUs designed for connection to remote rack compressors that are alternately sold (with the same model number) with a dedicated remote condensing unit are also eligible for ENERGY STAR qualification (based on measured performance with the associated dedicated condensing unit).

B. Excluded Products: Water-cooled ice makers, ice makers with ice and water dispensing systems, and air-cooled RCUs that are designed only for connection to remote rack compressors are not eligible for ENERGY STAR qualification.

3) Certification Criteria:

A. Measure the energy use and potable water use of each covered product by conducting the test procedure set forth in Section 5. Compare the Energy Use and the measured Potable Water Use values to the ENERGY STAR minimum values presented in Tables 1 and 2.

B. Energy Use (Energy Consumption Rate): The Energy Use requirement is a function of harvest rate in the form of $L = A * H + b$, where L is the energy use requirement level, H is the ice harvest rate for the system under evaluation, A is a coefficient, and b is a constant.

Table 1: ENERGY STAR Requirements for Air-Cooled Batch-Type Ice Makers

Equipment Type	Applicable Ice Harvest Rate Range (lbs of ice/24 hrs)	Energy Use (kWh/100 lbs ice)	Potable Water Use (gal/100 lbs ice)
IMH	**H** < 300	≤ 9.20 - 0.01134**H**	≤ 20.0
	300 ≤ **H** < 800	≤ 6.49 - 0.0023**H**	
	800 ≤ **H** < 1500	≤ 5.11 - 0.00058**H**	
	1500 ≤ **H** ≤ 4000	≤ 4.24	
RCU	**H** < 988	≤ 7.17 – 0.00308**H**	≤ 20.0
	988 ≤ **H** ≤ 4000	≤ 4.13	
SCU	**H** < 110	≤ 12.57 - 0.0399**H**	≤ 25.0
	110 ≤ **H** < 200	≤ 10.56 - 0.0215**H**	
	200 ≤ **H** ≤ 4000	≤ 6.25	

[4] FERC National Assessment & Action Plan on Demand Response, https://www.ferc.gov/industries/electric/indus-act/demand-response/dr-potential.asp

[5] http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PMO#Catalog_of_Standards_Processes

Table 2: ENERGY STAR Requirements for Air-Cooled Continuous-Type Ice Makers			
Equipment Type	**Applicable Ice Harvest Rate Range (lbs of ice/24 hrs)**	**Energy Use (kWh/100 lbs ice)**	**Potable Water Use (gal/100 lbs ice)**
IMH	**H** < 310	≤ 7.90 – 0.005409**H**	≤ 15.0
	310 ≤ **H** < 820	≤ 7.08 – 0.002752**H**	
	820 ≤ **H** ≤ 4000	≤ 4.82	
RCU	**H** < 800	≤ 7.76 – 0.00464**H**	≤ 15.0
	800 ≤ **H** ≤ 4000	≤ 4.05	
SCU	**H** < 200	≤ 12.37 – 0.0261**H**	≤ 15.0
	200 ≤ **H** < 700	≤ 8.24 – 0.005429**H**	
	700 ≤ **H** ≤ 4000	≤ 4.44	

Note: Upon review of the *Energy Conservation Program: Energy Conservation Standards for Automatic Commercial Ice Makers* regulatory text and the Code of Federal Regulations (CFR) §431.136, EPA made a slight modification to the Applicable Ice Harvest Rate Ranges for batch-type RCUs. In order to maintain continuity of certification requirements for all eligible products, EPA made a modest shift in the Energy Use requirement for batch-type RCUs with an Applicable Ice Harvest Rate of 988 or greater.

C. Significant Digits and Rounding:

a. All calculations shall be carried out with directly measured (unrounded) values. Final ratings for should be rounded in accordance with the DOE test procedure provisions, when applicable.

b. Directly measured or calculated values that are submitted for reporting on the ENERGY STAR website shall be calculated in accordance with the requirements for determining certified ratings for DOE, when applicable.

D. Additional Reporting Requirement

a. Report the type of refrigerant used in the respective ACIM model, for example: R-404A, R-290, or R-134a.

4) Optional Connected Functionality in Automatic Commercial Ice Makers:

For connected recognition, the following ***optional*** connected criteria are applicable to Included Products in Section 2.A:

A. Remote Management

The product shall be capable of receiving and responding to remote requests via a communication link that enable intelligent control of ice production in order to reduce energy use and/or energy expense. For example, such functionality could enable interconnection with an external device, or service that actively alters ice production in order to minimize energy expense when enrolled in a Time-of-Use or other time-varying electricity price program.

B. Demand Response (DR)

a. Grid Communications – The product shall include a communication link that facilitates the use of open standards, as defined in this specification, for all communication layers to enable DR functionality.

Note: *Products that enable direct, on-premises, open-standards based interconnection are preferred, but alternative approaches, where open-standards connectivity is enabled only with use of off-premise services, are also acceptable.*

b. Open Access – To enable interconnection with the product over the communication link, an interface specification, application programming interface (API) or similar documentation shall be made available that, at a minimum, enables DR functionality.

Note: *While EPA encourages broad availability of the interface spec or API, dissemination of these documents may be limited to certified/qualified developers, integration partners and other similar entities.*

c. Consumer Override – The product shall be capable of supporting DR event override-ability.

Note: *Based on in field studies with ACIMs supporting DR and Load Shifting strategies, EPA recommends including automatic DR/Load Shift exit points, based on ice bin levels (sensor). These exit points include a critical minimum level (often 25% bin capacity), and a sudden ice drop indicator (often 10% bin level in 5 minutes); these exit points ensure that end user ice levels are protected from sudden rushes, and from ice levels dropping below levels required for business operations.*

C. Capabilities Summary – A ≤ 500-word summary description of the product's Remote Management and DR capabilities/services shall be submitted. In this summary, EPA recommends noting the following, as applicable:

- Overview of Remote Management capability that the product supports, notable capabilities that can reduce energy usage or reduce energy expense.
- DR services that the product has the capability to participate in such as load dispatch, ancillary services, price notification and price response.
- Whether the product can be directly addressed via the interface specification, API or similar documentation.
- List open communications supported by the product, including applicable certifications.
- Feedback to Load Management Entity, e.g. verification/M&V, override notification.
- Measures to limit DR impacts, including automatic DR exit strategies, if any.
- DR response configurability/flexibility by the customer and/or Load Management Entity.

Note: EPA has extended the capabilities description from a 250 to a 500-word limit to allow manufacturers to list any capabilities that would support locational demand response.

5) Test Requirements:

A. Units shall be selected for testing per the sampling requirements defined in 10 CFR § 429.45, which references 10 CFR § 429.11.

B. When testing commercial ice makers, the following test methods shall be used to determine ENERGY STAR certification:

Table 3: Test Methods for ENERGY STAR Qualification	
ENERGY STAR Requirement	**Test Method Reference**
Energy Use (kWh/100 lbs ice)	10 CFR Part 431.134
Potable Water Use (gal/100 lbs ice)	AHRI Standard 810-2007 with Addendum 1, (AHRI 810) *Performance Rating of Automatic Commercial Ice-Makers*

6) Effective Date: The ENERGY STAR Automatic Commercial Ice Maker specification shall take effect on **January 28, 2018**. To qualify for ENERGY STAR a product model shall meet the ENERGY STAR specification in effect on the model's date of manufacture. The date of manufacture is specific to each unit and is the date on which a unit is considered to be completely assembled.

7) Future Specification Revisions: EPA reserves the right to change the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through industry discussions. In the event of a specification revision, please note that the ENERGY STAR certification is not automatically granted for the life of a product model.