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(2) [Reserved]

[87 FR 65900, Nov. 1, 2022]

§ 431.134 Uniform test methods for the measurement of harvest rate, energy consumption, and water consumption of automatic commercial ice makers.

NOTE 1 TO § 431.134: On or after October 27, 2023, any representations, including certifications of compliance for automatic commercial ice makers, made with respect to the energy use or efficiency of automatic commercial ice makers must be made in accordance with the results of testing pursuant to this section. Prior to October 27, 2023, any representations with respect to energy use or efficiency of automatic commercial ice makers must be made either in accordance with the results of testing pursuant to this section or with the results of testing pursuant to this section as it appeared in 10 CFR 431.134 in the 10 CFR parts 200–499 edition revised as of January 1, 2022.

(a) *Scope.* This section provides the test procedures for measuring the harvest rate in pounds of ice per 24 hours (lb/24 h), energy use in kilowatt hours per 100 pounds of ice (kWh/100 lb), and the condenser water use in gallons per 100 pounds of ice (gal/100 lb) of automatic commercial ice makers with capacities up to 4,000 lb/24 h. This section also provides voluntary test procedures for measuring the potable water use in gallons per 100 pounds of ice (gal/100 lb).

(b) *Testing and calculations.* Measure the harvest rate, the energy use, the condenser water use, and, to the extent elected, the potable water use of each covered automatic commercial ice maker by conducting the test procedures set forth in AHRI Standard 810 (I–P)–2016 with Addendum 1, section 3, “Definitions,” section 4, “Test Requirements,” and section 5.2, “Standard Ratings” (incorporated by reference, see § 431.133), and according to the provisions of this section. Use ANSI/ASHRAE Standard 29–2015 (incorporated by reference, see § 431.133) referenced by AHRI Standard 810 (I–P)–2016 with Addendum 1 for all automatic commercial ice makers, except as noted in paragraphs (c) through (k) of this section. If any provision of the referenced test procedures conflicts with the requirements in this section or the definitions in § 431.132, the require-

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ments in this section and the definitions in § 431.132 control.

(c) *Test setup and equipment configurations*—(1) *Baffles.* Conduct testing without baffles unless the baffle either is a part of the automatic commercial ice maker or shipped with the automatic commercial ice maker to be installed according to the manufacturer’s installation instructions.

(2) *Clearances.* Install all automatic commercial ice makers for testing according to the manufacturer’s specified minimum rear clearance requirements, or with 3 feet of clearance from the rear of the automatic commercial ice maker, whichever is less, from the chamber wall. All other sides of the automatic commercial ice maker and all sides of the remote condenser, if applicable, shall have clearances according to section 6.5 of ANSI/ASHRAE Standard 29–2015.

(3) *Purge settings.* Test automatic commercial ice makers equipped with automatic purge water control using a fixed purge water setting that is described in the manufacturer’s written instructions shipped with the unit as being appropriate for water of normal, typical, or average hardness. Purge water settings described in the instructions as suitable for use only with water that has higher or lower than normal hardness (such as distilled water or reverse osmosis water) must not be used for testing.

(4) *Ambient conditions measurement*—(i) *Ambient temperature sensors.* Measure all ambient temperatures according to section 6.4 of ANSI/ASHRAE Standard 29–2015, except as provided in paragraph (c)(4)(iv) of this section, with unweighted temperature sensors.

(ii) *Ambient relative humidity measurement.* Except as provided in paragraph (c)(4)(iv) of this section, ambient relative humidity shall be measured at the same location(s) used to confirm ambient dry bulb temperature, or as close as the test setup permits. Ambient relative humidity shall be measured with an instrument accuracy of ± 2.0 percent.

(iii) *Ambient conditions sensors shielding.* Ambient temperature and relative humidity sensors may be shielded if the ambient test conditions cannot be

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maintained within the specified tolerances because of warm discharge air from the condenser exhaust affecting the ambient measurements. If shields are used, the shields must not inhibit recirculation of the warm discharge air into the condenser or automatic commercial ice maker inlet.

(iv) *Alternate ambient conditions measurement location.* For automatic commercial ice makers in which warm air discharge from the condenser exhaust affects the ambient conditions as measured 1 foot in front of the air inlet, or automatic commercial ice makers in which the air inlet is located in the rear of the automatic commercial ice maker and the manufacturer's specified minimum rear clearance is less than or equal to 1 foot, the ambient temperature and relative humidity may instead be measured 1 foot from the cabinet, centered with respect to the sides of the cabinet, for any side of the automatic commercial ice maker cabinet with no warm air discharge or air inlet.

(5) *Collection container for batch type automatic commercial ice makers with*

harvest rates less than or equal to 50 lb/24 h. Use an ice collection container as specified in section 5.5.2(a) of ANSI/ASHRAE Standard 29-2015, except that the water retention weight of the container is no more than 4.0 percent of that of the smallest batch of ice for which the container is used.

(d) *Test conditions*—(1) *Relative humidity.* Maintain an average minimum ambient relative humidity of 30.0 percent throughout testing.

(2) *Inlet water pressure.* Except for portable automatic commercial ice makers, the inlet water pressure when water is flowing into the automatic commercial ice maker shall be within the allowable range within 5 seconds of opening the water supply valve.

(e) *Stabilization*—(1) *Percent difference calculation.* Calculate the percent difference in the ice production rate between two cycles or samples using the following equation, where A and B are the harvest rates, in lb/24 h (for batch type ice makers) or lb/15 mins (for continuous type ice makers), of any cycles or samples used to determine stability:

$$\text{Percent Difference} = \frac{|A - B|}{\frac{A + B}{2}} \times 100 \text{ percent}$$

(2) *Automatic commercial ice makers with harvest rates greater than 50 lb/24 h.* The three or more consecutive cycles or samples used to calculate harvest rate, energy use, condenser water use, and potable water use, must meet the stability criteria in section 7.1.1 of ANSI/ASHRAE Standard 29-2015.

(3) *Automatic commercial ice makers with harvest rates less than or equal to 50 lb/24 h.* The three or more consecutive cycles or samples used to calculate harvest rate, energy use, condenser water use, and potable water use, must meet the stability criteria in section 7.1.1 of ANSI/ASHRAE Standard 29-2015, except that the weights of the samples (for continuous type automatic commercial ice makers (ACIMs)) or 24-hour calculated ice production (for batch type ACIMs) must not vary

by more than ± 4 percent, and the 25 g (for continuous type ACIMs) and 1 kg (for batch type ACIMs) criteria do not apply.

(f) *Calculations.* The harvest rate, energy use, condenser water use, and potable water use must be calculated by averaging the values for the three calculated samples for each respective reported metric as specified in section 9 of ANSI/ASHRAE Standard 29-2015. All intermediate calculations prior to the reported value, as applicable, must be performed with unrounded values.

(g) *Rounding.* Round the reported values as follows: Harvest rate to the nearest 1 lb/24 h for harvest rates above 50 lb/24 h; harvest rate to the nearest 0.1 lb/24 h for harvest rates less than or equal to 50 lb/24 h; condenser water use to the nearest 1 gal/100 lb; and energy

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use to the nearest 0.01 kWh/100 lb. Round final potable water use value to the nearest 0.1 gal/100 lb.

(h) *Continuous type automatic commercial ice makers*—(1) *Ice hardness adjustment*—(i) *Calorimeter constant*. Determine the calorimeter constant according to the requirements in section A1 and A2 of Normative Annex A Method of Calorimetry in ANSI/ASHRAE Standard 29–2015, except that the trials shall be conducted at an ambient air temperature (room temperature) of $70^{\circ}\text{F} \pm 1^{\circ}\text{F}$, with an initial water temperature of $90^{\circ}\text{F} \pm 1^{\circ}\text{F}$. To verify the temperature of the block of pure ice as provided in section A2.e in ANSI/ASHRAE Standard 29–2015, a thermocouple shall be embedded at approximately the geometric center of the interior of the block. Any water that remains on the block of ice shall be wiped off the surface of the block before being placed into the calorimeter.

(ii) *Ice hardness factor*. Determine the ice hardness factor according to the requirements in section A1 and A3 of Normative Annex A Method of Calorimetry in ANSI/ASHRAE Standard 29–2015, except that the trials shall be conducted at an ambient air temperature (room temperature) of $70^{\circ}\text{F} \pm 1^{\circ}\text{F}$, with an initial water temperature of $90^{\circ}\text{F} \pm 1^{\circ}\text{F}$. The harvested ice used to determine the ice hardness factor shall be produced according to the test methods specified at § 431.134. The ice hardness factor shall be calculated using the equation for ice hardness factor in section 5.2.2 of AHRI Standard 810 (I–P)–2016 with Addendum 1.

(iii) *Ice hardness adjustment calculation*. Determine the reported energy use and reported condenser water use by multiplying the measured energy use or measured condenser water use by the ice hardness adjustment factor, determined using the ice hardness adjustment factor equation in section 5.2.2 of AHRI Standard 810 (I–P)–2016 with Addendum 1.

(2) [Reserved]

(i) *Automatic commercial ice makers with automatic dispensers*. Allow for the continuous production and dispensing of ice throughout testing. If an automatic commercial ice maker with an automatic dispenser is not able to continuously produce and dispense ice be-

cause of certain mechanisms within the automatic commercial ice maker that prohibit the continuous production and dispensing of ice throughout testing, those mechanisms must be overridden to the minimum extent which allows for the continuous production and dispensing of ice. The automatic commercial ice maker shall have an empty internal storage bin at the beginning of the test period. Collect capacity samples according to the requirements of ANSI/ASHRAE Standard 29–2015, except that the samples shall be collected through continuous use of the dispenser rather than in the internal storage bin. The intercepted ice samples shall be obtained from a container in an external ice bin that is filled one-half full of ice and is connected to the outlet of the ice dispenser through the minimal length of conduit that can be used.

(j) *Portable automatic commercial ice makers*. Sections 5.4, 5.6, 6.2, and 6.3 of ANSI/ASHRAE Standard 29–2015 do not apply. Ensure that the ice storage bin is empty prior to the initial potable water reservoir fill. Fill an external container with water to be supplied to the portable automatic commercial ice maker water reservoir. Establish an initial water temperature of $70^{\circ}\text{F} \pm 1.0^{\circ}\text{F}$. Verify the initial water temperature by inserting a temperature sensor into approximately the geometric center of the water in the external container. Immediately after establishing the initial water temperature, fill the ice maker water reservoir to the maximum level of potable water as specified by the manufacturer. After the potable water reservoir is filled, operate the portable automatic commercial ice maker to produce ice into the ice storage bin until the bin is one-half full. One-half full for the purposes of testing portable automatic commercial ice makers means that half of the vertical dimension of the ice storage bin, based on the maximum ice fill level within the ice storage bin, is filled with ice. Once the ice storage bin is one-half full, conduct testing according to section 7 of ANSI/ASHRAE Standard 29–2015. The potable water use is equal to the sum of the weight of ice and any corresponding melt water collected for

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the capacity test as specified in section 7.2 of ANSI/ASHRAE Standard 29–2015.

(k) *Self-contained refrigerated storage automatic commercial ice makers.* For door openings, the door shall be in the fully open position, which means opening the ice storage compartment door to an angle of not less than 75 degrees from the closed position (or the maximum extent possible, if that is less than 75 degrees), for 10.0 ± 1.0 seconds to collect the sample. Conduct door openings only for ice sample collection and returning the empty ice collection container to the ice storage compartment (*i.e.*, conduct two separate door openings, one for removing the collection container to collect the ice and one for replacing the collection container after collecting the ice).

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ENERGY CONSERVATION STANDARDS

§ 431.136 Energy conservation standards and their effective dates.

(a) All basic models of commercial ice makers must be tested for performance using the applicable DOE test procedure in § 431.134, be compliant with the applicable standards set forth in paragraphs (b) through (d) of this section, and be certified to the Department of Energy under 10 CFR part 429 of this chapter.

(b) Each cube type automatic commercial ice maker with capacities between 50 and 2,500 pounds per 24-hour period manufactured on or after January 1, 2010 and before January 28, 2018, shall meet the following standard levels:

Equipment type	Type of cooling	Harvest rate lb ice/24 hours	Maximum energy use kWh/100 lb ice	Maximum condenser water use ¹ gal/100 lb ice
Ice-Making Head	Water	<500	7.8–0.0055H ²	200–0.022H.
Ice-Making Head	Water	≥500 and <1,436	5.58–0.0011H	200–0.022H.
Ice-Making Head	Water	≥1,436	4.0	200–0.022H.
Ice-Making Head	Air	<450	10.26–0.0086H	Not Applicable.
Ice-Making Head	Air	≥450	6.89–0.0011H	Not Applicable.
Remote Condensing (but not remote compressor) ..	Air	<1,000	8.85–0.0038H	Not Applicable.
Remote Condensing (but not remote compressor) ..	Air	≥1,000	5.1	Not Applicable.
Remote Condensing and Remote Compressor	Air	<934	8.85–0.0038H	Not Applicable.
Remote Condensing (but not remote compressor) ..	Air	≥934	5.3	Not Applicable.
Self-Contained	Water	<200	11.40–0.019H	191–0.0315H.
Self-Contained	Water	≥200	7.6	191–0.0315H.
Self-Contained	Air	<175	18.0–0.0469H	Not Applicable.
Self-Contained	Air	≥175	9.8	Not Applicable.

¹ Water use is for the condenser only and does not include potable water used to make ice.

² H = harvest rate in pounds per 24 hours, indicating the water or energy use for a given harvest rate.

Source: 42 U.S.C. 6313(d).

(c) Each batch type automatic commercial ice maker with capacities between 50 and 4,000 pounds per 24-hour

period manufactured on or after January 28, 2018, shall meet the following standard levels:

Equipment type	Type of cooling	Harvest rate lb ice/24 hours	Maximum energy use kilowatt-hours (kWh)/100 lb ice ¹	Maximum condenser water use gal/100 lb ice ²
Ice-Making Head	Water	< 300	6.88–0.0055H	200–0.022H.
Ice-Making Head	Water	≥300 and <850	5.80–0.00191H	200–0.022H.
Ice-Making Head	Water	≥850 and <1,500	4.42–0.00028H	200–0.022H.
Ice-Making Head	Water	≥1,500 and <2,500	4.0	200–0.022H.
Ice-Making Head	Water	≥2,500 and <4,000	4.0	145.
Ice-Making Head	Air	< 300	10–0.01233H	NA.
Ice-Making Head	Air	≥ 300 and < 800	7.05–0.0025H	NA.
Ice-Making Head	Air	≥ 800 and < 1,500	5.55–0.00063H	NA.
Ice-Making Head	Air	≥ 1500 and < 4,000	4.61	NA.
Remote Condensing (but not remote compressor) ..	Air	< 988	7.97–0.00342H	NA.
Remote Condensing (but not remote compressor) ..	Air	≥ 988 and < 4,000	4.59	NA.
Remote Condensing and Remote Compressor	Air	< 930	7.97–0.00342H	NA.
Remote Condensing and Remote Compressor	Air	≥ 930 and < 4,000	4.79	NA.
Self-Contained	Water	< 200	9.5–0.019H	191–0.0315H.
Self-Contained	Water	≥ 200 and < 2,500	5.7	191–0.0315H.