DEPARTMENT OF ENERGY

10 CFR Parts 429 and 431

[EERE–2017–BT–TP–0006]

RIN 1904–AD81

Energy Conservation Program: Test Procedure for Automatic Commercial Ice Makers

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notice of proposed rulemaking and request for comment.

SUMMARY: The U.S. Department of Energy (''DOE'') proposes to amend the test procedure for automatic commercial ice makers (''ACIMs''; ''ice makers'') to update incorporated references to the latest version of the industry standards; establish relative humidity and water hardness test conditions; provide additional detail regarding certain test conditions, settings, setup requirements, and calculations; include a voluntary measurement of potable water use; clarify certification and reporting requirements; and add enforcement provisions. This notice of proposed rulemaking (''NOPR'') also proposes to provide additional detail to the DOE test procedure to improve the representativeness and repeatability of the current ACIM test procedure. DOE is seeking comment from interested parties on the proposal.

DATES: DOE will accept comments, data, and information regarding this proposal no later than February 22, 2022. See section V, ''Public Participation,'' for details. DOE will hold a webinar on Monday, January 24, 2022, from 1:00 p.m. to 4:00 p.m. See section V, ''Public Participation,'' for webinar registration information, participant instructions, and information about the capabilities available to webinar participants. If no participants register for the webinar, it will be cancelled.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov.* Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE–2017–BT–TP–0006, by any of the following methods:

(1) *Federal eRulemaking Portal: www.regulations.gov.* Follow the instructions for submitting comments.

(2) *Email: ACIM2017TP0006@ee.DOE.gov.* Include the docket number EERE–2017–BT–TP–0006 in the subject line of the message.

No telefacsimilies (faxes) will be accepted. For detailed instructions on submitting comments and additional information on the rulemaking process, see section V of this document.

Although DOE has routinely accepted public comment submissions through a variety of mechanisms, including postal mail and hand delivery/courier, the Department has found it necessary to make temporary modifications to the comment submission process in light of the ongoing corona virus 2019 (''COVID–19'') pandemic. DOE is currently suspending receipt of public comments via postal mail and hand delivery/courier. If a commenter finds that this change poses an undue hardship, please contact Appliance Standards Program staff at (202) 586–1445 to discuss the need for alternative arrangements. Once the Covid–19 pandemic health emergency is resolved, DOE anticipates resuming all of its regular options for public comment submission, including postal mail and hand delivery/courier.

Docket: The docket, which includes **Federal Register** notices, public meeting attendee lists and transcripts (if a public meeting is held), comments, and other supporting documents/materials, is available for review at *www.regulations.gov.* All documents in the docket are listed in the *www.regulations.gov* index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

The docket web page can be found at *www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=53&action=viewlive.* The docket web page contains instructions on how to access all documents, including public comments, in the docket. See section V for information on how to submit comments through *www.regulations.gov.*

FOR FURTHER INFORMATION CONTACT: Dr. Stephanie Johnson, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE–5B, 1000 Independence Avenue SW, Washington, DC 20585–0121. Telephone: (202) 287–1943. Email: *ApplianceStandardsQuestions@ee.doe.gov.*

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For further information on how to submit a comment, review other public comments and the docket, or participate in a public meeting (if one is held), contact the Appliance and Equipment Standards Program staff at (202) 287–1445 or by email: *ApplianceStandardsQuestions@ee.doe.gov.*

SUPPLEMENTARY INFORMATION: DOE proposes to incorporate by reference the following industry standards into 10 CFR part 431:

Air Conditioning, Heating, and Refrigeration Institute (''AHRI'') Standard 810–2016 with Addendum 1, ''Performance Rating of Automatic Commercial Ice-Makers,'' approved January 2018; and

American National Standards Institute (''ANSI'')/American Society of Heating, Refrigerating and Air-Conditioning Engineers (''ASHRAE'') Standard 29–2015, ''Method of Testing Automatic Ice Makers,'' approved April 30, 2015.

Copies of AHRI standards can be obtained from the Air-Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Blvd., Suite 500, Arlington, VA 22201, (703) 524–8800, *ahri@ahrinet.org,* or *http://www.ahrinet.org.*

Copies of ASHRAE standards can be purchased from the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle, NE, Atlanta, GA 30329, (404) 636–8400, *ashrae@ashrae.org,* or *www.ashrae.org.*

For a further discussion of these standards, see section IV.M of this document.

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I. Authority and Background

ACIMs are included in the list of ''covered equipment'' for which DOE is authorized to establish and amend energy conservation standards and test procedures. (42 U.S.C. 6311(1)(F)) DOE's energy conservation standards and test procedures for ACIMs are currently prescribed at 10 CFR 431.136 and 10 CFR 431.134, respectively. The following sections discuss DOE's authority to establish test procedures for ACIMs and relevant background information regarding DOE's consideration of test procedures for this equipment.

A. Authority

The Energy Policy and Conservation Act, as amended (''EPCA''),[1] authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part C[2] of EPCA, added by Public Law 95–619, Title IV, section 441(a), established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve energy efficiency. This equipment includes ACIMs, the subject of this document. (42 U.S.C. 6311(1)(F))

The energy conservation program under EPCA consists essentially of four parts: (1) Testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA include definitions (42 U.S.C. 6311), test procedures (42 U.S.C. 6314), labeling provisions (42 U.S.C. 6315), energy conservation standards (42 U.S.C. 6313), and the authority to require information and reports from manufacturers (42 U.S.C. 6316).

The Federal testing requirements consist of test procedures that manufacturers of covered equipment must use as the basis for: (1) Certifying to DOE that their equipment complies with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6316(a); 42 U.S.C. 6295(s)), and (2) making representations about the efficiency of that equipment (42 U.S.C. 6314(d)). Similarly, DOE uses these test procedures to determine whether the equipment complies with relevant standards promulgated under EPCA. (42 U.S.C. 6316(a); 42 U.S.C. 6295(s))

Federal energy efficiency requirements for covered equipment established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6316(a) and (b); 42 U.S.C. 6297) DOE may, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA. (42 U.S.C. 6316(b)(2)(D))

Under 42 U.S.C. 6314, EPCA sets forth the criteria and procedures DOE must follow when prescribing or amending test procedures for covered equipment. EPCA requires that any test procedures prescribed or amended under this section must be reasonably designed to produce test results which reflect energy efficiency, energy use, or estimated annual operating cost of a given type of covered equipment during a representative average use cycle and requires that test procedures not be unduly burdensome to conduct. (42 U.S.C. 6314(a)(2))

EPCA prescribed the first Federal test procedure for ACIMs, directing that the ACIM test procedure shall be the AHRI Standard 810–2003, ''Performance Rating of Automatic Commercial Ice-Makers'' (''AHRI Standard 810–2003''). (42 U.S.C. 6314(a)(7)(A)) EPCA requires if AHRI Standard 810–2003 is amended, that DOE must amend the Federal test procedures as necessary to be consistent with the amended AHRI standard, unless DOE determines, by rule, published in the **Federal Register** and supported by clear and convincing evidence, that to do so would not meet the requirements for test procedures to be representative of actual energy efficiency and to not be unduly burdensome to conduct. (42 U.S.C. 6314(a)(7)(B)(i))

EPCA also requires that at least once every 7 years, DOE evaluate test procedures for each type of covered equipment, including ACIMs, to determine whether amended test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating costs during a representative average use cycle. (42 U.S.C. 6314(a)(1))

In addition, if the Secretary determines that a test procedure amendment is warranted, the Secretary must publish proposed test procedures in the **Federal Register** and afford interested persons an opportunity (of not less than 45 days' duration) to present oral and written data, views, and arguments on the proposed test procedures. (42 U.S.C. 6314(b)) If DOE determines that test procedure revisions are not appropriate, DOE must publish its determination not to amend the test procedures. DOE is publishing this NOPR in satisfaction of the 7-year review requirement specified in EPCA. (42 U.S.C. 6314(a)(1)(A)(ii))

B. Background

DOE's existing test procedures for ACIMs appear at Title 10 of the Code of Federal Regulations (''CFR'') part 431, section 134.

In a January 11, 2012 test procedure final rule (''January 2012 final rule''), DOE satisfied its statutory obligation under 42 U.S.C. 6314(a)(7)(B) to amend the ACIM test procedure by incorporating by reference the following: AHRI Standard 810–2007 with Addendum 1 ''2007 Standard for Performance Rating of Automatic Commercial Ice Makers'' (''AHRI Standard 810–2007'') and ANSI/ASHRAE Standard 29–2009 ''Method of Testing Automatic Ice Makers,'' (including Errata Sheets issued April 8, 2010 and April 21, 2010), approved January 28, 2009 (''ASHRAE Standard 29–2009''). 77 FR 1591. Consistent with the updated AHRI Standard 810–2007, the amended DOE test procedure provides for the testing of equipment with capacities from 50 to 4,000 lb/24 h. The updated DOE test procedure also (1) provides test methods for continuous type ice makers and batch type ice makers that produce ice types other than cubes, (2) standardizes the measurement of energy and water use for continuous type ice makers with respect to ice hardness, (3) clarifies the test method and reporting requirements

[1] All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Public Law 116–260 (Dec. 27, 2020).

[2] For editorial reasons, upon codification in the U.S. Code, Part C was redesignated Part A–1.

for remote condensing ice makers designed for connection to remote compressor racks, and (4) discontinues the use of an energy use rate calculation and instead references the calculation of energy use per 100 pounds of ice as specified in ASHRAE Standard 29–2009. *Id.* The amended test procedure was required to be used for representations of energy use beginning on January 7, 2013. *Id.*

On March 19, 2019, DOE published a Request for Information (''RFI'') to solicit comment and information to inform DOE's determination of whether to propose amendments to the current ACIM test procedure. 84 FR 9979 (''March 2019 RFI''). DOE requested comment regarding new versions of the industry standards that the current DOE test procedure incorporates by reference; consideration of additional specifications and amendments that may improve the accuracy of the test procedure or reduce the testing burden on manufacturers; and any additional topics that may inform DOE's decisions in a test procedure rulemaking, including methods to reduce regulatory burden while ensuring the procedure's accuracy. *Id.*

DOE received comments in response to the March 2019 RFI from the interested parties listed in Table I.1.

TABLE I.1—MARCH 2019 RFI WRITTEN COMMENTS

Organization(s)	Reference in this NOPR	Organization type
Howe Corporation	Howe	Manufacturer.
Air-Conditioning, Heating, & Refrigeration Institute	AHRI	Trade Association.
Appliance Standards Awareness Project (''ASAP''), Natural Resources Defense Council (''NRDC''), Northwest Energy Efficiency Alliance (''NEEA'').	Joint Commenters	Energy Efficiency Organizations.
Brema Group S.p.A	Brema	Manufacturer.
Hoshizaki America, Inc	Hoshizaki	Manufacturer.

A parenthetical reference at the end of a quoted or paraphrased comment provides the location of the item in the public record.[3]

II. Synopsis of the Notice of Proposed Rulemaking

In this NOPR, DOE proposes to update 10 CFR 429.45, ''Automatic commercial ice makers;'' 10 CFR 429.134, ''Product-specific enforcement provisions,'' 10 CFR 431.132, ''Definitions concerning automatic commercial ice makers;'' 10 CFR 431.133, ''Materials incorporated by reference;'' and 10 CFR 431.134, ''Uniform test methods for the measurement of energy and water consumption of automatic commercial ice makers'' as follows:

(1) Updating the referenced methods of test to AHRI Standard 810–2016 and ASHRAE Standard 29–2015, except for the provisions as discussed;

(2) Including definitions and test requirements for low-capacity ACIMs;

(3) Incorporating changes to improve test procedure representativeness, accuracy, and precision, which include: Clarifying calorimeter constant test instructions; specifying ambient temperature measurement requirements; establishing a relative humidity test condition; establishing an allowable range of water hardness; clarifying the stability requirements that were updated in ASHRAE Standard 29–2015; clarifying water pressure requirements; and increasing the tolerance on capacity collection time;

(4) Specifying certain test settings, conditions, and installations, including: Clarifying ice hardness test conditions; clarifying baffle use for testing; amending clearance requirements; clarifying automatic purge control settings; and providing instructions for testing ACIMs with automatic dispensers;

(5) Including voluntary provisions for measuring potable water use;

(6) Including clarifying language for calculations, rounding requirements, sampling plan calculations, and certification instructions; and

(7) Adding language to the equipment-specific enforcement provisions.

DOE's proposed actions are summarized in Table II.1 compared to the current test procedure as well as the reason for the proposed change.

TABLE II.1—SUMMARY OF CHANGES IN PROPOSED TEST PROCEDURE RELATIVE TO CURRENT TEST PROCEDURE

Current DOE test procedure	Proposed test procedure	Attribution
References industry standard AHRI Standard 810–2007, which refers to ASHRAE Standard 29–2009.	Updates reference to industry standard AHRI Standard 810–2016, which refers to ASHRAE Standard 29–2015.	Adopt latest industry standards.
Scope includes ACIMs with capacities between 50 and 4,000 lb/24 h.	Includes definitions for low-capacity ACIMs and expands test procedure scope to cover all ACIMs with capacities up to 4,000 lb/24 h; includes additional instructions to allow for testing low-capacity ACIMs.	Ensures representative, repeatable, and reproducible measures of performance for ACIMs currently not in scope.
Does not specify the ambient & water temperature and water pressure when harvesting ice to be used in determining the ice hardness factor.	Specifies that the harvested ice used to determine the ice hardness factor must be produced at the Standard Rating Conditions presented in section 5.1.2 of AHRI Standard 810–2016.	Harmonize with industry standard; improves representativeness, repeatability, and reproducibility.

[3] The parenthetical reference provides a reference for information located in the docket of DOE's rulemaking to consider amended test procedures for ACIMs (EERE–2017–BT–TP–0006, which is maintained at *www.regulations.gov/#!docketDetail;D=EERE-2017-BT-TP-0006*). The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

TABLE II.1—SUMMARY OF CHANGES IN PROPOSED TEST PROCEDURE RELATIVE TO CURRENT TEST PROCEDURE—Continued

Current DOE test procedure	Proposed test procedure	Attribution
Does not specify where to measure the temperature of the ice block used to determine the calorimeter constant.	Specifies that the temperature measurement location must be at approximately the geometric center of the block of ice and that any water on the block of ice must be wiped off the surface prior to placement in the calorimeter.	Improves representativeness, repeatability, and reproducibility.
Capacity measurements begin after the unit has been stabilized.	All cycles or samples used for the capacity test meet the stability criteria.	Clarify industry TP to reduce test burden while maintaining representative results; harmonize with industry standard.
Continuous ACIMs shall be considered stabilized when the weights of three consecutive 14.4-minute samples taken within a 1.5-hour period do not vary by more than ±2 percent.	Continuous ACIMs shall be considered stabilized when the weights of two consecutive 15.0 min ±9.0 s samples having no more than 5 minutes between the end of a sample and the start of the next sample do not vary more than ±2 percent or 0.055 pounds, whichever is greater.	Harmonizes with industry TP update, but timing tolerance increased by DOE to reduce test burden while maintaining representative results.
Does not specify relative humidity test condition	Adds relative humidity test condition of 35 ±5.0 percent.	Improves representativeness, repeatability, and reproducibility.
Does not specify water hardness test condition	Specifies that water for testing must have a maximum water hardness of 180 mg of calcium carbonate per liter of water (180 mg/L).	Improves representativeness, repeatability, and reproducibility.
Use of baffles and purge setting addressed in guidance.	Incorporates existing guidance into the test procedure; allow for an alternate ambient measurement location instead of shielding the thermocouple and for rear clearances which are less than the required inlet measurement distance.	Improves representativeness, repeatability, and reproducibility.
ACIMs shall be tested with a clearance of 18 inches on all four sides.	ACIMs shall be tested according to the manufacturer's specified minimum rear clearances requirements, or 3 feet from the rear of the ACIMs, whichever is less; all other sides of the ACIMs and all sides of the remote condensers, if applicable, shall be tested with a minimum clearance of 3 feet or the minimum clearance specified by the manufacturer, whichever is greater.	Improves representativeness, repeatability, and reproducibility and updates certain requirements to harmonize with industry standard.
Does not specify use of weighted/unweighted sensors to measure ambient temperature.	Specifies that unweighted sensors shall be used for all ambient temperature measurements.	Improves representativeness, repeatability, and reproducibility.
Does not specify how to measure water inlet pressure requirements.	Specifies that the water pressure shall be measured within 8 inches of the ACIM and be within the allowable range within 5 seconds of water flowing into the ACIM.	Improves representativeness, repeatability, and reproducibility.
Does not specify how to collect capacity samples for ACIMs with dispensers.	Provides instruction to test certain ACIMs with an automatic dispenser with an empty internal bin at the start of the test and to allow for the continuous production and dispensing of ice, with samples collected from the dispenser through a conduit connected to an external bin one-half full of ice.	In response to waiver.
Does not specifically reference potable water usage.	Includes voluntary reference to potable water use in 10 CFR 431.134 based on AHRI 810–2016.	Harmonize with industry standard; improves representativeness, repeatability, and reproducibility.
Rounds energy use in multiples of 0.1 kWh/100 lb and harvest rate to the nearest 1 lb/24 h.	Rounds energy use in multiples of 0.01 kWh/100 lb; rounds harvest rate to the nearest 0.1 lb/24 h for ACIMs with harvest rates of 50 lb/24 h or less.	Harmonize with latest industry standard; improves representativeness, repeatability, and reproducibility.
Does not specify if intermediate values used in calculations should be rounded.	Clarifies that the calculations of intermediate values be performed with raw measured data and only the final results be rounded; clarifies that the energy use, condenser water use, and potable water use (if voluntarily measured) be calculated by averaging the calculated values for the three measured samples for each respective metric.	Improves representativeness, repeatability, and reproducibility.
Does not specify how to calculate the percent difference between two measurements.	Specifies that the percent difference between two measurements be calculated by taking the absolute difference between two measurements and divide by the average of the two measurements.	Improves representativeness, repeatability, and reproducibility.

TABLE II.1—SUMMARY OF CHANGES IN PROPOSED TEST PROCEDURE RELATIVE TO CURRENT TEST PROCEDURE—Continued

Current DOE test procedure	Proposed test procedure	Attribution
References ''maximum energy use'' and ''maximum condenser water use'' at 10 CFR 429.45, no reference to water use in sampling plan.	Removes ''maximum'' from the referenced terms; adds reference to condenser water use in sampling plan.	Improves clarity.
Defines ''cube type ice'' at 10 CFR 431.132	Removes ''cube type ice'' from 10 CFR 431.132; removes reference to cube type ice in the definition of ''batch type ice maker''.	Improves clarity.
Does not specify how the represented value of harvest rate for each basic model should be determined based on the test sample.	The represented value of harvest rate for the basic model is determined as the mean of the harvest rate for each tested unit.	Improves representativeness, repeatability, and reproducibility.
Does not specify rounding requirements for represented values in 10 CFR 429.45.	Specifies that represented values determined in 10 CFR 429.45 must be rounded consistent with the test procedure rounding instructions, upon the compliance date of any amended standards.	Improves representativeness, repeatability, and reproducibility.
No equipment-specific enforcement provisions	The certified harvest rate will be considered for determination of the maximum energy consumption and maximum condenser water use levels only if the average measured harvest rate is within five percent of the certified harvest rate, otherwise the measured harvest rate will be used to determine the applicable standards.	Improves clarity.

DOE has tentatively determined that while the proposed amendments would introduce additional test requirements compared to the current approach, the impact to the measured efficiency of certified ACIMs is expected to be de minimis. Accordingly, DOE does not expect that manufacturers would be required to re-test or re-certify existing ACIM models as a result of the proposals in this NOPR. Additionally, for low-capacity ACIMs, testing according to the proposed test procedure would not be required until the compliance date of any energy conservation standards for that equipment. DOE expects that any low-capacity ACIM manufacturers currently making representations of energy consumption are already doing so according to the existing DOE test procedure, and similarly would not be required to re-test their equipment according to the proposed test procedure. While DOE does not expect that manufacturers would incur additional cost as a result of the proposed test procedure, DOE provides a discussion of testing costs in section III.F.1 of this NOPR. DOE has also tentatively determined that the proposed test procedure would not be unduly burdensome to conduct. Discussion of DOE's proposed actions are addressed in detail in section III of this NOPR.

III. Discussion

In the following sections, DOE describes the proposed amendments to the test procedures for ACIMs. This proposal reflects DOE's review of the updates to the referenced industry test procedures and the comments received in response to the March 2019 RFI and other relevant information. DOE seeks input from the public to assist with its evaluation of proposed amendments to the test procedures for ACIMs. In addition, DOE welcomes comments on other relevant issues that may not specifically be identified in this document.

A. Scope

DOE defines automatic commercial ice maker as ''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.'' 10 CFR 431.132 (see also, 42 U.S.C. 6311(19)). The existing DOE test procedure for ACIMs applies to both batch-type and continuous-type ice makers[4] with harvest rates between 50 and 4,000 lb/24 h. DOE further subdivides the batch-type and continuous-type equipment ACIM categories into several distinct equipment classes based on the equipment configuration, condenser cooling method, and harvest rate in pounds per 24 hours (lb/24 h), as shown in Table III.1. See also, 10 CFR 431.136(c) and (d). ACIM configurations include individual ice-making heads, remote condensing equipment (both with and without a remote compressor), and self-contained equipment. Ice-making heads and self-contained equipment can be air- or water-cooled; however, DOE prescribes standards only for remote condensing equipment that are air-cooled. Self-contained ACIMs include a means for storing ice, while ice-making heads and remote condensing equipment are typically paired with separate ice storage bins. At 10 CFR 431.132, DOE defines these related components, as well as several metrics related to ACIMs.

[4] A batch type ice maker is defined as an ice maker that has alternate freezing and harvesting periods, including ACIMs that produce cube type ice and other batch technologies. 10 CFR 431.132. Batch type ice makers also produce tube type ice and fragmented ice. A continuous-type ice maker is defined as an ice maker that continually freezes and harvests ice at the same time. *Id.* Continuous type ice makers primarily produce flake and nugget ice.

TABLE III.1—SUMMARY OF ACIM EQUIPMENT CLASSES

Equipment configuration	Condenser cooling	Ice-making mechanism	Harvest rate (lb/24 h)
Ice-Making Head	Water	Batch	<300 ≥300 and >850 ≥850 and <1,500 ≥1,500 and <2,500 ≥2,500 and <4,000
		Continuous	<801 ≥801 and >2,500 ≥2,500 and >4,000
	Air	Batch	<300 ≥300 and >800 ≥800 and <1,500 ≥1,500 and <4,000
		Continuous	<310 ≥310 and >820 ≥820 and <4,000
Remote-Condensing (but not remote compressor).	Air	Batch	<988 ≥988 and <4,000
		Continuous	<800 ≥800 and <4,000
Remote-Condensing and Remote Compressor.	Air	Batch	<930 ≥930 and <4,000
		Continuous	<800 ≥800 and <4,000
Self-Contained	Water	Batch	<200 ≥200 and <2,500 ≥2,500 and <4,000
		Continuous	<900 ≥900 and <2,500 ≥2,500 and <4,000
	Air	Batch	<110 ≥110 and <200 ≥200 and <4,000
		Continuous	<200 ≥200 and <700 ≥700 and <4,000

The regulatory and statutory definitions of ACIM are not limited by harvest rate (*i.e.,* capacity). (*See* 10 CFR 431.132 and 42 U.S.C. 6311(19), respectively.) However, the scope of DOE's test procedure is limited explicitly to ACIMs with capacities between 50 and 4,000 lb/24 h. 10 CFR 431.134(a). DOE is aware of ACIMs available in the market with harvest rates less than or equal to 50 lb/24 h (hereafter referred to as ''low-capacity ACIMs'').

DOE had previously considered test procedures for low-capacity ACIMs in a December 16, 2014 NOPR for test procedures for miscellaneous refrigeration products. 79 FR 74894 (''December 2014 MREF Test Procedure NOPR'').[5] In a supplemental notice of proposed determination regarding miscellaneous refrigeration products coverage, DOE noted that a working group established to consider test procedures and standards for miscellaneous refrigeration products made two observations: (1) Ice makers are fundamentally different from the other product categories considered as miscellaneous refrigeration products; and (2) ice makers are covered as commercial equipment and there is no clear differentiation between consumer and commercial ice makers. 81 FR 11454, 11456 (Mar. 4, 2016). In a 2016 final rule, DOE determined that low-capacity ACIMs were significantly different from the other product categories considered, and low-capacity ACIMs were not included in the scope of coverage or test procedure for miscellaneous refrigeration products. 81 FR 46773 (July 18, 2016).

In response to the March 2019 RFI, the Joint Commenters supported the establishment of a test procedure for low-capacity ACIMs, stating that such a test procedure would ensure that information provided to consumers about harvest rates and/or efficiency is based on a standardized test method. They asserted that these smaller units could likely be tested with a test procedure similar to the existing test procedure for larger-capacity units. (Joint Commenters, No. 2 at p. 1)

[5] Available at *www.regulations.gov/document?D=EERE-2013-BT-TP-0029-0011.*

On December 8, 2020, DOE published an early assessment review for amended energy conservation standards for miscellaneous refrigeration products (''December 2020 MREF Standards RFI''). In response to the December 2020 MREF Standards RFI, ASAP and NEEA supported establishing standards for low-capacity ACIMs through the ACIM rulemaking.[6]

In the December 2014 MREF Test Procedure NOPR, DOE stated that it is aware that manufacturers are using the DOE ACIM test procedure to represent the energy use of consumer ice makers (*i.e.,* low-capacity ACIMs). 79 FR 74894, 74916. DOE also stated that it is unaware of any test procedure that has been specifically developed for consumer ice makers (*i.e.,* low-capacity ACIMs). *Id.* DOE is still unaware of an industry test procedure for testing and rating low-capacity ACIMs.

As stated previously, DOE is aware of low-capacity ACIM models available on the market. The energy performance of these models is typically either not specified or is based on the existing industry test procedures. However, the lack of a DOE test procedure could allow for manufacturers to make performance claims using other unknown test procedures, which could result in inconsistent ratings from model to model. Establishing a test procedure for low-capacity ACIMs would allow purchasers to make more informed decisions regarding the performance of low-capacity ACIMs as compared to the currently covered ACIM equipment, if a low-capacity ACIM manufacturer chooses to make a representation of energy efficiency or energy use. Low-capacity ACIMs are not currently subject to DOE testing or energy conservation standards. As such, manufacturers would not be required to test low-capacity ACIMs until such time as DOE establishes energy conservation standards for such equipment. Under the proposed test procedure, were a manufacturer to choose to make representations of the energy efficiency or energy use of a low-capacity ACIM energy, beginning 360 days after a final rule, were DOE to finalize the proposal, manufacturers would be required to base such representations on the DOE test procedure. (42 U.S.C. 6314(d)) DOE is proposing test procedures for low-capacity ACIMs in this NOPR.

Issue 1: DOE requests comment on the proposal to include test procedure provisions for low-capacity ACIMs within the scope of the ACIM test procedure.

Issue 2: DOE seeks information on whether there is an industry test procedure for testing and rating low-capacity ACIMs. If so, DOE requests information on how such a test procedure addresses (or could address) the specific features of low-capacity ACIMs that are not present in higher-capacity ACIMs, such that the test procedure produces results that are representative of an average use cycle.

B. Definitions

As noted, 10 CFR 431.132 provides definitions concerning ACIMs. DOE proposes new definitions to support test procedure amendments proposed elsewhere in this document, as discussed in the following paragraphs.

1. Refrigerated Storage ACIM

Typical self-contained ACIMs have an ice storage bin that is insulated but provides no active refrigeration. As a result, the ice melts at a certain rate and the ice maker must periodically replenish the melted ice. Conversely, some self-contained low-capacity ACIMs feature a refrigerated storage bin that prevents melting of the stored ice. Because of the additional refrigeration system components, ACIMs with a refrigerated storage bin (*i.e.,* refrigerated storage ACIMs) have different energy use characteristics than ACIMs without refrigerated storage. DOE is proposing amendments specific to refrigerated storage ACIMs, as explained in Section III.D.1.b of this NOPR.

To effectively differentiate refrigerated storage ACIMs from ACIMs with unrefrigerated storage bins, and to support the proposed test provisions for refrigerated storage ACIMs, DOE proposes to add the following definition to 10 CFR 431.132 for refrigerated storage ACIMs:

A ''refrigerated storage automatic commercial ice maker'' is an automatic commercial ice maker that has a refrigeration system that actively refrigerates the self-contained storage bin.

Issue 3: DOE requests comment on the proposed definition for refrigerated storage automatic commercial ice maker.

2. Portable ACIM

Some low-capacity ACIMs are ''portable'' and do not require connection to water supply plumbing to operate. Instead, these units contain a reservoir that the user manually fills with water prior to operation and must refill when it becomes empty. In the December 2014 MREF Test Procedure NOPR, DOE proposed to define ''portable ice maker'' as an ice maker that does not require connection to a water supply and instead has one or more reservoirs that would be manually supplied with water. 79 FR 74894, 74916. DOE noted that the lack of a fixed water connection and the small size of these units contribute to their portability. *Id.* DOE did not receive comments on the proposed definition for portable ice makers in response to the December 2014 MREF Test Procedure NOPR.

In this NOPR, DOE proposes a definition for portable ice maker as proposed in the December 2014 MREF Test Procedure NOPR, but with additional specification that ACIMs with an optional connection to a water supply line would not be considered portable ACIMs (*i.e.,* a unit would be considered portable if the water supplied to the unit is only via one or more reservoirs). DOE proposes to add the following definition to 10 CFR 431.132 for portable ACIMs:

''Portable automatic commercial ice maker'' means an automatic commercial ice maker that does not have a means to connect to a water supply line and has one or more reservoirs that are manually supplied with water.

Issue 4: DOE requests comment on the proposed definition for portable automatic commercial ice maker.

3. Industry Standard Definitions

In addition to the definitions specified at 10 CFR 431.132, the current DOE test procedure at 10 CFR 431.134 references section 3, ''Definitions'' of AHRI Standard 810–2007, which includes many of the same terms DOE defines at 10 CFR 431.132 and 10 CFR 431.134. To avoid potential confusion regarding multiple definitions of similar terms, DOE is proposing to clarify in 10 CFR 431.134 that where definitions in AHRI Standard 810 conflict with those in DOE's regulations, the DOE definitions take precedence.

AHRI Standard 810–2016 updated its definition of ''Energy Consumption Rate'' to require expressing the rate in multiples of 0.01 kWh/100 lb of ice. To maintain consistency with the industry standard, DOE is proposing to incorporate this same rounding requirement in its definition of ''Energy use'' at 10 CFR 431.132 instead of the current requirement of multiples of 0.1 kWh/100 lb of ice.

AHRI Standard 810–2016 also deleted its definition of ''Cubes Type Ice Maker'' and replaced it with a definition of ''Batch Type Ice-Maker.'' To be consistent with this industry update, DOE is proposing to remove the

[6] See documents number 4 and 7 available at *www.regulations.gov/document/EERE-2020-BT-STD-0039-0001/comment.*

reference to cubes type ice maker in the definition of ''Batch type ice maker'' in 10 CFR 431.132. DOE is also proposing to remove ''Cube type ice'' from the list of DOE definitions at 10 CFR 431.132, consistent with the industry standard update.

Issue 5: DOE requests comment on its proposal to amend 10 CFR 431.132 to revise the definitions of ''Batch type ice maker'' and ''Energy Use'' and delete the definition of ''Cube type ice,'' consistent with updates to AHRI Standard 810–2016. DOE also requests feedback on the proposed clarification that the DOE definitions take precedence over any conflicting industry standard definitions.

The following section discusses additional updates included in the latest versions of the industry standards.

C. Industry Test Standards Incorporated by Reference

The existing DOE ACIM test procedure incorporates by reference AHRI Standard 810–2007 and ASHRAE Standard 29–2009. 10 CFR 431.134(b). Since publication of the January 2012 final rule, both AHRI and ASHRAE have published new versions of the referenced standards. The most recent versions are AHRI Standard 810–2016 and ASHRAE Standard 29–2015 (reaffirmed in 2018). The 2018 reaffirmed version of ASHRAE Standard 29–2015 has no changes compared to the 2015 version of the standard. DOE has reviewed the most recent versions of both AHRI Standard 810 and ASHRAE Standard 29 and has compared the updated versions of these industry standards to those currently incorporated by reference in the ACIM test procedure.

The updates in ASHRAE Standard 29–2015 provide additional specificity to several aspects of the test method. In general, these updates increase the precision and improve the repeatability of the test method, but do not fundamentally change the testing process, conditions, or results. In addition, ASHRAE made several grammatical, editorial, and formatting changes to improve the clarity of the test method. DOE summarizes these changes in Table III.2.

TABLE III.2—SUMMARY OF CHANGES BETWEEN ASHRAE STANDARD 29–2009 AND ASHRAE STANDARD 29–2015

Requirement	ASHRAE standard 29–2009	ASHRAE standard 29–2015
Test Room Operations	None	No changes to the test room shall be made during operation of the ice maker under test that would impact the vertical ambient temperature gradient or the ambient air movement.
Temperature Measuring Instruments.	Accuracy of ±1.0 °F and resolution of ≤2.0 °F	Accuracy and resolution of ±1.0 °F; where accuracy greater than ±1.0 °F, the resolution shall be at least equal to the accuracy requirement.
Harvest Water Collection	None	Harvest water shall be captured by a non-perforated pan located below the perforated pan.
Ice Collection Container Specification.	''Perforated pan, bucket, or wire basket'' and ''non-perforated pan or bucket''.	Requirements regarding water retention weight and perforation size for perforated pans and ''solid surface'' for non-perforated pan.
Pressure Measuring Instruments.	None	Accuracy of and resolution of ±2.0 percent of the quantity measured.
Sampling Rate	None	Maximum interval between data samples of 5 sec.
Supply Water Temperature and Pressure.	±1 °F (water supply temperature)	±1 °F (water supply temperature) and ''within 8 in. of the ice maker . . . within the specified range'' (water pressure) during water fill interval.
Inlet Air Temperature Measurement.	Measure a minimum of 2 places, centered 1 ft from the air inlet(s).	Measure at a location geometrically center to the inlet area at a distance 1 ft from each inlet.
Clearances	18 inches on all sides	3 ft or the minimum clearance allowed by the manufacturer, whichever is greater.
Stabilization Criteria	Three consecutive 14.4 min samples (continuous) taken within a 1.5 hr period or two consecutive batches (batch) do not vary by more than ±2 percent.	Two consecutive 15.0 min ±2.5 sec samples taken within 5 mins of each other within 2 percent or 0.055 lbs (continuous) or calculated 24-hour ice production rate from two consecutive batches within ±2 percent or 2.2 lb (batch).
Capacity Test Ice Collection	Three consecutive 14.4 min samples (continuous) or batches (batch).	Specifies that batch ice must be weighed 30 ±2.5 s after collection and continuous ice samples must be within 5 mins of each other.
Calorimetry Testing	(1) Room temperature is not specified	(1) Room temperature shall be within 65–75 °F during the entire procedure.
	(2) To determine the calorimeter constant, 30 lbs of water must be added.	(2) To determine the calorimeter constant, add a quantity of water 5 times the mass of ice (see #4 below).
	(3) Rate of stirring is described as ''vigorously''	(3) Rate of stirring is to be 1 ±0.5 revolutions/second.
	(4) To determine the calorimeter constant, 6 lbs of ice must be added.	(4) To determine the calorimeter constant, add a mass of ice between 50–200% of the rated ice production for a period of 15 minutes of the ice maker to be tested, or 6 lbs, whichever is less.
	(5) The block of ice is seasoned at room temperature. A temperature measurement location is not specified for the block of ice.	(5) The block of pure ice must reach an equilibrium temperature measured by a thermocouple embedded in the interior of the block and is free of trapped water.
	(6) To determine the calorimeter constant, it is not explicitly stated to continue stirring for 15 minutes after the ice has melted.	(6) To determine the calorimeter constant, continue stirring after ice has disappeared for 15 minutes.

TABLE III.2—SUMMARY OF CHANGES BETWEEN ASHRAE STANDARD 29–2009 AND ASHRAE STANDARD 29–2015—Continued

Requirement	ASHRAE standard 29–2009	ASHRAE standard 29–2015
	(7) The calorimeter constant shall be determined twice, at the beginning and at the end of the daily tests.	(7) The calorimeter constant shall be determined, at a minimum, each time the temperature measuring and weighting instruments are calibrated or if there is a change to the container or stirring apparatus.
	(8) The calorimeter constant shall be no greater than 1.02.	(8) The calorimeter constant must be within 1.0–1.02.
	(9) To determine the net cooling effect, the water must stand in the calorimeter for 1 min before adding harvested ice.	(9) To determine the net cooling effect, stir the water for 15 minutes prior to the addition of the harvested ice.
	(10) Section 7.2.3 specifies that the ice sample used for calorimetry testing shall be intercepted in a manner similar to that prescribed in Section 7.2.2 (7.2.2 reads: Record the required data (see Section 8).), except that the sample size shall be suitable for the test.	(10) Section 7.2.4 specifies that the ice sample used for calorimetry testing shall be intercepted using a non-perforated container, precooled to ice temperature, and collected from a stabilized ice maker over a time period of 15 min or until 6 lbs has been captured.
Recorded Data	Specifies 7 discrete elements be recorded	Specifies that ambient temperature gradient (at rest), maximum air-circulation velocity (at rest), and water pressure must also be recorded.

* AHRI Standard 810–2007 specifies the inlet water pressure of 30.0 ±3.0 psig.

DOE also reviewed the updates to AHRI Standard 810–2016 and identified the following revisions: New definitions for, among others, ice hardness factor and potable water use rate; and an updated rounding requirement for energy consumption rate (from 0.1 kilowatt hours per 100 pounds (''kWh/100 lb'') to 0.01 kWh/100 lb). The changes to AHRI Standard 810–2016 are primarily clerical in nature and provide greater consistency in the use of terms and specific definitions for those terms.

In the March 2019 RFI, DOE requested comment on updating the DOE test procedure to incorporate by reference the latest industry standards—AHRI Standard 810–2016 and ASHRAE Standard 29–2015. Additionally, DOE requested comment on the benefits and burdens of adopting any industry/voluntary consensus-based or other appropriate test procedure.

Generally, commenters supported incorporating by reference the latest industry standards. AHRI commented that incorporating the current editions of ASHRAE 29 and AHRI 810 would capture the most accurate and repeatable energy usage of ACIM in the marketplace today and that the updates to the consensus standards produce accurate results without unduly burdensome testing requirements for laboratories or manufacturers. (AHRI, No. 5 at p. 2) AHRI stated that testing burden is most manageable when industry standards are implemented with effective dates that allow manufacturers and testing facilities to adjust and upgrade accordingly. (AHRI, No. 5 at p. 9) AHRI also stated that the industry committee weighs the potential improvement in testing accuracy associated with tightening the tolerances and increasing the instrumentation accuracies with the increase in testing burden and costs. AHRI commented that the current process identified all of these factors when considering each individual change to the standard. (AHRI, No. 5 at p. 8)

Hoshizaki commented in support of updating the test procedure to the most recent versions of AHRI 810 and ASHRAE 29 and does not support incorporating any additional requirements. (Hoshizaki, No. 4 at p. 1)

Howe also commented in support of moving forward with the updates to both AHRI 810–2016 and ASHRAE Standard 29–2015 to their current released versions with changes as outlined in the March 2019 RFI, stating that the updates to the standard will improve the accuracy of the energy testing and will not increase testing burden. Howe also warned that compulsory adoptions of revisions to AHRI and ASHRAE standards could potentially favor the interests of the corporations involved in the industry revisions process. Howe stated that confirming any test procedure changes in DOE's rulemaking would ensure that all ACIM manufacturers have an opportunity to participate in the adoption of those changes. (Howe, No. 6 at p. 3)

DOE also compared the latest version of ASHRAE Standard 29–2015 to the requirements in the current DOE test procedure in 10 CFR 431.134. These test methods specify different conditions for calorimetry testing of continuous ice makers. Specifically, the current DOE test procedure requires an ambient air temperature of 70 ±1 °F, with an initial water temperature of 90 ±1 °F. 10 CFR 431.134(b)(2)(ii). ASHRAE Standard 29–2015 states in Appendix A3 that room temperature shall be kept between 65 °F and 75 °F, and that the water temperature is 20 °F ±1 °F above room temperature.

In the March 2019 RFI, DOE also noted that third-party test laboratories have had difficulty achieving the calorimeter constant value as specified in ASHRAE Standard 29–2009 (*i.e.,* no greater than 1.02, and therefore also the requirements in ASHRAE Standard 29–2015, in the range of 1.00 to 1.02), and that amended instructions regarding the calorimeter constant may reduce testing burden while maintaining the accuracy of the test procedure. 84 FR 9979, 9982.

In response to the March 2019 RFI, Hoshizaki commented that the method used in ASHRAE Standard 29–2015 to determine the calorimeter constant is labor intensive but repeatable. (Hoshizaki, No. 4 at p. 1) AHRI and Howe commented that manufacturers and third-party laboratories that are currently testing in accordance with the updated industry standard have been able to achieve repeatable results and have not seen variance outside of the allowable range when using the updated industry testing methods. (AHRI, No. 5 at p. 3; Howe, No. 6 at p. 3) Howe also opposed increasing the range of acceptable values for the calorimeter constant for ASHRAE Standard 29–2015, stating that the calorimeter constant has a direct relationship with the calculation of the ice hardness from the net cooling effect test, and increasing the range of acceptable values can result in inaccurate ice hardness adjustment factors that will be applied to energy and condenser water use, which would add significant uncertainty that should be avoided. (Howe, No. 6 at p. 3)

Brema commented that DOE should define a common tool for calorimetric verification to be performed as a preliminary check, before beginning the energy consumption test. (Brema, No. 3 at p. 2) Howe commented that DOE should discuss requiring a specific container that is verified by third-party laboratories for calorimeter testing to aid in consistency between testing facilities. (Howe, No. 6 at p. 3)

Howe noted that ice hardness values above 100 percent are possible if ice produced by an ice maker is sensibly cooled after the phase change is complete, and that in ASHRAE Standard 29–2015, for example, this would show a ''latent heat'' capacity above 144 Btu/lb because there is not a calculation showing the sensible heat removed to sub-cool the ice below its fusion temperature. (Howe, No. 6 at p. 4)

DOE has tentatively determined that the current ambient and water condition requirements for calorimetry testing in the DOE test procedure are appropriate because they provide more precise and repeatable measurements than the tolerances described in ASHRAE Standard 29–2015. Additionally, manufacturers have been meeting the requirements to maintain 70 °F ±1 °F ambient air temperature and 90 °F ±1 °F initial water temperature for calorimetry testing as part of the current DOE test procedure in 10 CFR 431.134. The current DOE test approach also is consistent with the industry test standard requirements, *i.e.,* a test performed at the DOE required temperature conditions meets the temperature conditions specified in ASHRAE Standard 29–2015. Therefore, DOE is not proposing to amend the 70 °F ±1 °F ambient air temperature and 90 °F ±1 °F initial water temperature requirements for calorimetry testing. DOE is proposing to explicitly provide that the harvested ice used to determine the ice hardness factor be produced at the Standard Rating Conditions specified in Section 5.2.1 of AHRI Standard 810–2016. These conditions are provided in the industry standard, indicating that they are currently used by manufacturers and therefore this clarification would not change how manufacturers test. In response to Howe's comment, this proposed approach accounts for the ice quality and corresponding cooling effect for any ice samples, including those that may be sub-cooled below 32 °F.

Additionally, added specificity may be needed to accurately determine the calorimeter constant. DOE has found that the lack of specificity as to the location of the temperature measurement of the block of pure ice may lead to variation in the resulting calorimeter constant. Therefore, DOE is proposing to specify that the block of pure ice, as specified in Section A2.e of ASHRAE Standard 29–2015, is measured by a thermocouple embedded at approximately the geometric center of the interior of the block. Furthermore, DOE is proposing to specify that any liquid water present on the block of ice must be wiped off the surface of the block before placing the block into the calorimeter.

In response to the March 2019 RFI comments, DOE is not proposing to define specific test equipment for the calorimeter to allow laboratories the flexibility to use available equipment and to avoid the potential lack of availability of specific test equipment.

In this NOPR, DOE is proposing to adopt by reference AHRI Standard 810–2016 and ASHRAE Standard 29–2015 (note that AHRI Standard 810–2016 refers to ASHRAE Standard 29–2015 and not the 2018 re-affirmed version) as the basis for DOE's ACIM test procedure, with additional proposed provisions for calorimetry testing as discussed previously in this section and the additional proposed provisions discussed in the later sections of this NOPR.

As noted earlier in this section, the updates in ASHRAE Standard 29–2015 provide additional specificity to several aspects of the test method. In general, these updates increase the precision and improve the repeatability of the test method, but do not fundamentally change the testing process, conditions, or results. Additionally, the changes to AHRI Standard 810–2016 are primarily clerical in nature and provide greater consistency in the use of terms and specific definitions for those terms. Accordingly, DOE does not expect that the proposed references to the updated industry standards would result in changes to measured performance as compared to the existing test procedure.

Issue 6: DOE requests comment on its proposal to maintain the current specifications of 70 °F ±1 °F ambient air temperature and 90 °F ±1 °F initial water temperature for calorimetry testing. DOE also requests comment on its proposal to clarify that the harvested ice used to determine the ice hardness factor be collected from the ACIM under test at the Standard Rating Conditions specified in Section 5.2.1 of AHRI Standard 810–2016.

Issue 7: DOE requests comment on its proposal to clarify that the temperature of the block of pure ice, as specified in Section A2.e. of ASHRAE Standard 29–2015, is measured by a thermocouple embedded at approximately the geometric center of the interior of the block. DOE also requests comment on its proposal to clarify that any water that remains on the block of ice must be wiped off the surface of the block before placing the ice into the calorimeter.

Issue 8: DOE requests comment on its proposal to adopt by reference AHRI Standard 810–2016 and ASHRAE Standard 29–2015, except for the provisions for calorimetry testing as discussed previously, for all ACIMs.

D. Additional Proposed Amendments

DOE conducted testing to identify whether ASHRAE Standard 29–2015 and AHRI Standard 810–2016 could potentially benefit from additional detail and to investigate topics discussed in the March 2019 RFI. The testing and initial findings are discussed along with any corresponding proposed amendments in the following sections.

1. Low-Capacity ACIMs

DOE examined the comments received in response to the December 2014 MREF TP NOPR to consider what test method would be appropriate for low-capacity ACIMs. During the December 2014 MREF TP NOPR public meeting, True Manufacturing commented that there are very few differences between ice makers with harvest rates less than 50 lb/24 h and those with harvest rates greater than 50 lb/24 h. (Public Meeting Transcript, No. EERE–2013–BT–TP–0029–0014 at p. 31) Hoshizaki commented in response to the December 2014 MREF TP NOPR that the ASHRAE 29 test needs to be evaluated for accuracy for units that make less than 50 lb/24 h, as they are outside the listed scope of the standard. (Hoshizaki, No. EERE–2013–BT–TP–0029–0011 at p. 1)

DOE evaluated the provisions in its existing ACIM test procedure to determine if any modifications are necessary to ensure the proposed test method would provide representative and repeatable measures of performance for low-capacity ACIMs and would not be unduly burdensome to conduct. DOE also evaluated the provisions in AHRI Standard 810–2016 and ASHRAE Standard 29–2015 to determine their applicability to low-capacity ACIMs.

During investigative testing of batch type low-capacity ACIMs, DOE observed that the ice collection container requirements in section 5.5.2(a) of ASHRAE Standard 29–2015 may not be appropriate for this equipment. Section 5.5.2(a) requires that the collection container have a water retention weight that is no more than 1.0 percent of that of the smallest batch of ice for which the container is used. For low-capacity batch type ACIMs, the weight of ice in each batch is significantly lower than for other higher capacity ACIMs. Accordingly, 1.0 percent of an individual batch represents a very small weight for low-capacity ACIMs. For example, one such low-capacity ACIM has a typical batch weight of 0.087 pounds; 1.0 percent of that would be 0.00087 pounds, the equivalent of 0.080 teaspoons of water. The water retention weight of a typical very small collection container is approximately 0.0030 pounds. DOE was not able to identify collection containers that would meet this threshold for the low-capacity ACIMs with the lowest batch weights.

From its test sample, DOE determined that a water retention weight of no more than 4.0 percent would allow for testing low-capacity ACIMs with the lowest batch weights with a typical collection container. Accordingly, DOE is proposing that the water retention requirement in section 5.5.2(a) not apply to batch type low-capacity ACIMs, and instead to require a water retention weight of no more than 4.0 percent of the smallest batch of ice for which the container is used.

a. Portable ACIMs

For portable ACIMs, DOE has initially determined that some provisions for measuring and maintaining inlet water conditions in ASHRAE Standard 29–2015 are not appropriate: *i.e.,* sections 5.4, 5.6, 6.2 and 6.3. These sections include instrument specifications, test conditions, and measurement instructions regarding inlet water flow, pressure, and temperature. These sections are not applicable to portable ACIMs because such equipment do not have a fixed water connection, and therefore the conditions in these sections would not provide representative conditions for portable ACIMs. Portable ACIMs instead require that the fill reservoir be manually filled with a maximum volume of water that is recommended by the manufacturer.

To determine typical operation and the corresponding need for additional test procedure instructions regarding the water supply for portable ACIMs, DOE conducted tests on portable ACIMs according to the requirements of AHRI Standard 810–2016 and ASHRAE Standard 29–2015, except for sections 5.4, 5.6, 6.2, and 6.3 of ASHRAE Standard 29–2015. From this testing, DOE has initially determined that additional instructions are needed regarding supply water characteristics and filling the water reservoirs in portable ACIMs.

Section 5.2.1 of AHRI 810–2016 specifies an inlet water temperature of 70.0 °F for ACIM testing. Because portable ACIMs do not have a continuous water supply, the water filled in the water reservoir is not maintained at a constant temperature; the temperature may change after the initial fill based on heat transfer with the ambient air and the other components of the ACIM. Accordingly, DOE has initially determined that specifying only the initial fill temperature of the water supplied to the reservoir is most representative of typical use. DOE proposes to establish the initial water temperature in a separate external container before transferring the water to the water reservoir. In DOE's experience, using an external container to establish and verify the initial water temperature is significantly less burdensome than measuring and adjusting the water temperature within the water reservoir itself. Therefore, DOE proposes that the initial water temperature condition be established in an external container and verified by inserting a temperature sensor into approximately the geometric center of the water in the external container. The initial water temperature would be defined as 70 °F ±1.0 °F, consistent with the condition as specified in section 5.2.1 of AHRI Standard 810–2016 and the tolerance as specified in section 6.2 of ASHRAE Standard 29–2015.

Portable ACIM users may have an option of filling the reservoirs to varying levels. To determine the appropriate fill level for testing, DOE reviewed operating instructions for portable ACIMs available from a range of manufacturers. DOE observed that the operating instructions typically instruct the user to fill to the maximum specified level, or to any level up to the maximum. To ensure repeatable and reproducible test results, DOE has initially determined that filling the water reservoir to the maximum volume of water as specified by the manufacturer is representative of typical use. In addition, specifying a consistent fill level for testing at the maximum fill level would limit variability associated with reservoir water temperature and would ensure the portable ACIM has sufficient water to conduct the test.

In summary, DOE proposes that portable ACIMs be subject to the test procedure as proposed in this NOPR, except that sections 5.4, 5.6, 6.2, and 6.3 of ASHRAE Standard 29–2015 would not apply. DOE proposes to provide the following additional test instructions necessary for testing portable ACIMs: Ensure that the ice storage bin is empty; fill an external container with water; establish a water temperature in the external container is consistent with the requirements of section 5.2.1 of AHRI Standard 810–2016 and the tolerance specified in section 6.2 of ASHRAE Standard 29–2015 (*i.e.,* 70 °F ±1.0 °F); verify the water temperature in the external container by inserting a temperature sensor into approximately the geometric center of the water; after establishing water temperature, immediately transfer the water to the portable ACIM reservoir and fill the reservoir to the maximum level as specified by the manufacturer.

Issue 9: DOE requests comment on its proposal that portable ACIMs be subject to the test procedure as proposed in this NOPR, except that sections 5.4, 5.6, 6.2, and 6.3 of ASHRAE Standard 29–2015 do not apply. DOE requests comment on its proposal that the potable water reservoir be filled to the maximum level of potable water as recommend by the manufacturer with an initial water temperature of 70 °F ±1.0 °F. DOE requests comment on its proposal that the initial water temperature be established in an external container and verified by inserting a temperature sensor into approximately the geometric center of the water in the external container.

DOE has also initially determined that additional instructions are needed for portable ACIMs to meet the requirements of section 6.6 of ASHRAE Standard 29–2015, which requires that ''bins shall be used when testing and shall be filled one-half full with ice.'' Because section 6.6 of ASHRAE Standard 29–2015 does not specify how the bin would be filled with ice, a laboratory may fill the ice storage bin one-half full of externally produced ice (*i.e.,* ice that was made by a separate ACIM), for example to avoid waiting for the unit under test to produce enough ice to fill the bin one-half full prior to initiating the start of the test. Using externally produced ice does not directly affect the performance of a non-portable ACIM because the conditions within the ice storage bin do not have a direct impact on the incoming potable water temperature.

In contrast, the conditions within the ice storage bin of a portable ACIM do directly impact performance because portable ACIMs typically recycle the melt water (at 32 degrees) from the internal ice storage bin and combine it with water from the reservoir (initially at 70 degrees) to make additional ice.

Accordingly, any externally produced ice introduced to a portable ACIM to fill the bin one-half full prior to testing could affect the performance of the system during the test when compared to the tested performance using ice produced by the portable ACIM under test.

To limit test variability that could occur due to the introduction of externally produced ice, DOE proposes that for portable ACIMs, the ice storage bin must be empty prior to the initial water fill, and the unit under test must be operated to produce ice into the ice storage bin until the bin is one-half full (*i.e.,* precluding the use of externally produced ice to fill the bin one-half full prior to testing). DOE proposes to define one-half full as half of the vertical dimension of the storage bin, based on the maximum possible fill level. Once the ice storage bin is one-half full of ice, testing would proceed according to section 7 of ASHRAE Standard 29–2015, consistent with non-portable ACIM testing.

Issue 10: DOE requests comment on its proposal that portable ACIMs have the ice storage bin empty prior to the initial reservoir fill and then produce ice into the ice storage bin until the bin is one-half full, at which point testing would proceed according to section 7 of ASHRAE Standard 29–2015. DOE requests comment on its proposal to define one-half full as half of the vertical dimension of the storage bin based on the maximum ice fill level within the storage bin.

b. Refrigerated Storage ACIMs

DOE has initially determined that refrigerated storage ACIMs can be tested according to the current DOE ACIM test procedure as well as AHRI Standard 810–2016 and ASHRAE Standard 29–2015. DOE investigated whether additional specification was necessary to ensure that these test methods would provide representative and repeatable results for refrigerated storage ACIMs and would not be unduly burdensome to conduct.

DOE identified two aspects of refrigerated storage ACIM testing that may need further specification to limit variability: Door openings for refrigerated storage ACIMs and refrigeration set point controls.

Door opening durations may affect the measured performance of refrigerated storage ACIMs more than non-refrigerated storage ACIMs because the refrigeration system provides cooling for the entire self-contained storage bin rather than only for the ice making evaporator. Thus, when opening the storage container door to collect ice from refrigerated storage ACIMs, some portion of cold air from the storage container will likely be replaced by higher temperature ambient air. Both the duration and the extent of the door opening can contribute to this air exchange within the storage container. Therefore, specifying the duration and the extent of the door opening would limit variability from test to test, thus promoting repeatable and reproducible test results.

From investigative testing, DOE has determined that the process of opening the bin door, carefully removing or replacing the ice collection container, and closing the door can be readily performed in under 10 seconds. DOE therefore proposes that for refrigerated storage ACIMs, any storage bin door openings shall be conducted with the door in the fully open position for 10 ±1 seconds. DOE proposes to specify that ''fully open'' means opened to an angle of not less than 75 degrees (or to the maximum angle possible, if that is less than 75 degrees), which is consistent with the definition for fully open in ANSI/ASHRAE Standard 72–2018, ''Method of Testing Open and Closed Commercial Refrigerators and Freezers.'' To ensure a consistent number of door openings, DOE also proposes to specify that door openings would occur only when collecting the ice sample and when returning the empty collection container to the ice storage compartment (*i.e.,* two separate door openings per sample collection).

Issue 11: DOE requests comment on its proposal to specify that door openings must only occur on self-contained refrigerated storage ACIMs to collect samples after each cycle, and that the door shall be in the fully open position for 10.0 ±1.0 seconds to collect the sample. DOE also requests comment on its proposal to specify that ''fully open'' means opening a door to an angle of not less than 75 degrees.

Refrigeration set point controls may also affect the measured performance of refrigerated storage ACIMs, if the controls can be adjusted by the user to maintain different storage compartment temperatures. DOE investigated whether refrigerated storage ACIMs allow the user to adjust the refrigeration set point of the ACIM and if so, how. DOE reviewed user manuals for several refrigerated storage ACIMs and found that the models either do not allow the user to adjust the refrigeration set point, or have a factory preset temperature control that can be adjusted by the user, but not in an easily accessible manner (*e.g.,* temperature control screws adjustable only with a screwdriver or accessible behind grilles). The ability to adjust the refrigeration set point on some refrigerated storage ACIMs does not appear to be a setting that users would typically adjust and is likely used only for troubleshooting. Based on this information, DOE proposes that the refrigeration set point for testing a refrigerated storage ACIM be consistent with section 4.1.4 of AHRI Standard 810–2016 (*i.e.,* per the manufacturer's written instructions with no adjustment prior to or during the test).

Issue 12: DOE requests comment on its proposal to test refrigerated storage ACIMs consistent with section 4.1.4 of AHRI Standard 810–2016 (*i.e.,* with adjustable temperature settings tested per the manufacturer's written instructions with no adjustment prior to or during the test). DOE requests comment on whether a specific refrigeration set point or internal air temperature should be specified for testing instead of the manufacturer's factory preset refrigeration set point.

2. Stability Criteria

The current DOE test procedure, through reference to section 7.1.1 of ASHRAE Standard 29–2009, defines ACIM stability based on the harvest rate. Specifically, continuous-type ice makers shall be considered stabilized when the weights of three consecutive 14.4-minute samples taken within a 1.5-hour period do not vary by more than ±2 percent. Batch type ice makers are considered stable when the weights from the samples from two consecutive cycles do not vary by more than ±2 percent.

Section 7.1.1 of ASHRAE Standard 29–2015 revised the stabilization criteria to consider continuous-type ice makers stable when the weights of two consecutive 15.0 minute ±2.5 seconds samples do not vary by more than the greater of ±2 percent, or 0.055 pounds. Section 7.1.1. of ASHRAE Standard 29–2015 specifies that batch type ice makers are considered stable when the 24-hour calculated ice production rate from samples taken from two consecutive cycles do not vary by the greater of ±2 percent or 2.2 pounds. Compared to the 2009 version, ASHRAE Standard 29–2015 added absolute stability criteria of 0.055 lb/15 minutes for continuous equipment and 2.2 lb/24 h for batch equipment.

In addition, ASHRAE Standard 29–2009 states that the unit must be stable before the capacity tests are started. This provision was changed in ASHRAE Standard 29–2015, which instead states that the ice maker must be stable for capacity test data to be valid. In application, the stability provision in ASHRAE Standard 29–2009 means that any cycle or sample after the stability criteria is met is valid to be used for the capacity test. DOE notes that the applicability of the stability criteria in ASHRAE Standard 29–2015 could be understood in one of two ways: (1) Unchanged from ASHRAE Standard 29–2009, meaning that any cycle or sample after the stability criteria are met is valid to be used for the capacity test; or (2) the ice production rate for each cycle used for the capacity test relative to any other cycle or sample used for the capacity test must be within the greater of ±2 percent and 2.2 lb/24 h for batch type ice makers, and each sample used for the capacity test must be within the greater of ±2 percent and 0.055 lb/15 mins for continuous ice makers. The second interpretation limits potential variability compared to the first interpretation because it puts specific limits on the variability between cycles and samples to be used for the capacity tests. The difference in the potential interpretations of the stability provisions in ASHRAE Standard 29–2015 could result in variation in capacity ratings. Additionally, the second interpretation limits test burden by not requiring separate cycles for meeting the stability criteria and for testing performance. Under the second interpretation, the same cycles are used to determine stability and performance. In this NOPR, DOE proposes to expressly provide that the second interpretation be used for determining stability, such that all cycles or samples used for the capacity test are stable. DOE does not expect that this proposal would impact ACIM performance as measured under the existing test procedure as it would not substantively change the cycles required for evaluating performance.

Section 7.1.1 of ASHRAE Standard 29–2015 added a requirement that the duration of each sample for continuous type ice makers be 15.0 minutes ±2.5 seconds. DOE testing indicated that removing the plastic pan or bucket within the tolerance of ±2.5 seconds can be difficult depending on the specific test setup (*e.g.,* removing the container from the ice maker or bin without spilling ice). An increased tolerance would reduce burden on manufacturers to test continuous ice makers, while still sufficiently limiting the variability between samples used for the capacity test to the criteria proposed.

Therefore, DOE proposes to increase the tolerance to collect samples for continuous ice makers from 15.0 minutes ±2.5 seconds to 15.0 minutes ±9.0 seconds. Increasing the tolerance to 9.0 seconds could affect the weight of each sample; however, variability would not increase because the samples used for the capacity test would still need to meet the proposed stability criteria. With the 9-second tolerance, the maximum and minimum allowable collection times would vary by approximately 2 percent, which is consistent with the allowable variation in capacity to determine stability. DOE expects that this proposal would reduce the test burden compared to the ASHRAE Standard 29–2015 approach and would ensure that valid samples can be obtained. Additionally, DOE does not expect that this proposal would affect measured performance as compared to the existing test procedure because the sample collection period as proposed is not substantively different from the existing test procedure approach.

Issue 13: DOE requests comment on its interpretation of Section 7.1.1 of ASHRAE Standard 29–2015 and proposal to require that all cycles or samples used for the capacity test meet the stability criteria.

Issue 14: DOE requests comment on the proposal to increase the tolerance for continuous ice makers to collect samples from 15.0 minutes ±2.5 seconds to 15.0 minutes ±9.0 seconds.

Section 7.1.1 of ASHRAE 29–2015 includes stabilization requirements, which specify: (1) For continuous ACIMs, collected weights must not vary by more than ±2 percent or 25 g (0.055 lb), whichever is greater; or (2) for batch ACIMs, the calculated 24-hour ice production rates must not vary by more than ±2 percent or 1 kg (2.2 lb), whichever is greater.

Based on investigative testing, DOE observed that the absolute stability criteria of 2.2 lb/24 h for batch type ice makers would not necessarily represent stable operation for low-capacity batch ACIMs. DOE conducted a market assessment and observed batch low-capacity ACIMs with harvest rates as low as 7 lb/24 h. Based on this harvest rate of 7 lb/24 h, a 2.2 lb/24 h stability criteria could result in a harvest rate variation of up to 31 percent (*i.e.,* 2.2 lb/24 h divided by 7 lb/24 h). Because of the potential high variability in the stability criteria for low-capacity ACIMs, DOE proposes to not apply the absolute stability criteria specified in ASHRAE 29–2015 to the proposed test procedure for low-capacity ACIMs.

DOE also considered whether applying only the ±2 percent stability criterion would be appropriate for low-capacity ACIMs. Due to the lower overall ice harvest rates, a 2 percent stability requirement represents much smaller weight variations for low-capacity ACIMs. For example, a 2 percent stability requirement for the 7 lb/24 h model represents a variation of 0.14 lb/24 h, which may be difficult to achieve for low-capacity ACIMs.

The 2 percent stability requirement is also not currently applicable to the lowest capacity ACIMs currently in scope for the DOE test procedure (as described, the requirement is 2 percent or 2.2 lb/24 h, whichever is greater). Accordingly, the effective stability requirement for the lowest capacity ACIMs currently in scope is approximately 4 percent (*i.e.,* 2.2 lb/24 h divided by 50 lb/24 h). DOE has initially determined that applying this same percentage (*i.e.,* 4 percent) as the low-capacity ACIM stability requirement would be more appropriate than applying either the 2 percent or 2.2 lb/24 h stability requirements currently defined in Section 7.1.1 of ASHRAE 29–2015. DOE has observed through testing that low-capacity ACIMs are able to achieve stability based on a 4 percent requirement.

Therefore, for consistency (on a percentage basis) with the existing test requirements for small ACIMs currently in scope and to limit test burden, DOE proposes to require a ±4 percent stability criterion (without an absolute stability criterion) for testing low-capacity ACIMs.

Issue 15: DOE requests comment on the proposal to require that all cycles or samples of low-capacity ACIMs used for the capacity test meet a ±4 percent stability criterion and not be subject to an absolute stability criterion.

3. Test Conditions

In the March 2019 RFI, DOE requested comment on potential modifications to the existing standard test conditions, and whether any modifications would improve the accuracy of the test procedure or reduce testing burden. 84 FR 9979, 9984.

Hoshizaki commented that tightening the tolerances for testing would place an undue burden on manufacturers, pointing out that if the tolerance is tightened outside of the manufacturer's existing equipment, it would entail buying new equipment and introduce higher calibration costs for such equipment. (Hoshizaki, No. 4 at p. 2) Howe stated that because equipment is readily available to achieve tighter tolerances, this change would not place an undue burden on manufacturers or third-party testing sites. (Howe, No. 6 at p. 13)

DOE discusses the potential changes to test conditions, including tolerances and instrumentation accuracies, in the following sections.

a. Relative Humidity

Variation in the moisture content of ambient air may affect the energy consumption of ice makers. However, neither the current DOE test procedure, nor AHRI 810–2016 or ASHRAE Standard 29–2015 include requirements to control for moisture content for testing. In contrast, industry test standards for other refrigeration equipment, such as commercial refrigerators, freezers and refrigerator-freezers (''CRE'') and refrigerated bottled or canned beverage vending machines (''BVMs''), have requirements for the moisture content.

In the March 2019 RFI, DOE requested comment on how moisture content of ambient air impacts ACIM performance. 84 FR 9979, 9984. In addition, DOE requested information regarding the burden of specifying a humidity range during testing. *Id.*

AHRI, Howe, and Hoshizaki stated that specifying a set humidity for testing would show a negligible effect for energy testing in ice makers, as the physics of an ice maker naturally involve the machine performing in a humid atmosphere for the freezing and harvesting of ice. (AHRI, No. 5 at p. 5; Howe, No. 6 at p. 9; Hoshizaki, No. 4 at p. 2) Hoshizaki commented that any discussion of humidity or temperatures for testing of ice makers should be handled through the ASHRAE 29 standard committee. (Hoshizaki, No. 4 at p. 2)

The Joint Commenters noted that test procedures for other refrigeration equipment specify standard conditions for relative humidity and wet bulb temperature, and that including these specifications would improve the repeatability and reproducibility of the test procedure by ensuring that similar conditions are being used across test laboratories. Furthermore, the Joint Commenters stated that specifying these standard conditions would prevent manufacturers from testing at conditions that may improve ratings but not be representative of typical field performance. (Joint Commenters, No. 2 at p. 3)

DOE tested three ACIMs in a test chamber with relative humidity at 35, 55 and 75 percent at the standard rating conditions to investigate the effect of relative humidity on energy use. Table III.3 summarizes the results of this testing.

TABLE III.3—COMPARISON OF ENERGY USE RATES AT DIFFERENT RELATIVE HUMIDITY TEST CONDITIONS

Test unit	Type	35% relative humidity (kWh/100 lb)	55% relative humidity (kWh/100 lb)	75% relative humidity (kWh/100 lb)	Difference from 35% relative humidity to 55% relative humidity (%)	Difference from 35% relative humidity to 75% relative humidity (%)
1	Batch	8.27	8.28	8.28	+0.2	+0.2
2	Batch	8.47	10.49	11.47	+24	+35
3	Continuous	4.27	Not Tested	4.43	N/A	+4

These results show a wide range of impacts on performance among the three tested units when relative humidity is varied. Test Unit 1 showed little impact in performance between the two relative humidity test conditions. Whereas, Test Unit 2 showed the greatest variation in performance, with the 55 percent relative humidity test condition resulting in 24 percent greater energy use than the 35 percent relative humidity test condition. Test Unit 3 showed a modest increase in energy use of 4 percent between the 35 percent and 75 percent relative humidity conditions. (Test Unit 3 was not tested at the 55 percent relative humidity condition). DOE has been unable to determine why Test Unit 2 showed significantly greater variation in performance compared to the other test units. Nevertheless, based on these results showing that different relative humidity conditions can result in a wide variation in performance, DOE proposes to specify a relative humidity test condition to ensure repeatable and reproducible test results.

DOE investigated what relative humidity condition would be most appropriate for testing ACIMs. Due to a lack of data regarding typical relative humidity levels for ACIM installations, DOE considered relative humidity conditions used for testing other types of commercial kitchen equipment, such as commercial refrigeration equipment (''CRE''), refrigerated bottled or canned beverage vending machines (''BVMs''), and refrigerated buffet and preparation tables.

The industry test standard for CRE has a requirement to maintain wet-bulb temperature, and the industry test standard for BVM requires that relative humidity be controlled. The relative humidity requirements in the industry standards for CRE and BVM are codified in the current DOE test procedures in Appendix B to Subpart C of 10 CFR 431 and Appendix B to Subpart Q of 10 CFR 431, respectively. ASTM Standard F2143–2016, ''Performance of Refrigerated Buffet and Preparation Tables,'' also includes relative humidity requirements. Based on a review of the test conditions for these other types of commercial food service equipment, DOE is proposing to require a relative humidity of 35 percent for ACIM testing, as discussed further in the following paragraphs. DOE summarizes the other commercial food service equipment test condition requirements along with the proposal for ACIMs in Table III.4.

TABLE III.4—COMPARISON OF RELATIVE HUMIDITY TEST CONDITIONS

Equipment type	Test standard	Ambient temperature (°F)	Wet bulb temperature (°F)	Relative humidity (percent)	Corresponding moisture content (lbs water vapor/lbs dry air)
Commercial Refrigeration Equipment	ASHRAE 72–2005 †	75.2	64.4	* 55	0.010
Refrigerated Beverage Vending Machines	ASHRAE 32.1–2010 †	75	No requirement	45	0.008
Refrigerated Buffet and Preparation Tables	ASTM Standard F2143–2016	86	No requirement	35	0.009

TABLE III.4—COMPARISON OF RELATIVE HUMIDITY TEST CONDITIONS—Continued

Equipment type	Test standard	Ambient temperature (°F)	Wet bulb temperature (°F)	Relative humidity (percent)	Corresponding moisture content (lbs water vapor/lbs dry air)
Automatic Commercial Ice Makers	Proposed	90	No requirement	** 35	0.011

* The relative humidity for commercial refrigeration equipment is calculated from the dry bulb temperature and the wet bulb temperature using a pressure of 760 mm of mercury.

** Proposed test condition.

† The test conditions currently incorporated by refence in the DOE test procedures are unchanged in the most recent versions of the industry standards, ASHRAE 72–2018 and ASHRAE 32.1–2017.

DOE has initially determined that establishing a relative humidity test condition at 35 percent would be appropriate for testing ACIMs. A relative humidity of 35 percent would maintain a moisture content similar to the moisture content required in the current DOE test procedures for BVMs and CRE, and the industry test standard for refrigerated buffet and preparation tables. Controlling to 35 percent relative humidity would also limit potential test burden on any ACIM manufacturers that already test and control conditions for the other refrigerated equipment types. DOE is proposing that the relative humidity be maintained and measured at the same location used to confirm ambient dry bulb temperature, or as close as the test setup permits.

DOE also investigated appropriate tolerances on relative humidity. DOE measured and controlled the relative humidity in the test chamber for all tests. DOE observed that relative humidity in the test chamber can vary from the set point during ACIM testing. The largest variation in relative humidity observed in the test chamber, typically by three percentage points, occurred when a self-contained unit was opened to remove and measure the weight of the ice. When the unit was closed, the relative humidity in the test chamber returned to the set level.

DOE considered a test condition tolerance and test operating tolerance on relative humidity. A test condition tolerance is a tolerance that is calculated based on the average of all relative humidity measurements during each freeze cycle. In contrast, a test operating tolerance would apply to all individual measurement during each cycle. The industry standards referenced in Table III.4, ASHRAE 72–2018, ASHRAE 32.1–2017, and ASTM Standard F2143–2016, all require a test condition tolerance. ASHRAE 72–2018 is the only standard mentioned in Table III.4 that also requires a test operating tolerance. To be consistent with the other commercial food service equipment standards, DOE proposes to add a test condition tolerance on the proposed relative humidity test condition of 35 percent.

To establish an appropriate test condition tolerance on relative humidity, DOE first investigated typical accuracies of relative humidity sensors. Accuracies of ±2.0 percent are typical for relative humidity sensors. Additionally, DOE's test procedure for BVMs requires a relative humidity instrument accuracy of ±2.0 percent. See section 1.1 of Appendix B to subpart Q of 10 CFR 431. Similarly, section 6.3 of ASTM Standard F2143–2016 also requires a relative humidity instrument accuracy of ±2.0 percent. A tolerance lower than the instrument measurement accuracy cannot be captured by such an instrument. Therefore, a system with an accuracy of 2 percent cannot measure a tolerance below 2 percent. To ensure that controlling for relative humidity in the test chamber is not unduly burdensome, DOE proposes to require a relative humidity instrument accuracy of ±2.0 percent and to include a test condition tolerance on relative humidity of ±5.0 percent. This is consistent with the tolerances included for relative humidity in ASTM Standard F2143–2016 and the BVM test procedure, and similar to the equivalent tolerance on wet bulb temperature for CRE testing. DOE's testing, including for the other equipment with similar tolerances, has shown that test laboratories are able to maintain relative humidity within the proposed test condition tolerance of ±5.0 percent.

Although a relative humidity requirement is not currently specified in the existing test procedure, DOE does not expect the proposal to affect measured performance of existing ACIM models. As discussed, the test procedures for other refrigeration equipment require testing to an ambient humidity level consistent with that proposed for ACIMs in this NOPR. Additionally, the test facilities required to maintain the necessary ambient test temperature likely already implement humidity controls and DOE expects that existing tests would have been conducted in an ambient relative humidity within the proposed range, despite it not being a requirement in the current test procedure. Accordingly, DOE expects that the proposal would ensure repeatable and reproducible test results, but would not impact measured performance as compared to the existing test procedure.

Issue 16: DOE requests comment on the proposal to control relative humidity at 35 ±5.0 percent. Specifically, DOE requests comment on the representativeness of 35 percent relative humidity in field use conditions, whether manufacturers currently control and measure relative humidity for ACIM testing (and if so, the conditions used for testing), and the burden associated with controlling relative humidity within a tolerance of ±5.0 percent.

b. Water Hardness

ASHRAE Standard 29–2015 and AHRI Standard 810–2016 do not specify the water hardness of the water supply used for testing. The United States Geological Survey (''USGS'') defines water hardness as the concentration of calcium carbonate in milligrams per liter (''mg/L'') of water and lists general guidelines for the classification of water hardness as 0 to 60 mg/L of calcium carbonate for soft water; 61 to 120 mg/L of calcium carbonate for moderately hard water; 121 to 180 mg/L of calcium carbonate for hard water; and more than 180 mg/L of calcium carbonate for very hard water.[7] In the January 2012 final rule, DOE stated that harder water depresses the freezing temperature of water and results in increased energy use to produce the same quantity of ice. 77 FR 1591, 1605. DOE also stated that hard water (*i.e.,* water with a higher concentration of calcium carbonate) can affect energy consumption in the field due to increased scale build up on the heat exchanger surfaces over time, and the use of higher water purge quantities to help flush out dissolved solids to

[7] See *www.usgs.gov/special-topic/water-science-school/science/hardness-water?qt-science_center_objects=0#qt-science_center_objectswater.usgs.gov/owq/hardness-alkalinity.html.*

limit scale build up. *Id.* However, DOE declined to set requirements for water hardness for testing because of insufficient information to allow proper consideration of such a requirement. Specifically, DOE did not have information regarding the impact of variation in water hardness on as-tested performance of ACIMs, and therefore could not justify the additional burden associated with establishing a standardized water hardness requirement at that time. 77 FR 1591, 1605–1606.

In the March 2019 RFI, DOE requested comment on the impact of water hardness on ACIM performance and on the burden associated with controlling for water hardness during testing. 84 FR 9979, 9984–9985.

In response to the March 2019 RFI, the Joint Commenters stated that DOE should specify a value for water hardness in the test procedure that is representative of typical field conditions because water hardness may affect measured energy. They further commented that specifying such a requirement would improve repeatability and reproducibility and would also prevent manufacturers from testing using a water hardness that may improve ratings but not be representative of typical field performance. (Joint Commenters, No. 2 at p. 3)

Hoshizaki commented that testing with a certain water hardness would not be economically feasible for manufacturers and that any discussion about how to incorporate such a requirement without undue burden on manufacturers would be best addressed in the ASHRAE 29 standard committee. (Hoshizaki, No. 4 at p. 2)

AHRI and Howe stated that the amount of total dissolved solids can have an impact on energy and water consumption, but the level of the impact is difficult to ascertain and is most likely insignificant under standard testing conditions on new ACIMs with clean evaporators. (AHRI, No. 5 at p. 6; Howe, No. 6 at p. 10) Brema commented that water hardness should be set to be in the range of the user manual and potability regulations. (Brema, No. 3 at p. 7)

DOE conducted testing to investigate whether changing the water hardness could affect the energy consumption and harvest rate of ACIMs. Testing was conducted on new models (*i.e.,* with clean evaporators prior to accumulation of any significant scale). DOE conducted water hardness tests on two batch type ice makers and one continuous type ice maker.

According to the United States Geological Survey (''USGS''), the vast majority of water hardness in the United States ranges from 0 mg/L to 250 mg/L of calcium carbonate.[8] Given the range of water hardness in the United States, DOE used a water hardness of 42 mg/L of calcium carbonate for a ''soft water'' test (which also represented water readily available at the test facility) and a water hardness of 342 mg/L of calcium carbonate for a ''very hard water'' test (*i.e.,* a 300 mg/L increase relative to the soft water test to represent an extreme comparison case). DOE tested four ACIMs in a test chamber with soft and very hard water hardness at the standard rating conditions to investigate the effect of water hardness on harvest rate and energy use. The results of these tests are summarized in Table III.5.

TABLE III.5—ACIM PERFORMANCE DIFFERENCES OF SOFT WATER COMPARED TO VERY HARD WATER

Unit	Type	Harvest rate with soft water *	Harvest rate with very hard water *	Difference (%)	Energy use with soft water *	Energy use with very hard water *	Difference (%)
1	Batch	95	105	11	10.49	9.43	−10.1
2	Batch	126	131	4	8.28	7.96	−3.9
3	Batch	351	359	2.3	5.73	5.64	−1.6
4	Continuous	562	582	3.4	4.40	4.18	−5.0

* Soft Water was 42 mg/L of calcium carbonate during testing. Very Hard Water was 342 mg/L of calcium carbonate during testing.

These test results show that water hardness can impact measured harvest rates and energy consumption rates, and that very hard water generally resulted in more favorable performance than soft water. DOE acknowledges that the observed test results show the opposite impact on performance than expected and discussed in the January 2012 final rule (*i.e.,* that harder water would be expected to increase energy consumption).

Given that the performance of the tested ACIMs improved with harder water, to limit the potential for testing under favorable conditions not necessarily representative of typical operation, DOE proposes to require that water used for testing have a maximum hardness of 180 mg/L of calcium carbonate. According to the USGS, a majority of the U.S. has ground water with a water hardness equal to or below 180 mg/L of calcium carbonate.[9] Establishing a maximum water hardness of 180 mg/L would ensure that ACIMs are tested with water that is not considered ''very hard'' according to the USGS and that the tested water hardness is within a range representative of water hardness that ACIMs are likely to experience in actual use.

DOE proposes that water hardness must be measured using a water hardness meter with an accuracy of ±10 mg/L or taken from the most recent version of the water quality report that is sent by water suppliers, which is updated at least annually and is accessible at: *ofmpub.epa.gov/apex/safewater/f?p=136:102.* DOE expects that any test facilities in locations with water supply hardness greater than 180 mg/L would likely already incorporate water softening controls, and therefore this proposal is not expected to require updates to existing test facilities. For this same reason, DOE does not expect that this proposal would impact rated performance for any ACIMs tested under the current DOE test procedure.

DOE also notes that this proposal does not conflict with any provisions of the industry test and rating standards and would provide additional specifications to ensure the representativeness of the results and improve the repeatability and reproducibility of the test results.

Issue 17: DOE requests comment on its proposal that water used for ACIM testing have a maximum water hardness of 180 mg/L of calcium carbonate and on whether any test facilities would not have water hardness supplied within the proposed allowable range. If there are such test facilities, DOE requests comment on whether the supply water is softened when testing ACIMs and, if

[8] See *www.usgs.gov/media/images/map-water-hardness-united-states.*

[9] *See water.usgs.gov/owq/hardness-alkalinity.html.*

the water is not softened, the burden associated with implementing controls for water hardness. Additionally, while DOE is proposing that this requirement apply to all water supplied for ACIM testing, DOE requests information on whether this requirement should only be applicable to potable water used to make ice (and not any condenser cooling water).

c. Ambient Temperature Gradient

The current ACIM test procedure incorporates by reference section 5.1.1 of ASHRAE Standard 29–2009, which stipulates that, with the ice maker at rest, the vertical ambient temperature gradient in any foot of vertical distance from 2 inches above the floor or supporting platform to a height of 7 feet above the floor, or to a height of 1 foot above the top of the ice maker cabinet, whichever is greater, shall not exceed 0.5 °F/foot. This language, which is consistent with the requirement in section 5.1.1 of ASHRAE Standard 29–2015, is consistent with the test room requirements for residential refrigerators, as specified in section 7.2 of ANSI–AHAM Standard HRF–1–1979, ''Household Refrigerators, Combination Refrigerator-Freezers, and Household Freezers'' (ANSI/AHAM HRF–1–1979), the version of the AHAM standard that was incorporated by reference in the DOE test procedure for residential refrigerators in a final rule published August 10, 1982. 47 FR 34517. DOE modified the requirements associated with temperature gradient for residential refrigerators, in a final rule published April 21, 2014, to remove the reference to a 7 feet height requirement and require only that the gradient be maintained to a height 1 foot higher than the top of the unit. 79 FR 22320, 22335.

In the March 2019 RFI, DOE requested comment on how manufacturers are demonstrating compliance with the requirements of section 5.1.1 of ASHRAE Standard 29–2009.

AHRI commented that manufacturers confirm compliance of test rooms or cells used for testing with all standards requirements, and that the standard committee and manufacturers deemed the requirements within the method of test to be adequate. (AHRI, No. 5 at p. 7)

Hoshizaki commented that it confirms the compliance of the test room with the requirements before testing, and that there is no need to align the ACIM temperature gradient requirements with other standards because ice makers perform differently than other commercial refrigeration appliances. (Hoshizaki, No. 4 at p. 2)

Howe commented that DOE should consider changing the requirement to limit the temperature measurement to 1 foot above the unit because there are no standard heights for test setups and units, so this change would ensure that the standard is consistent across installations. (Howe, No. 6 at p. 12)

Because DOE did not receive information indicating that a modification to the existing requirements would improve test accuracy or decrease test burden, DOE is not proposing any changes to the ambient temperature gradient requirements. DOE agrees that there are no standard heights for test setups and units; however, the current requirements ensure that the temperature gradient is maintained to at least within 1 foot above the unit under test for all test setups.

Issue 18: DOE requests comment on maintaining the existing ambient temperature gradient requirements, through an updated reference to ASHRAE Standard 29–2015, and on whether any modifications would improve test accuracy or decrease test burden.

d. Ambient Temperature and Water Temperature

The current DOE ACIM test procedure incorporates by reference AHRI 810–2007, which specifies an ambient temperature of 90 °F and a supply water temperature of 70 °F. AHRI 810–2016 provides the same specifications. However, many ice makers may be installed in conditioned environments such as offices, schools, hospitals, hotels, and convenience stores (see 80 FR 4646, 4700 (Jan. 28, 2015)), which may have ambient air temperatures and supply water temperatures higher or lower than those specified in AHRI Standard 810.

In the March 2019 RFI, DOE requested comment on whether the ambient air temperature and water supply temperature specified in AHRI Standard 810–2016, and in the current DOE test procedure, are appropriately representative of those temperatures during an average use cycle or whether different temperature specifications should be considered. 84 FR 9979, 9985. In particular, DOE requested data and information describing the ambient air temperature and supply water temperature of different applications at which ACIM equipment are operated. *Id.*

The Joint Commenters and Brema raised concerns about the representativeness of current ambient temperature conditions, stating that many ice makers are installed in conditioned spaces with ambient temperatures closer to 70 °F. They commented that this would mean that efficiency ratings are not providing appropriately representative information to purchasers, although neither commenter submitted information or data as to actual field conditions. (Joint Commenters, No. 2 at p. 3; Brema, No. 3 at p. 8) The Joint Commenters further commented that DOE should consider testing ice makers at two sets of ambient temperature and supply water temperature conditions because there is likely a significant range of temperatures in the field reflecting different locations and applications. (Joint Commenters, No. 2 at p. 4)

Howe commented that lowering the ambient test temperature without the proper energy accounting will lead customers to choose less energy efficient options from a complete system perspective, because such units are assumed to be within a climate-controlled space. Howe stated that DOE must maintain the test conditions of 90 °F ambient and 70 °F inlet water temperature because the inlet water temperature is representative of the average worst-case supply water that can be seen within the United States, and the ambient temperature ensures customers can understand the true energy costs associated with operation. (Howe, No. 6 at p. 10)

AHRI stated that average use cycles vary greatly per applications based on water and ambient temperatures, and that the test procedure was developed to average outside variable conditions into a snapshot of unit performance under normal operating conditions. AHRI commented that test results provide comparable representation of energy consumption among products. (AHRI, No. 5 at p. 5) AHRI and Hoshizaki commented that the ambient air temperature and water supply temperature specified in AHRI Standard 810 were selected by manufacturers as a good compromise for a replicable, representative test. (AHRI, No. 5 at p. 6; Hoshizaki, No. 4 at p. 2)

DOE acknowledges that ACIMs may be installed and operated in a range of ambient conditions. However, DOE is proposing to maintain the single set of rating conditions currently required in the DOE test procedure. Specifically, DOE is proposing to maintain the reference to AHRI Standard 810, through AHRI Standard 810–2016, for rating conditions because those were selected as representative, repeatable rating conditions of this equipment. As noted, EPCA requires that if AHRI Standard 810 is amended, DOE must amend the test procedures for ACIM as necessary to be consistent with the amended AHRI test standard, unless DOE determines, by rule, published in the **Federal Register** and supported by clear and convincing evidence, that to do so would not meet the requirements for test procedures regarding representativeness and test burden. (42 U.S.C. 6314(7)(B)) DOE does not have any contrary data or information regarding the representativeness of the conditions specified in AHRI Standard 810–2016.

In addition, the response of ACIM refrigeration systems to varying ambient conditions is different than the response of refrigeration systems in other refrigeration and HVAC equipment. Other refrigeration or HVAC equipment is typically designed to maintain conditions within a space. Accordingly, as ambient conditions change, the refrigeration systems typically cycle (or in the case of variable-speed compressors, adjust speed) to match the varying heat loads. In the case of ACIMs, the refrigeration system continuously operates while actively making ice, as heat is constantly removed from the water throughout the freezing process. As a result, introducing a second lower-temperature test condition would not result in part-load operation for ACIMs and would not additionally differentiate between units based on a part-load response, as is the case for other refrigeration or HVAC equipment. Thus, DOE has tentatively determined that the existing test condition provides representative, repeatable rating conditions for this equipment, and DOE expects that the burden of introducing a second test condition (which would approximately double test duration) would not be justified.

Issue 19: DOE requests comment on its proposal to maintain the existing ambient temperature and water supply temperature requirements. If modifications should be considered to improve test representativeness or decrease test burden, DOE requests supporting data and information.

e. Water Pressure

As discussed in section III.C and shown in Table III.2, ASHRAE Standard 29–2015 now includes water pressure measurement requirements, whereas ASHRAE Standard 29–2009 did not address water pressure. Section 6.3 of ASHRAE Standard 29–2015 directs that the pressure of the supply water be measured within 8 inches of the ACIM and that the pressure remains within the specified range (AHRI Standard 810–2007 and 2016 both specify 30 +/− 3 psig water supply) during the period of time that water is flowing into the ACIM inlet(s).

Certain ACIMs do not continuously draw water into the unit during the entire test. The portions of the test when the water inlet valve opens may result in a short, transient state when the water pressure falls outside of the allowable tolerance. Eliminating such transient periods would likely require certain laboratories to re-configure their water supply setups. Because of this burden and the relatively low impact of these transient periods on water consumed (*i.e.,* the transient periods are typically very short relative to the overall duration of water flow), DOE is proposing to allow for water pressure to be outside of the specified tolerance for a short period of time when water begins flowing into the unit.

Section 2.4 of the DOE test procedure for consumer dishwashers addresses this same issue by requiring that the specified water pressure be achieved within 2 seconds of opening the water supply valve. 10 CFR 430, Subpart B, Appendix C1. The sampling rate in Section 5.7 of ASHRAE Standard 29–2015 requires a maximum interval between data samples for water pressure of no more than 5 seconds. Therefore, DOE proposes to clarify that water pressure when water is flowing into the ice maker must be within the allowable range within 5 seconds of opening the water supply valve. DOE does not expect that this proposal would impact tested performance under the current DOE test procedure as it provides additional specificity regarding the existing water pressure requirements.

Issue 20: DOE requests comment on its proposal to require that water pressure when water is flowing into the ice maker be within the allowable range within 5 seconds of opening the water supply valve.

4. Test Setup and Equipment Configurations

Since publication of the January 2012 final rule, DOE has issued two final guidance documents addressing certain aspects of the ACIM test procedure: Prohibiting the use of temporary baffles and requiring use of a fixed purge water setting. As discussed in the following paragraphs, DOE has reviewed the guidance documents to determine whether they should be maintained and expressly included in the test procedure. In addition, in reviewing the existing DOE ACIM test procedure, DOE has initially determined that the representativeness and repeatability of the test procedure could be further improved through additional specifications for test installation, ambient temperature measurement, and testing ACIMs with dispensers.

a. Temporary Baffles

After publication of the January 2012 final rule, DOE issued a guidance document on September 24, 2013, regarding the use of temporary baffles during testing.[10] As described in the guidance, a baffle is a partition, usually made of a flat material such as cardboard, plastic, or sheet metal, that reduces or prevents recirculation of warm air from an ice maker's air outlet to its air inlet, or, for remote condensers, from the condenser's air outlet to its inlet. Temporary baffles refer to those installed only temporarily during testing and are not part of the ACIM model as distributed in commerce or installed in the field. During testing, the use of temporary baffles can block recirculation of warm condenser discharge air to the air inlet. This would reduce the average temperature of the air entering the inlet, which would result in lower energy use that would not be representative of the energy use of the unit as operated by the end user.

In the guidance document, DOE expressly stated that installing such temporary baffles is inconsistent with the ACIM test procedure, which states that the unit must be ''set up for testing according to the manufacturer's written instruction provided with the unit'' and that ''no adjustments of any kind shall be made to the test unit prior to or during the test that would affect the ice capacity, energy usage, or water usage of the test sample.''[11] Therefore, DOE's final guidance stated that the use of baffles to prevent recirculation of air between the air outlet and inlet of the ice maker during testing is not consistent with the DOE test procedure for automatic commercial ice makers, unless the baffle is (a) a part of the ice maker or (b) shipped with the ice maker to be installed according to the manufacturer's installation instructions.

In the March 2019 RFI, DOE requested comment on the use of temporary baffles in testing ACIMs and whether DOE should amend the test procedure to permit their use in testing. 84 FR 9979, 9982–9983.

The Joint Commenters commented that the test procedure needs to address testing with temporary baffles, as this guidance would help clarify the intent of the test procedure. (Joint Commenters, No. 2 at p. 1) Hoshizaki,

[10] See *www1.eere.energy.gov/buildings/appliance_standards/pdfs/acim_baffles_faq_2013-9-24final.pdf.*

[11] Section 4.1.4, ''Test Set Up,'' of AHRI Standard 810–2007 and AHRI Standard 810–2016.

AHRI, and Howe commented that temporary baffles may not be used for testing, unless the baffle is found in product marketing, is shipped with the ice maker, and is to be installed according to the manufacturers' installation instructions. (Hoshizaki, No. 4 at p. 1; AHRI, No. 5 at p. 3; Howe, No. 6 at p. 4) Brema commented that all parts that can be removed by the final user should be removed during the energy consumption test. (Brema, No. 3 at p. 4)

Based on the final guidance document and consistent with feedback received in response to the March 2019 RFI, DOE proposes to define the term ''baffle'' consistent with the description in the guidance document and to expressly prohibit the use of baffles when testing of ACIMs unless the baffle is (a) a part of the ice maker or (b) shipped with the ice maker to be installed according to the manufacturer's installation instructions. DOE is not proposing that all parts that can be removed by the final user shall be removed for testing. The proposed approach based on manufacturer installation instruction is likely how an ice maker would be installed during use and is most representative of the energy use of ACIMs operated in the field. This proposal does not add any burden or impact measured performance compared to the existing test procedure, as it is consistent with how the test procedure currently must be performed, and based on commenters' feedback, how it is currently being conducted.

Issue 21: DOE requests comment on its proposal to expressly provide that a baffle must not be used when testing ACIMs unless the baffle is (a) a part of the ice maker or (b) shipped with the ice maker to be installed according to the manufacturer's installation instructions.

The guidance document issued by DOE on September 24, 2013, also acknowledged that warm air discharged from an ice maker's outlet can affect the ambient air temperature measurement such that it fluctuates outside the maximum allowed ±1 °F or ±2 °F range, and that baffles can prevent such fluctuation. Because temporary baffles are not permitted for use during testing, DOE stated in the guidance document that if the ambient air temperature fluctuations cannot be maintained within the required tolerances, temperature measuring devices may be shielded so that the indicated temperature will not be affected by the intermittent passing of warm discharge air at the measurement location. DOE also stated that the shields must not block recirculation of the warm discharge air into the condenser or ice maker inlet.

Based on the final guidance document, DOE proposes to specify in the test procedure that if the ambient air temperature fluctuations (and relative humidity as discussed in section III.D.3.a) cannot be maintained within the required tolerances, temperature measuring devices (and relative humidity measuring devices) may be shielded to limit the impact of intermittent passing of warm discharge air at the measurement locations. DOE further proposes that if shields are used, they must not block recirculation of the warm discharge air into the condenser or ice maker inlet. DOE does not expect this proposal to impact measured ACIM performance compared to the existing test procedure, as it is consistent with the existing test approach.

Issue 22: DOE requests comment on its proposal to specify that temperature measuring devices may be shielded to limit the impact of intermittent warm discharge air at the measurement locations and that if shields are used, they must not block recirculation of the warm discharge air into the condenser or ice maker air inlet.

Issue 23: DOE requests comment on whether any ACIM models discharge air such that the temperature and relative humidity measuring devices would be unable to maintain the required ambient air temperature or relative humidity tolerances even with the measuring devices shielded. If so, DOE requests comment on whether alternate ambient air temperature and relative humidity measurement locations would be necessary (*e.g.,* the ambient temperature measurement locations for water-cooled ice makers, if those locations are not affected by condenser discharge air) and if the ambient air temperature and relative humidity measured at the alternate locations should be within the same tolerances as would otherwise be required.

b. Purge Settings

Purge water refers to water that is introduced into the ice maker during an ice-making cycle to flush dissolved solids out of the ice maker and prevent scale buildup on the ice maker's wetted surfaces. Ice makers generally allow for setting the purge water controls to provide different amounts of purge water or different frequencies of purge cycles. Different amounts of purge water may be appropriate for different levels of water hardness or contaminants in the ACIM water supply. Most ice makers have manually set purge settings that provide a fixed amount of purge water, but some ice makers include an automatic purge water control setting that automatically adjusts the purge water quantity based on the supply water hardness.

Because purge water is cooled by the ice maker, allowing a different purge water quantity will result in a different measured energy use. To ensure representative and consistent test results for ice makers with automatic purge water controls, on September 25, 2013, DOE issued final guidance stating that ice makers with automatic purge water control should be tested using a fixed purge water setting that is described in the written instructions shipped with the unit as being appropriate for water of normal, typical, or average hardness.[12] DOE further stated that the automatic purge setting should not be used for testing.

In the March 2019 RFI, DOE requested comment on what purge settings should be considered for testing for ACIMs with multiple or automatic purge settings and whether any ACIMs exist with automatic purge settings but without a fixed purge setting appropriate for ''normal'' water hardness and, if such a unit exists, how it should be tested. 84 FR 9979, 9983.

The Joint Commenters commented that the test procedure would be more representative of the energy use of ACIM with automatic purge water control settings if these units were tested in such a way that allowed the controls to adjust automatically as they would in the field, stating that automatic purge water control settings may save energy by reducing purge water quantity when the water supply hardness is lower. (Joint Commenters, No. 2 at p. 2)

Howe stated that the test procedure should specify the purge setting associated with the highest energy use, as purge energy use is significant and will impact the energy consumption of an ACIM over its average use cycle. Howe also explained that it is not aware of any automatically sensing purge or flush setting devices. (Howe, No. 6 at p. 5–6)

AHRI commented that purge cycles and their frequency can affect the sensible heat transfer during the test and therefore influence the energy use. (AHRI, No. 5 at p. 3)

Hoshizaki commented that the purge cycle's energy use over a year is negligible compared to the energy used to produce ice. (Hoshizaki, No. 4 at p. 1) Hoshizaki and AHRI commented that ideal purge settings vary based on the

[12] See *www1.eere.energy.gov/buildings/appliance_standards/pdfs/acim_purge_faq_2013-9-25final.pdf.*

water quality of the area, and purge settings are generally set by trained service technicians during installation. (Hoshizaki, No. 4 at p. 1; AHRI, No. 5 at p. 4) Hoshizaki commented that any changes to purge settings for testing should be addressed through ASHRAE 29. (Hoshizaki, No. 4 at p. 1)

Consistent with DOE's existing guidance, DOE proposes that ice makers with automatic purge water control must be tested 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. Such a control setting is likely to reflect the most typical ACIM installation and operation. Any other automatic purge controls (*i.e.,* those without any user-controllable settings) would operate as they would during normal use. Additionally, while ACIMs may be installed and set up by service technicians based on the installation location, such setup is not appropriate for testing because it may introduce variability in test settings based on the test facility location. Consistent with DOE's existing guidance, DOE is also proposing that 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.

This proposal does not conflict with any of the setup or installation requirements in AHRI 810–2016. Additionally, this proposal would not add burden to manufacturers or impact ACIM performance as measured under the existing test procedure, as it would codify the final guidance document issued on September 25, 2013, specifying use of a fixed purge setting.

In the March 2019 RFI, DOE also explained that batch ice makers might initiate a flush or purge cycle every 12 hours, and continuous ice makers might pause the ice making operation periodically to accomplish the additional purge. 84 FR 9979, 9983. Testing according to the current test procedure might not include such a purge cycle, and thus the resulting tested energy use might not appropriately represent what an end user would experience in the field. *Id.* DOE requested comment on the presence and frequency of any ''additional'' or ''increased-water'' purge cycles and their impact on energy and water use. *Id.*

The Joint Commenters commented that because purge water is cooled by the ice maker, it contributes to energy use during a representative average use cycle. In addition, the Joint Commenters noted that the previous energy conservation standards rulemaking considered reduced potable water flow as a technology option for reducing energy use. The Joint Commenters further stated that DOE's analysis showed that some or all of the purge water drained from batch ice makers leaves the equipment near 32 °F, which represents lost refrigeration that could potentially have been used to produce more ice. (Joint Commenters, No. 2 at p. 1) The Joint Commenters stated that DOE should investigate how to capture the impact of any ''additional'' or ''increased-water'' purge cycles, including additional purges outside of regular cycling or continuous operation, which may not be captured by the current test procedure. (Joint Commenters, No. 2 at p. 2)

AHRI commented that introducing specifications to require a purge cycle during the test would introduce additional burden to manufacturers, and that all ACIM units should be tested at the factory default settings. (AHRI, No. 5 at p. 4)

Howe commented that the current ACIM test procedure does not allow for the energy use from a flush cycle to be determined, and that the current test procedure results are not representative of the total energy used by the ice maker when flush cycles are considered. Howe stated that some manufacturers allow settings that flush all contents of the evaporator, in which case all of the water/ice product inside of the evaporator is melted by the incoming water to ensure all the dissolved solids in the evaporator are flushed from the system. Howe commented that the energy used by the ice maker to make the chilled water/ice inside of the evaporator at the beginning of the cycle is wasted and not turned into useable ice product for the end user. Howe stated that following the flush, the ACIM will then turn on and need to pull down the evaporator to return to the steady state operating condition. (Howe, No. 6 at p. 6) Howe also suggests that the internal volume of ACIMs that use flush cycles be used to estimate the amount of ice product that is wasted during a flush cycle to determine an energy penalty associated with the flush cycle. (Howe, No. 6 at p. 6)

Brema commented that the purge cycle must be excluded from the average functionality time and not be considered for the energy consumption calculation. (Brema, No. 3 at p. 4)

DOE conducted testing to investigate the energy and water consumption associated with flush or purge cycles. Table III.6 summarizes how a purge cycle contributes to the energy and water consumption of a continuous ACIM.

TABLE III.6—SUMMARY OF ENERGY & WATER CONSUMPTION OF A CONTINUOUS ACIM WITH PURGE CYCLE

Mode	Average power draw (W)	Energy consumption (kWh)	Average water usage (lbs)
Ice Production	936	11.23	* 275
Purge (every 12 hours by default)	35	0.01	2.0
Recovery after Purge	1,062	0.08	N/A

* This number represents the harvest weight during the associated operating period. The total amount of water used may be higher. N/A: The water used during the recovery after purge does not differ from normal ice production.

As shown in Table III.6, the purge cycle, including the recovery after purge, consumed 0.09 kWh, representing less than 1 percent of the total energy consumed over a period of normal operation (*i.e.,* ice production, automatic purge cycle, and purge recovery). Additionally, the ACIM consumed 2 gallons of water during the purge cycle, representing less than 1 percent of the total consumed over the period of normal operation.

In comparison, DOE testing of a batch ACIM showed that the purge occurred once every 5 hours under the default setting and coincided with the start of a harvest, resulting in no separate purge cycle. DOE observed an increased batch cycle time for the purge cycle and a corresponding increase in ice collected. DOE also observed that power draw over the purge cycle was consistent with a typical non-purge cycle. As a result, the harvest rate and energy use rate observed for a purge cycle were similar to those measured over stable non-purge cycles.

DOE also observed that testing to account for the energy and water consumption of purge cycles would require a significant increase in total test time. Table III.7 presents DOE's estimates of the test durations under the existing test approach and under an approach that would account for purge operation.

TABLE III.7—SUMMARY OF ESTIMATED TEST DURATIONS WITH AND WITHOUT INCLUDING PURGE CYCLES

Test unit	Duration (hours)			
	Existing ice production test (without purge)	Existing test total (without purge)	Ice production test (with purge)	Test total (with purge)
Continuous	2	8	12.5	18.5
Batch	2	8	5.5	11.5

As discussed further in section III.F.1.a, DOE estimates a typical ACIM test duration to be 8 hours, including set up, pull-down, and test operation. The period of active ice production measured depends on how quickly the unit achieves stability, but the existing test approach requires measuring at least 5 or 6 ice collection periods (for batch and continuous ACIM, respectively) for confirming stability and conducting the test. DOE observed that the durations of the required ice collection periods were approximately 2 hours for both the continuous and batch ACIM in the test sample. Accounting for purge cycle operation would require extending the test period to capture both stable ice production and normal purge operation. This would require an estimated increase in test duration of 10.5 hours (more than double) for the continuous test unit and 3.5 hours (approximately 44 percent) for the batch test unit.

The energy and water consumption during the flush or purge cycles are very small relative to the energy and water consumed during normal ice production and the additional test burden associated with measuring purge events would be a significant increase in test burden. Therefore, DOE is not proposing to address flush or purge cycles in its test procedure.

Issue 24: DOE requests comment on its proposal to require ACIMs with automatic purge water control to be tested 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. DOE also requests comment on its initial determination to not account for energy or water used during intermittent flush or purge cycles. DOE continues to request data regarding the energy and water use impacts of purge cycles.

c. Clearances

As discussed in section III.C and shown in Table III.2, the clearance requirements around a unit under test changed between ASHRAE Standard 29–2009 and ASHRAE Standard 29–2015. The current DOE test procedure, through reference to section 6.4 of ASHRAE Standard 29–2009, requires a clearance of 18 inches on all four sides of the test unit, while section 6.5 of ASHRAE Standard 29–2015 requires a minimum clearance of 3 feet to adjacent test chamber walls, or the minimum clearance specified by the manufacturer, whichever is greater.

In response to the March 2019 RFI, Howe commented that it is reasonable for customers to expect units to perform at their ratings when using the minimum clearances as described in the manufacturer literature. Howe recommended that DOE require a clearance of 3 feet, or the minimum clearance allowed by the manufacturer, whichever is less, to better represent an average use cycle. Howe also commented that this clearance should include all machine clearances, not just walls within the test chamber, and that a minimum clearance enclosure be built for testing ACIMs based on the harshest manufacturer-recommended operating installation, without blocking an intake air path to the ice maker. Howe also commented that this setup would not be a large test burden as many manufacturers test units of similar size, and the enclosures could be used over multiple tests. (Howe, No. 6 at p. 4)

DOE conducted testing to assess how the different clearance requirements could affect the measured energy consumption and harvest rate of ACIMs. DOE investigated the performance of ACIMs under four clearance setups: (1) The clearance required by ASHRAE Standard 29–2015, (2) the clearance required by the current DOE test procedure (through reference to ASHRAE Standard 29–2009), (3) all minimum clearances as recommend by the manufacturer, and (4) the rear minimum clearance as recommend by the manufacturer with all other clearances per ASHRAE Standard 29–2015. Table III.8 summarizes how four test units performed under the four clearance setups.

TABLE III.8—SUMMARY OF CLEARANCE IMPACT ON ACIM PERFORMANCE

Test unit	Clearance setup	Harvest rate (lbs of ice/24hrs)	Change in harvest rate (from ASHRAE standard 29–2015)	Energy consumption (kWh/100 lbs of ice)	Change in energy consumption (from ASHRAE standard 29–2015)
1	ASHRAE Standard 29–2015	573	N/A	4.93	N/A
	Current DOE Test Procedure	575	0%	4.97	1%
	Minimum Clearances	548	−4%	5.25	6%
	Minimum Rear Clearance	576	1%	4.94	0%
2	ASHRAE Standard 29–2015	814	N/A	4.46	N/A
	Current DOE Test Procedure	815	0%	4.48	0%
	Minimum Clearances	794	−2%	4.59	3%

TABLE III.8—SUMMARY OF CLEARANCE IMPACT ON ACIM PERFORMANCE—Continued

Test unit	Clearance setup	Harvest rate (lbs of ice/24hrs)	Change in harvest rate (from ASHRAE standard 29–2015)	Energy consumption (kWh/100 lbs of ice)	Change in energy consumption (from ASHRAE standard 29–2015)
	Minimum Rear Clearance	820	1%	−4.41	1%
3	ASHRAE Standard 29–2015	1,164	N/A	4.41	N/A
	Current DOE Test Procedure	1,164	0%	4.46	1%
	Minimum Clearances	1,043	−10%	5.14	17%
	Minimum Rear Clearance	1,149	−1%	4.44	1%
4	ASHRAE Standard 29–2015	1,197	N/A	5.40	N/A
	Current DOE Test Procedure	1,195	0%	5.43	1%
	Minimum Clearances	1,105	−8%	6.04	12%
	Minimum Rear Clearance	1,197	0%	5.39	0%

The tests indicate that the different clearance requirements, except for the installation with all minimum clearances, have little to no impact on the measured performance of ACIMs. The impact observed from the minimum clearance test is likely due to the exhaust air being directed through the test enclosure (*i.e.,* the minimum clearances on the sides, back, and top of the ACIM resulted in an enclosure guiding condenser exhaust air) back to the front air inlet on the ACIM, which results in the ACIM drawing in warmer air than under the three other setup configurations. As described in section III.D.4.a, testing with a temporary baffle to prevent such air flow is not appropriate, so the condenser exhaust re-circulated during this investigative testing.

Based on these test results, an installation configuration that provides only the minimum manufacturer test clearances for all sides represents a worst-case installation for ACIM performance. While manufacturers might provide minimum clearances for all sides of a unit, the expectation may be that units are installed such that one or more of the sides has clearance exceeding the manufacturer minimum.

Similarly, a minimum clearance of 3 feet to adjacent test chamber walls or a clearance of 18 inches on all four sides (as required by ASHRAE Standard 29–2015 and the current DOE test procedure, respectively) may also not be a typical ACIM installation. Because ACIMs are typically installed in commercial food service applications with space constraints, such as commercial kitchens, end users likely install their ACIMs against at least a rear wall using the manufacturer minimum clearance to maximize available working space. Based on the test data in Table III.7, testing according to the manufacturer-specified minimum rear clearance has little to no measured impact on ACIM performance for the four test units. However, because ACIMs may exhaust condenser air from the rear of the unit, an inappropriate manufacturer minimum rear clearance (or lack of manufacturer instructions regarding rear clearance) could adversely affect ACIM performance while being representative of typical use, and should be captured in the tested performance.

Therefore, DOE proposes that ACIMs be tested according to the manufacturer's specified minimum rear clearance requirements, or 3 feet from the rear of the ACIM, whichever is less. DOE is proposing testing be conducted with a minimum clearance of 3 feet or the minimum clearance specified by the manufacturer, whichever is greater, on all other sides of the ACIM and all sides of the remote condenser, if applicable. This clearance for all sides other than the rear of the ACIM is generally consistent with the requirement in ASHRAE Standard 29–2015. As discussed, and shown in the DOE test data, the impact of this proposed change on measured energy use for currently certified ACIMs would likely be de minimis. DOE expects manufacturer installation instructions would typically provide for clearances that would ensure sufficient air flow to avoid any adverse impacts on ACIM performance under the proposed test setup.

DOE is not proposing specific requirements for the wall used to maintain the rear clearance when conducting the test. Test laboratories would be able to satisfy the clearance requirements in any way they choose, as long as the test installation meets the proposed requirements.

Issue 25: DOE requests comment on its proposal to require that ACIMs be tested according to the manufacturer's specified minimum rear clearance requirements, or 3 feet from the rear of the ACIM, whichever is less. All other sides of the ACIM and all sides of the remote condenser, if applicable, shall be tested with a minimum clearance of 3 feet or the minimum clearance specified by the manufacturer, whichever is greater. DOE also requests comment on whether this proposal would affect measured energy use and harvest rate compared to the existing DOE test procedure.

d. Ambient Temperature Measurement

Air temperature fluctuations from the test chamber or the ACIM's condenser exhaust air can potentially affect an ACIM's measured energy consumption and harvest rate.

The current ACIM test procedure, which is based on AHRI Standard 810–2007 and ASHRAE Standard 29–2009, does not specify whether a weighted or unweighted sensor is to be used to measure ambient temperature. A weighted sensor measures the temperature of a high conductivity (isothermal) mass to which it is connected. The mass slows equilibration of the measured temperature with the surrounding air, thus damping out air temperature fluctuations. This may result in a weighted sensor indicating that the fluctuations are within the required temperature tolerances, whereas an unweighted sensor could indicate temperature extremes exceeding the required temperature tolerances. This difference in function of the sensors impacts the application of the required temperature tolerances, *i.e.,* temperature fluctuations that fall outside the required tolerances may not be detected when using a weighted sensor, but would be detected when using an unweighted sensor.

In the March 2019 RFI, DOE requested comment about whether manufacturers use weighted or unweighted temperature measurement instruments to measure ambient temperatures during ice maker testing. DOE also sought comment and data on the benefits and burdens of using unweighted temperature measurement instruments compared to weighted temperature measurement instruments. 84 FR 9979, 9985.

Hoshizaki commented that it currently uses unweighted temperature measurement instruments to record ambient temperature readings during testing. (Hoshizaki, No. 4 at p. 2) AHRI stated that these unweighted instruments are quick to react to change but can exhibit some fluctuation during readings. AHRI also noted that unweighted instrumentation sufficiently meets the tolerances and requirements set forth in the test procedures and does not increase testing time or instrumentation cost as weighted temperature sensors would. (AHRI, No. 5 at p. 7) Howe recommended that DOE make the type of temperature instrument explicit for each measurement location on the product, noting that an unweighted versus weighted temperature instrument can create uncertainty that will impact the average use cycle energy use. Howe also commented that room temperature could be measured by a weighted temperature device, while the condenser inlet air be measured by an unweighted temperature device, due to the nature of the inlet air directly impacting the performance of the refrigeration system. (Howe, No. 6 at p. 12–13)

DOE conducted testing to evaluate the ability to meet the specified tolerances of ASHRAE Standard 29–2015 using both weighted and unweighted temperature sensors. The temperature fluctuations recorded by weighted temperature sensors may be less than those recorded with unweighted measurement due to damping of the fluctuations by the weighted thermal mass. As such, weighted sensors may give the false impression that ambient temperature tolerances of ±2 °F during the first 5 minutes of each freeze cycle, and not more than ±1 °F thereafter, are met during testing. The measurement of ambient temperature using unweighted sensors provides more representative measures of actual instantaneous ambient temperature conditions than the measurement of weighted sensors. DOE observed in its testing that the ambient temperature was within the tolerances specified in ASHRAE Standard 29–2015 for all freeze cycles when using either weighted or unweighted sensors.

Therefore, DOE proposes to specify that unweighted sensors shall be used to make all ambient temperature measurements. Based on comments, this proposal reflects current industry practice and would not add any burden. This proposal is consistent with AHRI Standard 810–2016 because it specifies the instrumentation for measuring ambient temperature, but does not otherwise change the existing requirements.

Issue 26: DOE requests comment on its proposal to specify that ambient temperature measurements shall be made using unweighted sensors.

The current DOE guidance and proposal in this NOPR regarding the use of temporary baffles, as discussed in section III.D.4.a, illustrate that temporary baffles can reduce or prevent recirculation of warm air from an ACIM's condenser exhaust air to its air inlet. This recirculation of warm air can potentially affect an ACIM's measured energy consumption and harvest rate, and using a temporary baffle for testing is unrepresentative of actual ACIM use. The recirculation of warm air may also affect the ability to maintain ambient temperature within the range specified in AHRI Standard 810–2016 and relative humidity within the range proposed in this NOPR. For example, if the condenser exhaust is warm enough and directed towards the air inlet location (and corresponding ambient temperature measurement), the measured ambient temperature may be warmer than the representative ambient temperature around the unit under test, even with shielding around the temperature sensor.

To evaluate the extent of this potential impact on temperature, DOE tested an ACIM which exhausted its warm condenser air on the side of the ACIM adjacent to the side with the air intake. Three ambient thermocouples were placed 1 foot from the geometric center of each side around the ACIM in addition to the unshielded ambient thermocouple that was placed 1 foot from the air inlet. The unshielded ambient thermocouple that was located 1 foot from the air inlet was used to control the test chamber conditions in accordance with AHRI Standard 810–2016 (*i.e.,* the overall chamber temperature was reduced as necessary to maintain the temperature one foot in front of the air inlet as close to 90 °F as possible). Table III.9 summarizes the results of this testing.

TABLE III.9—AVERAGE AMBIENT TEMPERATURES MEASURED ON EACH SIDE AROUND AN ACIM

Inlet (°F)	Exhaust (°F)	Opposite side of exhaust (°F)	Opposite side of inlet (°F)
89.9	90.2	88.5	88.2

As shown in Table III.9, the air within the chamber had to be reduced below 89 °F (outside the 90 ±1 °F allowable ambient temperature range specified in ASHRAE Standard 29–2015) to maintain the temperature at the air inlet near the specified 90 °F condition. This data suggests that ACIM models that allow the warm condenser exhaust air to recirculate to the air intake may require lower overall ambient test chamber temperatures to maintain the specified condition at the air inlet. As discussed in section III.D.4.a, DOE's guidance regarding temporary baffles states that temperature measuring devices may be shielded so that the indicated temperature will not be affected by the intermittent passing of warm discharge air at the measurement location. DOE also noted that the shields must not block recirculation of the warm discharge air into the condenser or ice maker inlet. The ambient temperature measurement is meant to represent the temperature of the air around the unit under test that is not impacted by unit operation. Because test facilities may have difficulty effectively shielding the air inlet thermocouple from warm discharge air without blocking the recirculation of that air to the ACIM air inlet, DOE is proposing that the ambient temperature may be recorded at an alternative location. DOE proposes that for ACIMs in which warm air discharge impacts the ambient temperature as measured in front of the air inlet (*i.e.,* the warm condenser exhaust airflow is directed to the ambient temperature location in front of the air inlet), the ambient temperature may instead be measured at locations 1 foot from the cabinet, centered with respect to the sides of the cabinet, for each side of the ACIM cabinet with no air discharge or inlet. This proposal is an alternative intended to reduce burden compared to the existing approach implemented in DOE's current test procedure guidance. DOE expects that this proposal would not impact measured ACIM performance compared to the existing test approach. DOE also proposes that the relative humidity measurement, as proposed in this NOPR, would also be made at the same alternative locations.

Test installation according to the manufacturer's minimum rear clearance requirements, as discussed in section III.D.4.c, may affect the ability to measure the ambient temperature and relative humidity 1 foot from the air inlet if the air intake is through the rear side of the ACIM and the minimum rear clearance is less than 1 foot from the air inlet. Additionally, the alternate measurement location, as proposed earlier in this section, would not be feasible for the rear side of a model with no air discharge or inlet on that side and with a minimum rear clearance of less than 1 foot.

Accordingly, DOE proposes that if a measurement location 1 foot from the rear of an ACIM is not feasible for testing that would otherwise require a measurement at that location, the ambient temperature and relative humidity shall instead be measured 1 foot from the cabinet, centered with respect to the surface(s) of the ACIM, for any surfaces around the perimeter of the ACIM that do not include an air discharge or air inlet. DOE similarly does not expect this proposal to impact current ACIM measurements as it provides an alternative measurement location for the existing ambient temperature and relative humidity requirements.

Issue 27: DOE requests comment on its proposal to allow for an alternate ambient temperature (and relative humidity) measurement location to avoid complications associated with shielding the measurement in front of the air inlet, as currently required. DOE also requests comment on the proposal for measuring ambient temperature and relative humidity for ACIMs for which the proposed rear clearance would preclude temperature measurements at the rear of the unit under test.

e. Ice Cube Settings

DOE is aware that some ice makers have the capability to make various sizes of cubes. The size of the cube can typically be selected on the control panel of the ice maker, for example. Section 5.2 of AHRI Standard 810–2016 states that for machines with adjustable ice cube settings, standard ratings are determined for the largest and the smallest cube settings, and that ratings for intermediate cube settings may be published as application ratings. This is consistent with the current DOE requirement as incorporated by reference in AHRI Standard 810–2007.

In response to the March 2019 RFI, DOE received a comment from Brema suggesting that, if parts of an ACIM can be adjusted by the final user (*e.g.,* electronic settings), the ACIM must be tested with the worst possible configuration. (Brema, No. 3 at p. 4)

DOE is not proposing any change to the existing industry requirement to determine ratings under the largest and smallest cube settings for ACIMs with adjustable ice cube settings. EPCA requires the DOE test procedure to be reasonably designed to produce test results which reflect energy use during a representative average use cycle. The current requirement to test using the largest and smallest cube setting is based on the industry standard, which was developed based on industry's experience with this equipment. There is no information to support that testing at the ''worst possible configuration'' would be representative of an average use cycle. Additionally, the approach suggested by Brema would require manufacturers to test every possible size setting to determine which has the highest energy use rate. As such, DOE is not proposing to change the current requirement to test at both the smallest and largest cube setting, which is the same as the requirement in AHRI Standard 810–2016.

Issue 28: DOE requests comment on maintaining the current requirement to test at the largest and smallest ice cube size settings, consistent with AHRI Standard 810–2016. DOE also requests information on the ice cube size setting typically used by customers with ACIMs with multiple size settings (largest, smallest, default, *etc.*).

f. Ice Makers With Dispensers

DOE is aware of certain self-contained ACIMs that dispense ice to a user through an automatic dispenser when prompted by the user. Testing according to the current DOE test procedure or the updated industry standards as proposed in this NOPR may be difficult or impossible for certain ACIM configurations with automatic dispensers.

Section 6.6 in ASHRAE Standard 29–2015 specifies that an ACIM must have its bin one-half full of ice when collecting capacity measurements. DOE is aware of self-contained ACIMs with dispensers that contain internal storage bins that are not accessible during normal operation (*i.e.,* users access the ice only through use of the dispenser). Because the internal bins are not accessible during normal operation, it can be difficult or impossible to establish a storage bin one-half full of ice for testing. Additionally, isolating the ice produced during testing from the ice initially placed in a one-half full storage bin may be difficult or impossible, depending on the dispenser and internal storage bin configuration.

Section 6.10 of ASHRAE Standard 29–2015 requires that the ACIM be completely assembled with all panels, doors, and lids in their normally closed positions during the test. Additionally, Section 4.1.4 of AHRI Standard 810–2016 requires that the test unit shall be configured for testing per the manufacturer's written instructions provided with the unit. It also requires that no adjustments of any kind shall be made to the test unit prior to or during the test that would affect the ice capacity, energy usage, or water usage of the test sample. Many self-contained ACIMs with dispensers would require removing case panels or the top lid to access the internal ice bin for ice collection or establishing initial test setup. In typical operation, users would access the ice only through the dispenser mechanism.

Through a letter dated January 28, 2020, Hoshizaki America, Inc. (''Hoshizaki'') petitioned for a waiver and interim waiver from the DOE ACIM test procedure at 10 CFR 431.134 for ice/water dispenser ACIM basic models to address the test issues previously described in this section (case number 2020–001 [13]). On July 23, 2020, DOE granted Hoshizaki an interim waiver to test the identified ACIM basic models with a modified test procedure. 85 FR 44529. After providing opportunity for public comment on the interim waiver and reviewing the one comment received, DOE granted Hoshizaki a waiver through a final decision and order published on October 28, 2020, requiring that the subject basic models be tested according to the modified alternate test procedure as follows:

Prior to the start of the test, remove the front panel of the unit under test and insert a bracket to hold the shutter (which allows for the dispensing of ice during the test) completely open for the duration of the test. After inserting the bracket, return the front panel to its original position on the unit under test. Conduct the test procedure as specified in 10 CFR 431.134 except that the internal ice bin for the unit under test shall be empty at the start of the test and intercepted ice samples shall be obtained from a container in an external ice bin that is filled one-half full with

[13] The petition and related documents are available at *www.regulations.gov* in docket EERE–2020–BT–WAV–0005.

ice and is connected to the outlet of the ice dispenser through the minimum length of conduit that can be used. 85 FR 68315.

This waiver granted to Hoshizaki includes instructions for testing the specific basic models addressed in that waiver process. However, other ACIM models with dispensers would likely require similar testing instructions. Moreover, after the granting of any waiver, DOE must publish in the **Federal Register** a notice of proposed rulemaking to amend its regulations to eliminate any need for the continuation of such waiver. 10 CFR 431.401(l). Therefore, DOE proposes to add general test instructions to the DOE test procedure at 10 CFR 431.134(b)(6) to allow for testing such models. DOE is proposing that ACIMs with a dispenser be tested with continuous production and dispensing of ice throughout the stabilization and test periods. If an ACIM with a dispenser is not able to allow for the continuous production and dispensing of ice because of certain mechanisms within the ACIM that prohibit this function, those mechanisms must be overridden to the minimum extent that allows for the continuous production and dispensing of ice. For example, this would allow for the temporary removal of panels or overriding of certain controls, if necessary. The capacity samples would be collected in an external bin one-half full with ice and connected to the outlet of the ice dispenser through the minimal length of conduit that can be used for the required time period as defined in ASHRAE Standard 29–2015. Because of the continuous production and dispensing of ice, these ACIMs would be required to have an empty internal storage bin at the beginning of testing. This would ensure that the collection periods capture only the quantity of ice produced during that period (*i.e.,* this would avoid any ice being collected that was produced prior to the collection period). This proposed approach would address issues with testing ACIM models with automatic dispensers, while allowing a representative measure of how ACIMs with dispensers are typically used. This approach would also minimize test burden by avoiding the need to significantly alter the configurations of these ACIM models for testing (*e.g.,* allowing for access to any internal storage bins during performance testing).

Issue 29: DOE requests comment on its proposal to collect capacity samples for ACIMs with dispensers through the continuous production and dispensing of ice throughout testing, using an empty internal storage bin at the beginning of the test period and collecting the ice sample through the dispenser in an external bin one-half full of ice. DOE also requests comment on its proposal to allow for certain mechanisms within the ACIM that would prohibit the continuous production and dispensing of ice throughout testing to be overridden to the minimum extent that allows for the continuous production and dispensing of ice. DOE seeks information on how manufacturers of these ACIMs currently test and rate this equipment under the existing DOE test procedure, whether the proposal would impact the energy use as currently measured, and on the burden associated with the proposed approach or any alternative test approaches.

g. Remote ACIMs

In the March 2019 RFI, DOE requested comment on whether the current test procedure could be improved to measure energy use more accurately during a representative average use cycle for remote condensing ice makers with dedicated condensing units. 84 FR 9979, 9983–9984. More specifically, DOE requested feedback on whether default refrigerant charging and line set specifications would be necessary absent manufacturer recommendations. *Id.* DOE also sought information on whether any additional test instructions would be needed for remote condensing ice makers. *Id.*

AHRI noted that many units are meant to be installed with specific condensing equipment, and DOE should follow the manufacturer installation and operation instructions to appropriately set up and test the unit. (AHRI, No. 5 at p. 5)

The Joint Commenters commented in support of providing default refrigerant charging and line set specifications, claiming it would provide consistency across testing laboratories and improve test repeatability and reproducibility. The Joint Commenters added that, before doing so, DOE should verify that the minimum requirement of 25 feet of interconnection tubing specified in AHRI 810 is representative of typical field installations. (Joint Commenters, No. 2 at p. 2–3)

Brema commented that the test must be performed according to technical specification and information listed on installation/instruction manufacturer manual. (Brema, No. 3 at p. 5)

Hoshizaki stated that ASHRAE 29 and AHRI 810 specify a minimum 25-foot line set or manufacturer's recommended set and that any additions to the current test method would need to be addressed in the ASHRAE 29 standard committee to verify that it would not be costly and burdensome. (Hoshizaki, No. 4 at p. 2)

Howe requested that DOE mandate refrigerant line size and charge instructions be included by the manufacturer with all remote condensing applications because there are many differences between manufacturers' systems, and a general guideline will not suffice. Howe recommended that the line size length for remote installations continue to be specified in the standard and account for typical remote condensing application in the field. (Howe, No. 6 at p. 8)

In the March 2019 RFI, DOE also requested comment on the appropriate test approach for remote ACIMs intended to be installed without a dedicated condensing unit (*i.e.,* ACIMs intended for use with refrigerant supplied by a remote compressor rack). 84 FR 9979, 9983–9984. DOE sought feedback on what types of these units are available on the market (*i.e.,* batch vs. continuous), whether an enthalpy test approach similar to that used for commercial refrigeration equipment would be appropriate for testing these ice makers, and if so, any additional instructions that would be needed for such testing. *Id.*

The Joint Commenters and Howe commented that DOE should apply a similar approach to remote condensing ice makers designed to be connected to compressor racks as for other types of remote condensing refrigeration equipment, which relies on a refrigerant enthalpy calculation and assumed compressor efficiencies to estimate the energy consumption of the compressor rack. (Joint Commenters, No. 2 at p. 3; Howe, No. 6 at p. 8–9)

AHRI stated that remote condensing ice makers that connect to condensing racks are currently outside the scope of AHRI 810 and ASHRAE 29. (AHRI, No. 5 at p. 5) Hoshizaki and AHRI commented that the market for these remote ACIM with non-dedicated condensing units is very small, and those that do exist are typically continuous. Hoshizaki and AHRI stated that testing units without dedicated compressors or condensers is more difficult due to the wide variety of installation variables. (Hoshizaki, No. 4 at p. 2; AHRI, No. 5 at p. 5)

DOE is not proposing amendments to the existing test procedures for testing remote condensing ACIMs. Based on a review of manufacturer installation instructions for ACIMs with dedicated remote condensing units, manufacturers typically recommend line sets and/or limitations to installation locations.

DOE has preliminarily determined that testing according to the manufacturer recommendations, as is currently required, rather than one specified remote setup, would represent typical use in the field and would produce consistent test results.

Many ACIMs that could be installed with refrigerant supplied by a compressor rack can also be tested with an appropriately sized dedicated condensing unit according to the existing test procedure. For ACIMs installed with a compressor rack, DOE lacks information on typical installation locations, operation, and market availability. As noted in the AHRI and Hoshizaki comments, the market for compressor rack installations is very small. Based on these comments, the existing requirement to test such units with an appropriately sized dedicated condensing unit is representative of typical use. Additionally, as discussed in the January 2012 final rule, any ACIMs designed only for connection to remote compressor racks are out of the scope of DOE's regulations. 77 FR 1591, 1600. Therefore, DOE is not proposing any amendments to its test procedure to address such units.

Issue 30: DOE requests comment on its initial determination that additional test setup and installation instructions are not required for ACIMs with dedicated remote condensing units. DOE seeks information and test data on the range of ACIM performance within the manufacturer-recommended installation parameters to determine whether additional requirements are needed to improve repeatability and reproducibility.

Issue 31: DOE requests comment on its proposal to not establish test procedures for ACIMs intended for installation with a compressor rack. DOE seeks information on the market availability of such equipment, including how manufacturers currently test and rate these units, and the extent to which they are installed with a compressor rack rather than a dedicated condensing unit.

5. Modulating Capacity Ice Makers

An ice maker could be designed to be capable of operating at multiple capacity levels, *i.e.,* a ''modulating capacity ice maker.'' This modulation could be accomplished by using a single compressor with multiple or variable capacities, using multiple compressors, or in some other manner. In the January 2012 final rule, DOE did not establish a test method for measuring the energy use or water consumption of automatic commercial ice makers that are capable of operating at multiple capacities. 77 FR 1591, 1601–1602. The decision to exclude modulating capacity ice makers was based on the lack of existing ACIMs with modulating capacity, as well as limited information regarding how such equipment would function. *Id.*

In the March 2019 RFI, DOE requested comment on the availability of modulating capacity ice makers in the market and, if any are available, DOE requested information on how such equipment functions, including typical capacity ranges and the relative frequency of use at different capacity ranges, and how such equipment is currently tested. 84 FR 9979, 9981.

AHRI and Howe commented that they are not aware of modulating capacity ACIM on the market today. (AHRI, No. 5 at p. 2; Howe, No. 6 at p. 2) AHRI added that if modulating capacity ACIMs become available, equipment manufacturers would provide the ASHRAE 29 committee with information on differences in equipment function. (AHRI, No. 5 at p. 2) Howe commented that future modulating capacity units should take a similar approach as taken in the residential refrigerator industry for features that temporarily introduce varying states of energy use (*i.e.,* they would not be active for testing), with the justification that the customer could not permanently change the capacity of the ice maker. However, Howe commented that any mode that will be consistently used by the customer daily should be accounted for in any measurement of the average use cycle of the product. (Howe, No. 6 at p. 2)

DOE conducted market research and examined publicly available sources to determine the prevalence of modulating capacity ice makers. DOE did not find any modulating capacity ice makers that are currently available in the market. Therefore, DOE is not proposing test procedures for modulating capacity ice makers.

Issue 32: DOE requests comment on its initial determination regarding the lack of availability of modulating capacity ice makers on the market.

6. Standby Energy Use and Energy Use Associated With Ice Storage

The current ACIM test procedure considers only active mode energy use when an ice maker is actively producing ice, and represents that consumption using a metric of energy use per 100 pounds of ice. The existing ACIM test procedure does not address standby energy use associated with continuously powered sensors and controls or ice storage outside of active mode operation. When not actively making ice, an ice maker continues to consume energy to power sensors and controls. In addition, ice that is stored in an integral or paired ice storage bin will melt over time and the ice maker will use additional energy to replace the ice that has melted to keep the bin full. In these ways, standby energy use from control devices and energy use associated with ice storage can impact the daily energy consumption of ACIM equipment.

In the March 2019 RFI, DOE requested data and information on the magnitude of energy use associated with standby energy use and energy use associated with replacing melted ice, as well as the relationship of such values to daily energy consumption of ACIMs. 84 FR 9979, 9986.

The Joint Commenters commented that incorporating standby energy use in the test procedure would provide a better representation of the daily energy consumption of ice makers and would require a minimal addition to test burden. (Joint Commenters, No. 2 at p. 4)

Hoshizaki, AHRI, and Howe commented that standby energy use for ACIMs is negligible. (Hoshizaki, No. 4 at p. 3; AHRI, No. 5 at p. 9; Howe, No. 6 at p. 15)

AHRI commented that standby energy use may be higher in remote condenser units because of the pump down switch, which energizes the compressor in the off-mode to maintain a balanced minimum pressure. (AHRI, No. 5 at p. 9) AHRI further stated that generally, ice makers do not run continuously, but it is possible for the equipment to be installed in restaurant kitchens or hotels where they could be used for an extended period of peak time. Because of the variations in application, AHRI stated that attempting to introduce an average use cycle beyond what is currently in the test procedure would be nearly impossible. (AHRI, No. 5 at p. 5)

Howe commented that all customers have the potential of using the ice maker continuously in operation, so standby loss energy is only relevant if the unit is being turned on and off during its operation. (Howe, No. 6 at p. 15) Howe commented that it is critical that transient behavior be considered in the average use cycle if it is a feature of the ice maker because any interruptions in ice making that are caused by design are within the manufacturer's design and impact energy, potable water, and condenser water use. (Howe, No. 6 at p. 8) Howe stated that, if DOE wants to properly account for all energy used by the ice maker in an average use cycle, the test procedure must include transient processes that are inherent to ice maker operation. (Howe, No. 6 at p. 5) Howe commented that there would be energy use associated with the standby as the unit rests and the increased energy use during pulldown [14] of the unit once it starts again, which is like the energy use for ice maker flush cycles. If DOE determines that the average use cycle of a product includes the transient process of ice making, standby, pulldown and returning to ice making, Howe proposed that all aspects of that transient process be considered for energy use. (Howe, No. 6 at p. 15) Howe further proposed a potential test method that would account for transient energy consumption. (Howe, No. 6 at p. 6)

Howe further commented in support of developing a test to account for ice melt rate. Howe stated that the utility of any ice produced is dependent on the customer's ability to use the ice before it melts. (Howe, No. 6 at p. 14)

Brema commented that there is no current test to evaluate ice melt, but such a measurement could be integrated with a similar approach used for calorimetric verification. (Brema, No. 3 at p. 12) Brema also commented that DOE should add a measurement of the performance rating of ice storage bins as specified in standard AHRI 820–2017. (Brema, No. 3 at p. 12)

DOE researched available test methods for determining energy use associated with ice storage. The AHRI certification program currently includes rating ice storage bins using AHRI 820–2017, ''Performance Rating of Ice Storage Bins.'' Similar methods are currently referenced in the Australian and Canadian test methods and standards applicable to self-contained ice makers and storage bins.[15 16] AHRI 820–2017 describes a standardized method for measuring the ''efficiency'' of ice storage bins using a metric called ''Theoretical Storage Effectiveness,'' which describes the percent of ice that would remain in a bin 24 hours after it is produced. In contrast, the December 2014 MREF Test Procedure NOPR considered energy use associated with ice storage based on testing the ice maker and storing the ice in a bin over a period of up to 48 hours with no ice retrieval to determine the energy use associated with replenishing the bin. 79 FR 74894, 74921–74922.

Many ice makers (including ice making heads (''IMHs'') and remote condensing unit (''RCU'') ice makers) can be paired with any number of storage bins, including those produced by other manufacturers. These ice makers are typically paired in the field with a bin chosen by the end user, rather than the manufacturer. However, DOE understands that many IMH and RCU equipment are advertised as compatible with a list of specific bins and, therefore, may be able to be rated based on recommended bin combinations.

Based on comments received in response to the March 2019 RFI, the energy use of ACIMs in standby mode is likely very low compared to active mode ice making energy use. Additionally, the contribution of any standby mode energy use to overall energy use can vary significantly depending on the specific installation and end use of the ACIM.

At this time, DOE does not have sufficient data and information to establish test procedures for standby energy use or energy use associated with ice storage. In addition, incorporating standby energy use and energy use associated with ice storage would require significant test procedure changes requiring an increase in test time. Therefore, because of the lack of data and undue burden on manufacturers, DOE is not proposing to amend its test procedures to account for standby or ice storage energy use.

Issue 33: DOE requests comment on its proposal to not amend its test procedures to account for standby or ice storage energy use. DOE also requests data on the typical durations and associated energy use for all ACIM operating modes and on the potential burden associated with testing energy use in those modes.

7. Calculations and Rounding Requirements

As compared to ASHRAE Standard 29–2009, section 9.1.1 ASHRAE Standard 29–2016 specifies averaging instructions for calculating the gross weight of product produced. ASHRAE Standard 29–2015 specifies to ''average the quantity for the three samples to determine the ice produced.'' However, this averaging instruction is not specified for the water or energy consumption calculations.

DOE proposes to provide explicitly that the energy use, condenser water use, and potable water use (as described in section III.D.8) be calculated by averaging the measured values for each of the three samples for each respective metric. This clarification would not affect the measured performance of ACIMs but would more explicitly present the calculation approach.

Issue 34: DOE requests comment on the proposal to clarify that the energy use, condenser water use, and potable water use (as described in section III.D.8) be calculated by averaging the calculated values for the three measured samples for each respective metric.

10 CFR 431.132 specifies rounding requirements for the ACIM metrics ''energy use'' and ''maximum condenser water use.'' Specifically, DOE requires energy use to be in multiples of 0.1 kWh/100 lb and condenser water use to be in multiples of 1 gallon per 100 pounds of ice (''gal/100 lb''). 10 CFR 431.132.

AHRI Standard 810–2007, which is currently incorporated by reference in the DOE test procedure, and AHRI Standard 810–2016, which is proposed for use in this NOPR, specify rounding requirements for the following quantities:

TABLE III.10—SUMMARY OF ROUNDING REQUIREMENTS

Quantity	AHRI standard 810 (both 2007 and 2016, except as noted)
Ice Harvest Rate	1 lb/24 h.
Condenser Water Use Rate	1 gal/100 lb.
Potable Water Use Rate	0.1 gal/100 lb.
Energy Consumption Rate	0.1 kWh/100 lb (2007); 0.01 kWh/100 lb (2016).
Ice Hardness Factor	Not Specified (percent).

[14] The evaporator temperature increases when the refrigeration system cycles off. Pulldown refers to the additional energy use needed to re-cool the evaporator for ice production.

[15] The Australian minimum energy performance standards (''MEPS'') apply to both stand-alone storage bins and ice storage bins contained in stand-alone equipment (AS/NZS 4865.2 & 3). The NRCan standard appears to apply only to storage bins contained in self-contained ice makers with integral storage bins.

[16] The newest version of the CSA test method, C742–15, refers directly to the 2012 version of AHRI 820 (and AHRI 821, which is the SI version of the standard).

DOE proposes to incorporate by reference AHRI Standard 810–2016, which would include the rounding requirements shown in Table III.10, with the exception of the provision for harvest rate. For harvest rate, the specified rounding to the nearest 1 lb/24 h could represent a significant percentage of harvest rates for low-capacity ACIMs. As discussed in section III.D.2, DOE observed low-capacity ACIMs available on the market with harvest rates as low as 7 lb/24 h. For this harvest rate, rounding to the nearest pound would allow a range of measured performance of approximately ±7 percent to have the same harvest rate result. Section 5.5.1 of ASHRAE Standard 29–2015 provides that ice-weighing instruments have accuracy and readability of ±1.0% of the quantity measured. Therefore, to avoid rounding harvest rate to a level that could impact test procedure accuracy, DOE proposes that harvest rate be rounded to the nearest 0.1 lb/24 h for ACIMs with harvest rates less than or equal to 50 lb/24 h.

Although rounding requirements are provided for the final calculated values used for rating ice makers, the DOE test procedure does not provide requirements for rounding intermediate values used in the calculations to determine those final values. Where rounding is not specified, the DOE test procedure intends the calculations of these values to be performed with raw measured data and only the final result to be rounded (where specified). However, this is not expressly specified in the current test procedure language. As such, DOE is proposing to specifically state that all calculations must be performed with raw measured values and that only the resultant energy use, condenser water use, and harvest rate metrics be rounded.

Issue 35: DOE requests comment on the proposal to expressly specify that all calculations must be performed with raw measured values and that only the resultant energy use, water use, and harvest rate metrics be rounded.

In addition, ASHRAE Standard 29–2015 specifies stabilization requirements in terms of either percent or absolute weight without specifically referencing a calculation for percent variation. There are multiple methods to calculate the percent difference between two measurements. One common method is to take the absolute difference between two measurements, for example ''A'' and ''B'', and to divide by the measurement of either ''A'' or ''B''. Under this method, the choice of denominator would affect the calculated value. Another method to calculate the percent difference is to take the absolute difference between two measurements and divide by the average of the two measurements. Under this method, the calculated percent difference is always the same. Therefore, DOE proposes to apply this second method, using the following equation, to calculate the percent difference between any two measurements. This includes any calculation to determine if the ice production rate has stabilized between cycles or samples, as described in section III.D.12.

$$Percent\ Difference = \frac{|A - B|}{\frac{A+B}{2}} x100\text{percent}$$

This proposal provides clarification but is otherwise consistent with the AHRI Standard 810–2016 and ASHRAE Standard 29–2015 requirements.

The proposed equation for calculating percent difference may affect when a unit meets the stability criteria. DOE analyzed over 50 ice maker tests conducted prior to this rulemaking where stability was calculated by dividing the absolute difference between the normalized harvest rate of two cycles by the harvest rate of one cycle, and found that calculating percent difference using the proposed equation did not affect the stabilization determination for any of the tests. The proposed equation to calculate the percent difference is appropriate to add clarity and consistency for testing.

Issue 36: DOE requests comment on its proposal to clarify that percent difference shall be calculated based on the average of the two measured values.

8. Potable Water Use

The water use of an ACIM includes water used in making the harvested ice; any dump or purge water used as part of the ice making process; and for water-cooled ACIMs, the water used to transfer heat from the condenser. In establishing initial standards for ACIMs, Congress addressed the latter type of water use. For ACIMs that produce cube type ice with capacities between 50 and 2500 pounds per 24-hour period, EPCA specified maximum condenser water use rates (in gallons per 100 pounds of ice). (42 U.S.C. 6313(d)(1)) In a note to the table establishing initial maximum condenser water use rates, the statute provides that ''Water use is for the condenser only and does not include potable water used to make ice.'' (*Id.*)

In the January 2012 final rule, DOE noted that 42 U.S.C. 6313(d) does not require DOE to develop a water conservation test procedure or standard for potable water use in cube type ice makers or other ACIMs; rather, it sets forth energy and condenser water use standards for cube type ice makers at 42 U.S.C. 6313(d)(1), and allows, but does not require, the Secretary to issue analogous standards for other types of ACIMs under 42 U.S.C. 6313(d)(2). 77 FR 1591, 1605.

DOE further stated that ambiguous statutory language may lead to multiple interpretations in the development of regulations. *Id.* DOE stated that the statutory language is unclear whether the footnote on potable water use that appears in 42 U.S.C. 6313(d)(1) has a controlling effect on 42 U.S.C. 6313(d)(2) and 42 U.S.C. 6313(d)(3)—the statutory direction to review and consider amended standards. *Id.* Potable water use is not referenced anywhere else in 42 U.S.C. 6313(d), and thus it is difficult to determine whether this footnote is a clarification or a mandate in regard to cube type ice makers, and furthermore, whether it would apply to the regulation of other types of ACIMS. *Id.*

DOE also stated that while there is generally a positive correlation between energy use and potable water use, DOE understands that at a certain point the relationship between potable water use and energy consumption reverses due to scaling. *Id.* Based on this fact, and given the added complexity inherent to the regulation of potable water use and the concomitant burden on ACIM manufacturers, DOE did not establish regulations or require testing and reporting of the potable water use of ACIMs. *Id.* Without a clear mandate from Congress on potable water use generally, and given that Congress chose not to regulate potable water use for cube type ice makers by statute, DOE exercised its discretion in choosing not to include potable water use rate in its test procedure for ACIMs. *Id.*

ASHRAE Standard 29–2015 and AHRI Standard 810–2016 include measurements and rating requirements for potable water use. The measurement of ''non-condenser'' potable water use (*i.e.,* water used in making the harvested ice and any dump or purge water) is currently not specified by the DOE test procedure, but is required by other programs, such as ENERGY STAR [17] and the AHRI certification program.[18]

As stated in the March 2019 RFI, DOE reviewed the relationship between potable water use with harvest rate and daily energy consumption by analyzing reported ACIM data from the AHRI directory and the ENERGY STAR product database.[19] [20] 84 FR 9979, 9986. DOE observed that all continuous ice makers had reported values for potable water use per 100 pounds of ice between 11.9 and 12.0 gallons, because all the water is converted to produced ice. *Id.* In contrast, potable water use varies for batch type ice makers because a portion of the potable water is drained from the sump at the end of each ice making cycle—this portion is different for different ice maker models. *Id.* The relationship between potable water use and daily energy consumption of the AHRI and ENERGY STAR data is not identifiable when considering the entire dataset. *Id.*

Because energy use can be affected by many factors other than potable water use, the lack of a clear trend between energy use and potable water use does not provide a definitive indication of the extent of the relationship between energy use and potable water use. Although the exact relationship between potable water use and energy use is not understood, potable water use does impact energy use. An ACIM must chill the entering potable water to some extent. The extent to which potable water is not directly converted to ice, it still is likely cooled to 32 °F. Cooled potable water that is not directly converted to ice and is drained from the unit represents lost refrigeration capacity. As such, reducing potable water use may provide the potential for reduced energy consumption.

In the March 2019 RFI, DOE requested comment and information on the relationship between potable water use and energy use, including data quantifying the relationship, and on any potential impact this relationship could have on customer utility. 84 FR 9979, 9986.

Hoshizaki commented that there is a large variation in the market on the relationship among energy use, water use, and ice production. (Hoshizaki, No. 4 at p. 2) Hoshizaki also asserted that regulating potable water usage would risk compromising the sanitary effects of ice makers. (Hoshizaki, No. 4 at p. 2–3)

Howe commented that there is a relationship between potable water use and energy use that is not currently accounted for. Howe agreed with DOE's determination that potable water use for all ice makers at steady state will be around 12 gallons per 100 lbs of ice due to the mass balance of water flow into and ice product out of the ice maker (most ice makers take in 12 gallons of water to produce 100 lbs of ice at some ice hardness). Howe commented that the differentiation in potable water use would become apparent when the ice hardness adjustment factor is added to this measurement as it is for energy consumption and condenser water use in 10 CFR 431.134(b)(2)(i). Howe suggested that potable water use must also be adjusted based on ice hardness to show differentiation in the water use by various continuous type ice makers. (Howe, No. 6 at p. 13–14) Howe also offered a test proposal to determine the impact of ice melt rate on potable water use. (Howe, No. 6 at p. 14)

AHRI commented that regulating water usage can be in direct conflict with the characteristics critical to the customers' needs and preferences, specifically clear and consistent ice. (AHRI, No. 5 at p. 8)

As discussed earlier in this section and as indicated in comments from interested parties, ACIMs currently available on the market have a wide range of potable water use, and the relationship between potable water use and energy use and harvest rate is not clear. Based on its inclusion in the AHRI certification program and ENERGY STAR qualification criteria, potable water use may be a useful measurement as part of characterizing the energy use associated with ACIM performance. To align with the AHRI certification program and ENERGY STAR, while allowing for a measurement of potable water use that is consistent with the test requirements proposed in this NOPR for energy use, harvest rate, and condenser water use, DOE is proposing to include measurement of potable water use in the DOE ACIM test procedure at 10 CFR 431.134. Because DOE does not regulate ACIM potable water use, testing for the potable water measurements would be voluntary. Specifically, DOE is not proposing to require manufacturers to conduct the potable water provisions of the test procedure, and manufacturers would not report the results of the potable water test to DOE, if conducted. In addition, consistent with 42 U.S.C. 6314(d), manufacturers would not be required to use the voluntary test procedure as the basis of any representations of potable water use.

DOE proposes that the measurement of potable water use would generally follow the test methods in AHRI Standard 810–2016 and ASHRAE Standard 29–2015, but with the additional test procedure amendments as proposed in this NOPR. This proposed approach is generally consistent with the methods currently used for the AHRI and ENERGY STAR programs; additionally, DOE does not expect that the additional test provisions as proposed in this NOPR would impact performance as measured under the existing approaches used by AHRI (AHRI Standard 810–2016) or ENERGY STAR (AHRI Standard 810–2007).

DOE also proposes to add a definition of ''potable water use'' in 10 CFR 431.132. DOE proposes to define ''potable water use'' as 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, in multiples of 0.1, and excludes any condenser water use. This definition is generally consistent with the term ''potable water use rate'' in AHRI Standard 810–2016, with the clarification that condenser water use is not considered potable water use.

DOE notes that AHRI Standard 810–2016 specifies under the ''Certified Ratings'' section that Potable Water Use Rate is applicable to Batch Type Ice-makers only, but that AHRI's Directory of Certified Product Performance includes the Potable Water Use Rate for both batch type and continuous type ACIMs.[21] Thus, the industry standard appears to currently be used for measuring potable water use for both batch and continuous ice makers.

Issue 37: DOE requests comment on the proposal to include a voluntary method for measuring potable water use, including the value or drawbacks of such an approach, in 10 CFR 431.134 according to the industry standards and additional test procedure proposals as discussed in this NOPR.

[17] The ENERGY STAR specification for automatic commercial ice makers is available at *www.energystar.gov/sites/default/files/Final%20V3.0%20ACIM%20Specification%205-17-17_1.pdf.*

[18] *www.ahrinet.org/Certification.aspx.*

[19] Available at *www.ahridirectory.org/NewSearch?programId=31&searchTypeId=3.*

[20] Available at *www.energystar.gov/productfinder/product/certified-commercial-ice-machines/results.*

[21] *www.ahridirectory.org/NewSearch?programId=31&searchTypeId=3.*

DOE is not proposing to adjust potable water use based on ice hardness factor, as is currently required for energy use and condenser water use. Both energy use and condenser water use correspond to the amount of heat removed from the potable water in producing ice. Ice that is more completely frozen will require more energy use and more heat rejection (via condenser water use, if applicable). However, potable water use does not similarly vary depending on the ice hardness. The same amount of potable water is used to make partially frozen ice as completely frozen ice. This is supported by nearly all continuous ice makers showing the same 11.9 to 12 gallons of potable water use per 100 lbs of ice production.

Issue 38: DOE requests comment on its proposal that potable water use is not adjusted based on ice hardness factor.

Potable water use for portable ACIMs is different than for ACIMs with a fixed water connection. As discussed, portable ACIMs require that the fill reservoir be filled manually with the maximum volume of water that is recommended by the manufacturer. In a portable ACIM, the unused ice collected in the ice storage bin slowly melts. This melt water is recycled back into the potable water reservoir to be reused. Unlike batch-type non-portable ACIMs, there is no dump or purge water to be measured. For portable ACIMs, water introduced to the reservoir is typically only removed from the unit as ice (and any corresponding melt water). Therefore, DOE proposes that the potable water use rate for portable ACIMs be defined as equal to the weight of ice and any corresponding melt water collected for the capacity test as specified in section 7.2 of ASHRAE Standard 29–2015.

Issue 39: DOE requests comment on the proposal that the potable water use rate of portable ACIMs be defined as equal to the weight of ice and water captured for the capacity test, as specified in section 7.2 of ASHRAE Standard 29–2015.

E. Representations of Energy Use and Energy Efficiency

In addition to updates to the ACIM test procedure, DOE is proposing revisions to the provisions related to the sampling plan and the determination of represented values currently specified at 10 CFR 429.45. DOE is also proposing to add equipment-specific enforcement provisions for ACIMs to 10 CFR 429.134.

1. Sampling Plan and Determination of Represented Values

In subpart B to 10 CFR part 429, DOE provides uniform methods for manufacturers to determine representative values of energy- and non-energy-related metrics for each basic model of covered equipment. The purpose of a statistical sampling plan is to provide a method to ensure that the test sample size (*i.e.,* number of units tested) is sufficiently large that represented values of energy- and non-energy-related metrics are representative of aggregate performance of the units in the basic model, while accounting for variability inherent to the manufacturing and testing processes.

DOE currently specifies the ACIM-specific sampling plans and requirements for the determination of represented values at 10 CFR 429.45. The sampling plan and method for determining represented values applies to represented values of maximum energy use, or other measures of energy consumption for which consumers would favor lower values.

The reference to ''maximum energy use'' and ''maximum condenser water use'' in 10 CFR 429.45 could be misinterpreted to refer to the energy and water conservation standard levels for that basic model (*i.e.,* the maximum allowable energy and maximum allowable condenser water use), as opposed to the tested performance. Therefore, for consistency and clarity, DOE is proposing to replace the term ''maximum energy use'' with the term ''energy use'' and the term ''maximum condenser water use'' with the term ''condenser water use.'' In addition, values of both energy and condenser water consumption are relevant for ACIMs. As such, DOE proposes to modify the language at 10 CFR 429.45 to specify expressly that the sampling plan at 10 CFR 429.45(a)(2)(i) applies both to measures of energy and condenser water use for which consumers would favor lower values.

Similarly, 10 CFR 431.132 includes a definition for the term ''maximum condenser water use.'' This language may also be misinterpreted to refer to the condenser water conservation standard level for a basic model as opposed to the tested condenser water use. Therefore, DOE proposes to modify the term and definition of ''maximum condenser water use'' to instead refer to the term ''condenser water use.'' This modification is consistent with the existing definition of ''energy use'' in 10 CFR 431.132.

In 10 CFR 429.45(a)(2)(ii), DOE also specifies calculation procedures for energy efficiency metrics, or measures of energy consumption where consumers would favor higher values. As DOE's test procedure does not require determining any values of energy efficiency or other measure of performance for which consumers would favor higher values, DOE proposes to remove this provision.

In addition to energy related metrics, DOE's current certification requirements mandate reporting of harvest rate, a key non-energy metric associated with determining energy and water standards for ACIM equipment, as applicable. However, the certification requirements do not specify how the represented value of harvest rate for each basic model should be determined based on the test results from the sample of individual models tested. Similar to the requirements for other covered products and commercial equipment, DOE is proposing that the represented value of harvest rate for the basic model be determined as the mean of the measured harvest rates for each unit in the test sample, based on the same tests used to determine the reported energy use and condenser water use, if applicable. Although not specified in 10 CFR 429.45, DOE expects manufacturers are currently certifying ACIM performance based on the tested harvest rates. Therefore, this proposed amendment would clarify the certification requirements but not impose any additional burden on manufacturers.

Issue 40: DOE requests comment on its proposal to amend the sampling plan and reporting requirements for ACIMs in 10 CFR 429.45. DOE seeks information on how manufacturers are currently interpreting ''maximum energy use'' and ''maximum condenser water use'' in the context of the sampling and certification report requirements, how manufacturers are currently determining harvest rates, and whether the proposed amendments would impose any burden on manufacturers. DOE also requests comment on its proposal to modify the term and definition of ''maximum condenser water use'' to instead refer to ''condenser water use''.

2. Test Sample Value Rounding Requirements

DOE currently requires test results for ACIMs to be rounded, as discussed in section III.D.7; however, the requirements in 10 CFR 429.45 do not specify how values calculated in accordance with 10 CFR 429.45(a) would be rounded. To ensure consistency, DOE proposes that any calculations according to 10 CFR 429.45 be rounded consistent with the rounding requirements for individual test results. Specifically, DOE proposes to require that values calculated from a test sample be rounded as follows: Energy use to the nearest 0.01 kWh/100 lb, condenser water use to the nearest gal/100 lb, and harvest rate to the nearest 1 lb/24 h (for ACIMs with harvest rates greater than 50 lb/24 h) or to the nearest 0.1 lb/24 h (for ACIMs with harvest rates less than or equal to 50 lb/24 h).

Issue 41: DOE requests comment on its proposal to require that values calculated from a test sample be rounded as follows: energy use to the nearest 0.01 kWh/100 lb, condenser water use to the nearest gal/100 lb, and harvest rate to the nearest 1 lb/24 h (for ACIMs with harvest rates greater than 50 lb/24 h) or to the nearest 0.1 lb/24 h (for ACIMs with harvest rates less than or equal to 50 lb/24 h).

3. Enforcement Provisions

Subpart C of 10 CFR part 429 establishes enforcement provisions applicable to covered products and covered equipment, including ACIMs. Product-specific enforcement provisions are provided in 10 CFR 429.134, but that section currently does not specify product-specific enforcement provisions for ACIMs. The DOE requirements in 10 CFR 429.134 provide which ratings or measurements will be used to determine the applicable energy or water conservation standard. Normally, DOE provides that the certified metric would be used for enforcement purposes (*e.g.,* calculation of the applicable energy conservation standard) if the average value measured during enforcement testing is within a specified percent of the rated value (the specific allowable range varies based on product and equipment type). Otherwise, the average measured value would be used.

Section 7.1 of ASHRAE Standard 29–2009, incorporated by reference into the DOE ACIM test procedure, allows for a two percent weight variation between collected ice samples when establishing stability of an ACIM. Additionally, section 5.5.1 of ASHRAE Standard 29–2009 specifies that the ice-weighing instruments are required to be accurate to within 1.0 percent of the quantity measured. Due to the allowable variability in test measurements, a five percent tolerance around the rated capacity value likely is appropriate for ACIMs. This tolerance is consistent with the tolerance for ice harvest rate ratings as specified in section 5.4 of AHRI Standard 810–2016. DOE proposes that the certified capacity metric for ACIMs (*i.e,* the harvest rate), will be used for determination of the maximum allowable energy consumption and maximum allowable condenser water use levels only if the average measured harvest rate during DOE testing is within five percent of the certified harvest rate. If the average measured harvest rate is found to be outside of this range when compared to the certified harvest rate, the average measured harvest rate of the units in the tested sample will be used as the basis for determining the maximum allowable energy consumption and maximum allowable condenser water use levels, as applicable.

Issue 42: DOE requests comment on its proposal to include a new section in 10 CFR 429.134 to specify how to determine whether the certified or measured harvest rate is used to calculate the maximum energy consumption and maximum condenser water use levels. DOE also requests comment on whether a five percent tolerance for the average measured harvest rate compared to the certified harvest rate is an appropriate tolerance for such purposes, and if not, what tolerance is appropriate.

F. Test Procedure Costs and Harmonization

1. Test Procedure Costs and Impact

In this NOPR, DOE proposes to include low-capacity ACIM in the scope of the test procedure; amend the existing test procedure for ACIMs by referencing the most recent versions of the test procedures incorporated by reference; clarify the stability criteria; revise clearances for test installations; include additional updates to clarify appropriate test measurements, conditions, settings, and setup requirements; establish provisions for the voluntary measurement of potable water use; and update calculation instructions. DOE has tentatively determined that these proposed amendments would impact testing costs as discussed in the following paragraphs.

a. Testing Cost Impacts

In the January 2012 final rule, DOE estimated per test costs of $5,000 to $7,500 for the current ACIM test procedure. 77 FR 1591, 1610. Based on feedback from third-party test laboratories since the January 2012 final rule published, DOE found that the low end of that range, or $5,000, is representative of current ACIM per test cost. One proposal in this NOPR will affect the cost per test.

As discussed in section III.C, ASHRAE Standard 29–2015 includes updated stabilization requirements. DOE is proposing to reference ASHRAE Standard 29–2015 and to provide additional detail to clarify application of its requirements. Under the proposed amendment, the ice production rate for each cycle used for the capacity test relative to any other cycle or sample used for the capacity test must meet the stability requirements. The current approach requires multiple cycles to determine stability, after which cycles are measured to test performance.

The proposed approach would decrease the total number of cycles required for testing by using the same cycles to determine stability and measured performance. For batch ice makers, this proposal would eliminate the need for testing two cycles prior to the test. For continuous ice makers, this proposal would eliminate the need for measuring three consecutive 14.4 min samples taken within a 1.5-hour period prior to the test.

DOE estimates that total ice maker test duration, including set up, pull-down, and test operation currently requires 8 hours. Under the proposed approach, DOE estimates that the total test time would decrease by approximately 1 hour. This represents a 12.5-percent reduction in test duration. Taking overhead costs into account, DOE estimates that the proposed stabilization requirement would decrease the test cost by approximately 6 percent, or $300 per test based on the initial $5,000 per test estimate. Because DOE requires manufacturers to test at least two units per model to certify performance, manufacturers would save approximately $600 per basic model for all future basic models tested in accordance with this proposed test procedure.

Issue 43: DOE requests comment on the impact and test cost of the proposed amendment to clarify the use of test cycles to also confirm stability of the ACIM under test.

b. Additional Amendments

The proposal discussed in the previous section regarding stability criteria would affect future individual test costs. DOE acknowledges that the proposals regarding stability criteria and the other proposals in this NOPR for testing ACIMs currently subject to DOE's energy conservation standards (*i.e.,* ACIMs other than low-capacity ACIMs) would introduce changes to test conduct as compared to the existing test procedure. However, DOE does not expect that these proposals would affect measured ACIM performance as compared to the existing test procedure, as discussed in detail for each proposal in section III in this NOPR. Rather, the proposals would generally improve representativeness, repeatability, and reproducibility of DOE's test procedure. Additionally, certain proposals would also incorporate test requirements consistent with DOE guidance or test procedure waivers already in effect for testing ACIMs. Because the proposed amendments are not expected to impact ACIM performance as measured under the existing DOE test procedure, DOE does not expect that manufacturers would be required to re-test or re-certify their existing models.

Specifically, DOE is proposing the following amendments that are not expected to impact measured ACIM performance compared to the existing DOE test procedure: (1) Updating references to the latest versions of the relevant industry standards (see section III.C); (2) clarifying stabilization criteria; (3) incorporating test conditions for relative humidity and water hardness and a clarification regarding water pressure (see section III.D.3); (4) clarifying test setup and setting requirements (see section III.D.4); (5) specifying a voluntary measurement of potable water use (see section III.D.8); and (6) including revisions to test sample calculations and enforcement provisions (see section III.E).

While DOE does not expect the proposals in this NOPR to impact measured performance for ACIMs overall, in the event that a manufacturer was to opt to re-test models according to the proposed amended test procedure, DOE estimates this optional cost would be $9,400 per re-rated basic model.[22]

As described, DOE has tentatively determined that manufacturers would be able to rely on data generated under the existing test procedure should any of these proposed amendments be finalized.

While DOE does not expect test facilities would require upgrades as a result of the proposed test procedure, if made final, DOE has developed cost estimates in the event that a facility may require upgrades to maintain the proposed test conditions for relative humidity and water hardness. As discussed in sections III.D.3.a and III.D.3.b, DOE expects that ACIM test facilities are already capable of maintaining the proposed conditions and likely already conduct ACIM testing in accordance with the conditions proposed in this NOPR.

DOE estimates the cost for purchasing relative humidity controls to range from $1,000 to $5,000, depending on the method that is chosen. DOE estimates that the purchase and installation of a humidifier boiler with modulating valves that releases steam on the wall to control relative humidity costs $5,000. However, DOE notes there are less expensive options to control for relative humidity, such as a dedicated coil with reheat, steam generators, humidifiers, and dehumidifiers. In addition, manufacturers may have to purchase additional instrumentation to measure relative humidity. A typical relative humidity sensor is Campbell Scientific's EE181–L which meets the accuracy of ±2 percent and costs $500.[23]

Regarding water hardness, DOE's market research shows that a typical water hardness meter has an accuracy of ±10 mg/L and costs $235.[24] However, DOE provides the option to verify water hardness from the most recent version of the water quality report that is sent by water suppliers, which would not require any additional substantive costs or burden.

DOE's proposed water hardness condition is intended to prevent testing under favorable conditions that are not representative of actual use (*e.g.,* with water hardness that would be considered very hard by the USGS). DOE expects that ACIM test facilities either have water supplies within the proposed water hardness range or already incorporate water softeners for their laboratory water supply. Therefore, DOE does not expect that the water hardness proposal would add any costs or burden to ACIM manufacturers.

Issue 44: DOE requests comment on the impacts and associated costs of the proposed amendments included in this NOPR. In particular, DOE requests feedback and data regarding whether the proposals would impact measured performance of ACIMs as tested under the existing DOE test procedure, and whether manufacturers would incur costs for re-testing existing ACIM models under the proposed procedure. DOE requests comment on the impact and any associated costs of the proposed amendments regarding test conditions for ACIM testing. DOE requests feedback on whether any test facilities would require upgrades to meet the proposed test requirements, and if so, information on the corresponding costs.

As discussed in section III.A of this NOPR, DOE is proposing to include low-capacity ACIMs within the scope of its test procedure. DOE is proposing additional test procedure requirements to ensure appropriate testing of low-capacity ACIMs, as discussed in section III.D.1.

Low-capacity ACIMs are not currently subject to DOE testing or energy conservation standards. As proposed, manufacturers would not be required to test low-capacity ACIMs until such time as DOE establishes energy conservation standards for such equipment. Under the proposed test procedure, were a manufacturer to choose to make representations of the energy efficiency or energy use of a low-capacity ACIM energy, beginning 360 days after a final rule were DOE to finalize the proposal, manufacturers would be required to base such representations on the DOE test procedure. (42 U.S.C. 6314(d))

Based on a review of low-capacity ACIMs available on the market, DOE has determined that manufacturers either make no claims regarding the energy consumption of their low-capacity ACIM models, or currently specify energy consumption in accordance with the existing DOE test procedure (and referenced industry standards). After establishing any test procedure, DOE expects that the manufacturers currently electing to make no claims regarding low-capacity ACIM energy consumption would continue to do so. For the reasons described in section III.F.1.b and the other discussion sections of this NOPR, DOE does not expect that the proposed test procedure would impact measured ACIM performance compared to the existing DOE test procedure. Therefore, DOE does not expect that manufacturers currently providing energy consumption information for their low-capacity ACIMs would be required to re-test their low-capacity ACIM models.

Based on these determinations, DOE does not expect that the proposal to expand the scope of its test procedure to low-capacity ACIMs would result in additional testing costs for low-capacity ACIM manufacturers. For any manufacturers not currently testing low-capacity ACIM models, testing according to the proposed test procedure would not be required (other than making voluntary representations of energy consumption) until the compliance date of any energy conservation standards for that equipment.

Issue 45: DOE requests comment on any expected costs associated with the proposed amendment to expand test procedure scope to include low-capacity ACIMs. Specifically, DOE requests comment on whether any manufacturers are currently making representations of low-capacity ACIM energy consumption based on test methods that would

[22] Based on the initial $5,000 per unit testing cost estimate and the $300 savings due to the stability criteria proposed, as discussed in section III.D.2 and III.F.1.a. Each basic model is tested twice.

[23] *www.campbellsci.com/ee181-l.*

[24] *www.hannainst.com/total-hardness-epa-portable-photometer.*

produce measures of performance that would be inconsistent with the existing DOE test procedure or the test procedure for low-capacity ACIMs as proposed in this NOPR.

2. Harmonization With Industry Standards

DOE's established practice is to adopt relevant industry standards as DOE test procedures unless such methodology would be unduly burdensome to conduct or would not produce test results that reflect the energy efficiency, energy use, water use (as specified in EPCA) or estimated operating costs of that product during a representative average use cycle. 10 CFR 431.4; Section 8(c) of appendix A 10 CFR part 430 subpart C. In cases where the industry standard does not meet EPCA statutory criteria for test procedures, DOE will make modifications through the rulemaking process to these standards and incorporate the modified standard as the DOE test procedure.

The test procedure for ACIMs at 10 CFR 431.134 incorporates by reference certain provisions of AHRI Standard 810–2007 and ASHRAE Standard 29–2009. DOE references 810–2007 for definitions and test procedure requirements. DOE references ASHRAE Standard 29–2009 for test procedure requirements and ice hardness factor calculations. In September 2016, AHRI released an updated version of the 810 Standard which DOE is evaluating as part of this rulemaking. In January 2015, ASHRAE released an updated version of the 29 Standard which DOE is evaluating as part of this rulemaking. The industry standards DOE proposes to incorporate by reference via amendments described in this notice are discussed in further detail in section IV.M. DOE requests comment on the benefits and burdens of the proposed updates and additions to industry standards referenced in the test procedure for ACIM.

G. Compliance Date and Waivers

EPCA prescribes that, if DOE amends a test procedure, all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with that amended test procedure, beginning 360 days after publication of such a test procedure final rule in the **Federal Register**. (42 U.S.C. 6314(d)(1)) To the extent the modified test procedure proposed in this document is required only for the evaluation and issuance of updated efficiency standards, use of the modified test procedure, if finalized, would not be required until the implementation date of updated standards. 10 CFR 431.4; Section 8(d) of appendix A 10 CFR part 430 subpart C.

Upon the compliance date of test procedure provisions of an amended test procedure, should DOE issue a such an amendment, any waivers that had been previously issued and are in effect that pertain to issues addressed by such provisions are terminated. 10 CFR 431.401(h)(3). Recipients of any such waivers would be required to test the products subject to the waiver according to the amended test procedure as of the compliance date of the amended test procedure. The amendments proposed in this document pertain to issues addressed by a waiver granted to Hoshizaki America, Inc. under case number 2020–001, as discussed in section III.D.4.f of this NOPR. Were DOE to finalize the amendments pertaining to the waiver granted to Hoshizaki at such time as testing were required according to the amended test procedure, the waiver granted to Hoshizaki would terminate and Hoshizaki would be required to make representations based on the amended test procedure.

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

The Office of Management and Budget (''OMB'') has determined that this test procedure rulemaking does not constitute a ''significant regulatory action'' under section 3(f) of Executive Order 12866, Regulatory Planning and Review, 58 FR 51735 (Oct. 4, 1993). Accordingly, this action was not subject to review under the Executive order by the Office of Information and Regulatory Affairs (''OIRA'') in OMB.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of an initial regulatory flexibility analysis (''IRFA'') for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, ''Proper Consideration of Small Entities in Agency Rulemaking,'' 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel's website: *energy.gov/gc/office-general-counsel.*

DOE reviewed this proposed rule to amend the test procedures for ACIMs under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003.

The Small Business Administration (''SBA'') considers a business entity to be a small business, if, together with its affiliates, it employs less than a threshold number of workers specified in 13 CFR part 121. The size standards and codes are established by the 2017 North American Industry Classification System (''NAICS'').

ACIM manufacturers are classified under NAICS code 333415, ''Air-conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing,'' which includes ice-making machinery manufacturing.[25] The SBA sets a threshold of 1,250 employees or fewer for an entity to be considered as a small business. This employee threshold includes all employees in a business's parent company and any other subsidiaries.

DOE conducted a focused inquiry into manufacturers of equipment covered by this rulemaking. DOE used available public information to identify potential small manufacturers. DOE accessed the CCD[26] and other public information, including manufacturer and vendor websites, to create a list of companies that import or otherwise manufacture ACIMs covered by this rulemaking and identified 30 ACIM manufacturers.

DOE then reviewed these companies to determine whether the entities met the SBA's definition of ''small business'' and screened out any companies that do not offer products covered by this rulemaking, do not meet the definition of a ''small business,'' or are foreign-owned and operated. Based on this review, DOE has identified 12 companies that are small business manufacturers of ACIMs in the United States. The average revenue of the twelve small businesses is $52 million.

As discussed in section III.F.1, DOE does not expect that ACIM manufacturers would incur any costs as a result of the proposals included in this NOPR. However, in the event that any test facilities may require upgrades to meet the proposed test conditions for relative humidity and water hardness, DOE has provided discussion and

[25] *www.sba.gov/document/support--table-size-standards*

[26] DOE's Compliance Certification Database is available at *www.regulations.doe.gov/certification-data/#q=Product_Group_spercent3A*.*

estimated costs for potential upgrades and seeks comment on whether such upgrades may be necessary.

As discussed in section III.F.1.b, DOE estimates the cost for purchasing relative humidity controls to range from $1,000 to $5,000, depending on the method that is chosen. In addition, the small businesses may have to purchase additional instrumentation to measure relative humidity, at an estimated cost of $500 per sensor.

Regarding water hardness, DOE expects that the cost to monitor water hardness would be $235 for a typical meter. However, test facilities may also verify water hardness at no additional cost by reviewing the most recent version of the water quality report that is sent by water suppliers. DOE additionally does not expect that any facility upgrades would be necessary to comply with the water hardness requirement, as any ACIM test facilities likely already incorporate water softening controls if the water supply is considered very hard. Therefore, DOE estimates that the water hardness proposal requirement would result in minimal, if any, additional costs or burdens to small businesses.

DOE does not expect ACIM manufacturers, including small business manufacturers, to incur any costs as a result of the test procedure proposed in this NOPR, even if a manufacturer were to incur costs due to the proposed test condition requirements. If manufacturers made updates to their test facility as a result of this NOPR, DOE estimates to maximum cost would be $5,735. The annual revenues for the twelve small manufacturers range from $1 million to $218 million. DOE estimates that the maximum cost would represent less than 1 percent of annual revenues for all identified small businesses. Therefore, DOE certifies that this rulemaking will not have a significant economic impact on a substantial number of small entities. Accordingly, DOE did not prepare an IRFA for this rulemaking. DOE's certification and supporting statement of factual basis will be provided to the Chief Counsel for Advocacy of the Small Business Administration for review under 5 U.S.C. 605(b).

Issue 46: DOE requests comment on its conclusion that the proposed test procedure amendments would not have a significant economic impact on a substantial number of small entities. Additionally, DOE request comment on its finding that there are twelve small businesses that manufacture ACIMs in the United States. DOE will consider comments received in the development of any final rule.

C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of ACIMs must certify to DOE that their products comply with any applicable energy conservation standards. To certify compliance, manufacturers must first obtain test data for their products according to the DOE test procedures, including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including ACIMs. (*See generally* 10 CFR part 429.) The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (PRA). This requirement has been approved by OMB under OMB control number 1910–1400. Public reporting burden for the certification is estimated to average 35 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

Notwithstanding any other provision of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA, unless that collection of information displays a currently valid OMB Control Number.

D. Review Under the National Environmental Policy Act of 1969

In this NOPR, DOE proposes test procedure amendments that it expects will be used to develop and implement future energy conservation standards for ACIMs. DOE has determined that this rule falls into a class of actions that are categorically excluded from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) and DOE's implementing regulations at 10 CFR part 1021. Specifically, DOE has determined that adopting test procedures for measuring energy efficiency of consumer products and industrial equipment is consistent with activities identified in 10 CFR part 1021, appendix A to subpart D, A5 and A6. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

Executive Order 13132, ''Federalism,'' 64 FR 43255 (August 4, 1999) imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. The Executive order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE has examined this proposed rule and has determined that it would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of this proposed rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6316(a); 42 U.S.C. 6297(d)) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

Regarding the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, ''Civil Justice Reform,'' 61 FR 4729 (Feb. 7, 1996), imposes on Federal agencies the general duty to adhere to the following requirements: (1) Eliminate drafting errors and ambiguity, (2) write regulations to minimize litigation, (3) provide a clear legal standard for affected conduct rather than a general standard, and (4) promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation (1) clearly specifies the preemptive effect, if any, (2) clearly specifies any effect on existing Federal law or regulation, (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction, (4) specifies the retroactive effect, if any, (5) adequately defines key terms, and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in sections 3(a) and 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, the proposed rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Public Law 104–4, sec. 201 (codified at 2 U.S.C. 1531). For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed ''significant intergovernmental mandate,'' and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at *energy.gov/gc/office-general-counsel.* DOE examined this proposed rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of $100 million or more in any year, so these requirements do not apply.

H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105–277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

DOE has determined, under Executive Order 12630, ''Governmental Actions and Interference with Constitutionally Protected Property Rights'' 53 FR 8859 (March 18, 1988), that this proposed regulation would not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

J. Review Under Treasury and General Government Appropriations Act, 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). Pursuant to OMB Memorandum M–19–15, Improving Implementation of the Information Quality Act (April 24, 2019), DOE published updated guidelines which are available at *www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf.* DOE has reviewed this proposed rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, ''Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,'' 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OMB, a Statement of Energy Effects for any proposed significant energy action. A ''significant energy action'' is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that (1) is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

The proposed regulatory action to amend the test procedure for measuring the energy efficiency of ACIMs is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

L. Review Under Section 32 of the Federal Energy Administration Act of 1974

Under section 301 of the Department of Energy Organization Act (Pub. L. 95–91; 42 U.S.C. 7101), DOE must comply with section 32 of the Federal Energy Administration Act of 1974, as amended by the Federal Energy Administration Authorization Act of 1977. (15 U.S.C. 788; FEAA) Section 32 essentially provides in relevant part that, where a proposed rule authorizes or requires use of commercial standards, the notice of proposed rulemaking must inform the public of the use and background of such standards. In addition, section 32(c) requires DOE to consult with the Attorney General and the Chairman of the Federal Trade Commission (FTC) concerning the impact of the commercial or industry standards on competition.

The proposed modifications to the test procedure for ACIMs would incorporate testing methods contained in the following commercial standards: AHRI Standard 810–2016 titled ''Performance Rating of Automatic Commercial Ice-makers'', and ANSI/ASHRAE Standard 29–2015 titled ''Method of Testing Automatic Ice Makers''. DOE has evaluated these standards and is unable to conclude whether they fully comply with the requirements of section 32(b) of the FEAA (*i.e.,* whether it was developed in a manner that fully provides for public participation, comment, and review). DOE will consult with both the Attorney General and the Chairman of the FTC concerning the impact of these test procedures on competition, prior to prescribing a final rule.

M. Description of Materials Incorporated by Reference

In this NOPR, DOE proposes to incorporate by reference the test standard published by AHRI, titled ''Performance Rating of Automatic Commercial Ice-makers,'' AHRI Standard 810–2016, and the test standard published by ANSI/ASHRAE, titled ''Method of Testing Automatic Ice

Makers,'' ANSI/ASHRAE Standard 29–2015. These standards prescribe an industry recognized method of rating and testing automatic commercial ice makers to evaluate performance. AHRI Standard 810–2016 prescribes the rating requirements and refers to ASHRAE Standard 29–2015 for the method of test.

Copies of AHRI Standard 810–2016 may be purchased from the Air-Conditioning, Heating, and Refrigeration Institute at 2111 Wilson Blvd., Suite 500, Arlington, VA 22201, (703) 524–8800, or by going to *www.ahrinet.org/Home.aspx.* Copies of ANSI/ASHRAE Standard 29–2015 may be purchased from ASHRAE at 1791 Tulie Circle, NE Atlanta, GA 30329, (404) 636–8400, or by going to *www.ashrae.org.*

V. Public Participation

A. Participation in the Webinar

The time and date of the webinar are listed in the **DATES** section at the beginning of this document. If no participants register for the webinar, it will be cancelled. Webinar registration information, participant instructions, and information about the capabilities available to webinar participants will be published on DOE's website: *www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=53&action=viewlive.* Participants are responsible for ensuring their systems are compatible with the webinar software.

B. Submission of Comments

DOE will accept comments, data, and information regarding this proposed rule no later than the date provided in the **DATES** section at the beginning of this proposed rule.[27] Interested parties may submit comments using any of the methods described in the **ADDRESSES** section at the beginning of this document.

Submitting comments via *www.regulations.gov.* The *www.regulations.gov* web page will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

However, your contact information will be publicly viewable if you include it in the comment or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached to your comment. Persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

Do not submit to *www.regulations.gov* information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as Confidential Business Information (CBI)). Comments submitted through *www.regulations.gov* cannot be claimed as CBI. Comments received through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

DOE processes submissions made through *www.regulations.gov* before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes of comments are being processed simultaneously, your comment may not be viewable for up to several weeks. Please keep the comment tracking number that *www.regulations.gov* provides after you have successfully uploaded your comment.

Submitting comments via email. Comments and documents submitted via email, also will be posted to *www.regulations.gov.* If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information on a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments.

Include contact information each time you submit comments, data, documents, and other information to DOE. No faxes will be accepted.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format. Provide documents that are not secured, written in English and free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

Campaign form letters. Please submit campaign form letters by the originating organization in batches of between 50 to 500 form letters per PDF or as one form letter with a list of supporters' names compiled into one or more PDFs. This reduces comment processing and posting time.

Confidential Business Information. Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email two well-marked copies: One copy of the document marked confidential including all the information believed to be confidential, and one copy of the document marked non-confidential with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

It is DOE's policy that all comments may be included in the public docket, without change and as received, including any personal information provided in the comments (except information deemed to be exempt from public disclosure).

C. Issues on Which DOE Seeks Comment

Although DOE welcomes comments on any aspect of this proposal, DOE is particularly interested in receiving comments and views of interested parties concerning the following issues:

Issue 1: DOE requests comment on the proposal to include test procedure provisions for low-capacity ACIMs within the scope of the ACIM test procedure.

Issue 2: DOE seeks information on whether there is an industry test

[27] DOE has historically provided a 75-day comment period for test procedure NOPRs pursuant to the North American Free Trade Agreement, U.S.-Canada-Mexico (''NAFTA''), Dec. 17, 1992, 32 I.L.M. 289 (1993); the North American Free Trade Agreement Implementation Act, Public Law 103–182, 107 Stat. 2057 (1993) (codified as amended at 10 U.S.C.A. 2576) (1993) (''NAFTA Implementation Act''); and Executive Order 12889, ''Implementation of the North American Free Trade Agreement,'' 58 FR 69681 (Dec. 30, 1993). However, on July 1, 2020, the Agreement between the United States of America, the United Mexican States, and the United Canadian States (''USMCA''), Nov. 30, 2018, 134 Stat. 11 (*i.e.,* the successor to NAFTA), went into effect, and Congress's action in replacing NAFTA through the USMCA Implementation Act, 19 U.S.C. 4501 *et seq.* (2020), implies the repeal of E.O. 12889 and its 75-day comment period requirement for technical regulations. Thus, the controlling laws are EPCA and the USMCA Implementation Act. Consistent with EPCA's public comment period requirements for consumer products, the USMCA only requires a minimum comment period of 60 days. Consequently, DOE now provides a 60-day public comment period for test procedure NOPRs.

procedure for testing and rating low-capacity ACIMs. If so, DOE requests information on how such a test procedure addresses (or could address) the specific features of low-capacity ACIMs that are not present in higher-capacity ACIMs, such that the test procedure produces results that are representative of an average use cycle.

Issue 3: DOE requests comment on the proposed definition for refrigerated storage automatic commercial ice maker.

Issue 4: DOE requests comment on the proposed definition for portable automatic commercial ice maker.

Issue 5: DOE requests comment on its proposal to amend 10 CFR 431.132 to revise the definitions of ''Batch type ice maker'' and ''Energy Use'' and delete the definition of ''Cube type ice,'' consistent with updates to AHRI Standard 810–2016. DOE also requests feedback on the proposed clarification that the DOE definitions take precedence over any conflicting industry standard definitions.

Issue 6: DOE requests comment on its proposal to maintain the current specifications of 70 °F ±1 °F ambient air temperature and 90 °F ±1 °F initial water temperature for calorimetry testing. DOE also requests comment on its proposal to clarify that the harvested ice used to determine the ice hardness factor be collected from the ACIM under test at the Standard Rating Conditions specified in Section 5.2.1 of AHRI Standard 810–2016.

Issue 7: DOE requests comment on its proposal to clarify that the temperature of the block of pure ice, as specified in Section A2.e. of ASHRAE Standard 29–2015, is measured by a thermocouple embedded at approximately the geometric center of the interior of the block. DOE also requests comment on its proposal to clarify that any water that remains on the block of ice must be wiped off the surface of the block before placing the ice into the calorimeter.

Issue 8: DOE requests comment on its proposal to adopt by reference AHRI Standard 810–2016 and ASHRAE Standard 29–2015, except for the provisions for calorimetry testing as discussed previously, for all ACIMs.

Issue 9: DOE requests comment on its proposal that portable ACIMs be subject to the test procedure as proposed in this NOPR, except that sections 5.4, 5.6, 6.2, and 6.3 of ASHRAE Standard 29–2015 do not apply. DOE requests comment on its proposal that the potable water reservoir be filled to the maximum level of potable water as recommend by the manufacturer with an initial water temperature of 70 °F ±1.0 °F. DOE requests comment on its proposal that the initial water temperature be established in an external container and verified by inserting a temperature sensor into approximately the geometric center of the water in the external container.

Issue 10: DOE requests comment on its proposal that portable ACIMs have the ice storage bin empty prior to the initial reservoir fill and then produce ice into the ice storage bin until the bin is one-half full, at which point testing would proceed according to section 7 of ASHRAE Standard 29–2015. DOE requests comment on its proposal to define one-half full as half of the vertical dimension of the storage bin based on the maximum ice fill level within the storage bin.

Issue 11: DOE requests comment on its proposal to specify that door openings must only occur on self-contained refrigerated storage ACIMs to collect samples after each cycle, and that the door shall be in the fully open position for 10.0 ±1.0 seconds to collect the sample. DOE also requests comment on its proposal to specify that ''fully open'' means opening a door to an angle of not less than 75 degrees.

Issue 12: DOE requests comment on its proposal to test refrigerated storage ACIMs consistent with section 4.1.4 of AHRI Standard 810–2016 (*i.e.,* with adjustable temperature settings tested per the manufacturer's written instructions with no adjustment prior to or during the test). DOE requests comment on whether a specific refrigeration set point or internal air temperature should be specified for testing instead of the manufacturer's factory preset refrigeration set point.

Issue 13: DOE requests comment on its interpretation of Section 7.1.1 of ASHRAE Standard 29–2015 and proposal to require that all cycles or samples used for the capacity test meet the stability criteria.

Issue 14: DOE requests comment on the proposal to increase the tolerance for continuous ice makers to collect samples from 15.0 minutes ±2.5 seconds to 15.0 minutes ±9.0 seconds.

Issue 15: DOE requests comment on the proposal to require that all cycles or samples of low-capacity ACIMs used for the capacity test meet a ±4 percent stability criterion and not be subject to an absolute stability criterion.

Issue 16: DOE requests comment on the proposal to control relative humidity at 35 ±5.0 percent. Specifically, DOE requests comment on the representativeness of 35 percent relative humidity in field use conditions, whether manufacturers currently control and measure relative humidity for ACIM testing (and if so, the conditions used for testing), and the burden associated with controlling relative humidity within a tolerance of ±5.0 percent.

Issue 17: DOE requests comment on its proposal that water used for ACIM testing have a maximum water hardness of 180 mg/L of calcium carbonate and on whether any test facilities would not have water hardness supplied within the proposed allowable range. If there are such test facilities, DOE requests comment on whether the supply water is softened when testing ACIMs and, if the water is not softened, the burden associated with implementing controls for water hardness. Additionally, while DOE is proposing that this requirement apply to all water supplied for ACIM testing, DOE requests information on whether this requirement should only be applicable to potable water used to make ice (and not any condenser cooling water).

Issue 18: DOE requests comment on maintaining the existing ambient temperature gradient requirements, through an updated reference to ASHRAE Standard 29–2015, and on whether any modifications would improve test accuracy or decrease test burden.

Issue 19: DOE requests comment on its proposal to maintain the existing ambient temperature and water supply temperature requirements. If modifications should be considered to improve test representativeness or decrease test burden, DOE requests supporting data and information.

Issue 20: DOE requests comment on its proposal to require that water pressure when water is flowing into the ice maker be within the allowable range within 5 seconds of opening the water supply valve.

Issue 21: DOE requests comment on its proposal to expressly provide that a baffle must not be used when testing ACIMs unless the baffle is (a) a part of the ice maker or (b) shipped with the ice maker to be installed according to the manufacturer's installation instructions.

Issue 22: DOE requests comment on its proposal to specify that temperature measuring devices may be shielded to limit the impact of intermittent warm discharge air at the measurement locations and that if shields are used, they must not block recirculation of the warm discharge air into the condenser or ice maker air inlet.

Issue 23: DOE requests comment on whether any ACIM models discharge air such that the temperature and relative humidity measuring devices would be unable to maintain the required ambient air temperature or relative humidity tolerances even with the measuring devices shielded. If so, DOE requests comment on whether alternate ambient air temperature and relative humidity measurement locations would be necessary (*e.g.,* the ambient temperature measurement locations for water-cooled ice makers, if those locations are not affected by condenser discharge air) and if the ambient air temperature and relative humidity measured at the alternate locations should be within the same tolerances as would otherwise be required.

Issue 24: DOE requests comment on its proposal to require ACIMs with automatic purge water control to be tested 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. DOE also requests comment on its initial determination to not account for energy or water used during intermittent flush or purge cycles. DOE continues to request data regarding the energy and water use impacts of purge cycles.

Issue 25: DOE requests comment on its proposal to require that ACIMs be tested according to the manufacturer's specified minimum rear clearance requirements, or 3 feet from the rear of the ACIM, whichever is less. All other sides of the ACIM and all sides of the remote condenser, if applicable, shall be tested with a minimum clearance of 3 feet or the minimum clearance specified by the manufacturer, whichever is greater. DOE also requests comment on whether this proposal would affect measured energy use and harvest rate compared to the existing DOE test procedure.

Issue 26: DOE requests comment on its proposal to specify that ambient temperature measurements shall be made using unweighted sensors.

Issue 27: DOE requests comment on its proposal to allow for an alternate ambient temperature (and relative humidity) measurement location to avoid complications associated with shielding the measurement in front of the air inlet, as currently required. DOE also requests comment on the proposal for measuring ambient temperature and relative humidity for ACIMs for which the proposed rear clearance would preclude temperature measurements at the rear of the unit under test.

Issue 28: DOE requests comment on maintaining the current requirement to test at the largest and smallest ice cube size settings, consistent with AHRI Standard 810–2016. DOE also requests information on the ice cube size setting typically used by customers with ACIMs with multiple size settings (largest, smallest, default, *etc.*).

Issue 29: DOE requests comment on its proposal to collect capacity samples for ACIMs with dispensers through the continuous production and dispensing of ice throughout testing, using an empty internal storage bin at the beginning of the test period and collecting the ice sample through the dispenser in an external bin one-half full of ice. DOE also requests comment on its proposal to allow for certain mechanisms within the ACIM that would prohibit the continuous production and dispensing of ice throughout testing to be overridden to the minimum extent that allows for the continuous production and dispensing of ice. DOE seeks information on how manufacturers of these ACIMs currently test and rate this equipment under the existing DOE test procedure, whether the proposal would impact the energy use as currently measured, and on the burden associated with the proposed approach or any alternative test approaches.

Issue 30: DOE requests comment on its initial determination that additional test setup and installation instructions are not required for ACIMs with dedicated remote condensing units. DOE seeks information and test data on the range of ACIM performance within the manufacturer-recommended installation parameters to determine whether additional requirements are needed to improve repeatability and reproducibility.

Issue 31: DOE requests comment on its proposal to not establish test procedures for ACIMs intended for installation with a compressor rack. DOE seeks information on the market availability of such equipment, including how manufacturers currently test and rate these units, and the extent to which they are installed with a compressor rack rather than a dedicated condensing unit.

Issue 32: DOE requests comment on its initial determination regarding the lack of availability of modulating capacity ice makers on the market.

Issue 33: DOE requests comment on its proposal to not amend its test procedures to account for standby or ice storage energy use. DOE also requests data on the typical durations and associated energy use for all ACIM operating modes and on the potential burden associated with testing energy use in those modes.

Issue 34: DOE requests comment on the proposal to clarify that the energy use, condenser water use, and potable water use (as described in section III.D.8) be calculated by averaging the calculated values for the three measured samples for each respective metric.

Issue 35: DOE requests comment on the proposal to expressly specify that all calculations must be performed with raw measured values and that only the resultant energy use, water use, and harvest rate metrics be rounded.

Issue 36: DOE requests comment on its proposal to clarify that percent difference shall be calculated based on the average of the two measured values.

Issue 37: DOE requests comment on the proposal to include a voluntary method for measuring potable water use, including the value or drawbacks of such an approach, in 10 CFR 431.134 according to the industry standards and additional test procedure proposals as discussed in this NOPR.

Issue 38: DOE requests comment on its proposal that potable water use is not adjusted based on ice hardness factor.

Issue 39: DOE requests comment on the proposal that the potable water use rate of portable ACIMs be defined as equal to the weight of ice and water captured for the capacity test, as specified in section 7.2 of ASHRAE Standard 29–2015.

Issue 40: DOE requests comment on its proposal to amend the sampling plan and reporting requirements for ACIMs in 10 CFR 429.45. DOE seeks information on how manufacturers are currently interpreting ''maximum energy use'' and ''maximum condenser water use'' in the context of the sampling and certification report requirements, how manufacturers are currently determining harvest rates, and whether the proposed amendments would impose any burden on manufacturers. DOE also requests comment on its proposal to modify the term and definition of ''maximum condenser water use'' to instead refer to ''condenser water use''.

Issue 41: DOE requests comment on its proposal to require that values calculated from a test sample be rounded as follows: Energy use to the nearest 0.01 kWh/100 lb, condenser water use to the nearest gal/100 lb, and harvest rate to the nearest 1 lb/24 h (for ACIMs with harvest rates greater than 50 lb/24 h) or to the nearest 0.1 lb/24 h (for ACIMs with harvest rates less than or equal to 50 lb/24 h).

Issue 42: DOE requests comment on its proposal to include a new section in 10 CFR 429.134 to specify how to determine whether the certified or measured harvest rate is used to calculate the maximum energy consumption and maximum condenser water use levels. DOE also requests comment on whether a five percent tolerance for the average measured harvest rate compared to the certified harvest rate is an appropriate tolerance for such purposes, and if not, what tolerance is appropriate.

Issue 43: DOE requests comment on the impact and test cost of the proposed amendment to clarify the use of test cycles to also confirm stability of the ACIM under test.

Issue 44: DOE requests comment on the impacts and associated costs of the proposed amendments included in this NOPR. In particular, DOE requests feedback and data regarding whether the proposals would impact measured performance of ACIMs as tested under the existing DOE test procedure, and whether manufacturers would incur costs for re-testing existing ACIM models under the proposed procedure. DOE requests comment on the impact and any associated costs of the proposed amendments regarding test conditions for ACIM testing. DOE requests feedback on whether any test facilities would require upgrades to meet the proposed test requirements, and if so, information on the corresponding costs.

Issue 45: DOE requests comment on any expected costs associated with the proposed amendment to expand test procedure scope to include low-capacity ACIMs. Specifically, DOE requests comment on whether any manufacturers are currently making representations of low-capacity ACIM energy consumption based on test methods that would produce measures of performance that would be inconsistent with the existing DOE test procedure or the test procedure for low-capacity ACIMs as proposed in this NOPR.

Issue 46: DOE requests comment on its conclusion that the proposed test procedure amendments would not have a significant economic impact on a substantial number of small entities. Additionally, DOE request comment on its finding that there are twelve small businesses that manufacture ACIMs in the United States. DOE will consider comments received in the development of any final rule.

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this proposed rule.

List of Subjects

10 CFR Part 429

Administrative practice and procedure, Confidential business information, Energy conservation, Reporting and recordkeeping requirements.

10 CFR Part 431

Administrative practice and procedure, Confidential business information, Energy conservation test procedures, Incorporation by reference, and Reporting and recordkeeping requirements.

Signing Authority

This document of the Department of Energy was signed on December 3, 2021, by Kelly Speakes-Backman, Principal Deputy Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on December 7, 2021.

Treena V. Garrett,

Federal Register Liaison Officer, U.S. Department of Energy.

For the reasons stated in the preamble, DOE is proposing to amend parts 429 and 431 of Chapter II of Title 10, Code of Federal Regulations as set forth below:

PART 429—CERTIFICATION, COMPLIANCE, AND ENFORCEMENT FOR CONSUMER PRODUCTS AND COMMERCIAL AND INDUSTRIAL EQUIPMENT

■ 1. The authority citation for part 429 continues to read as follows:

Authority: 42 U.S.C. 6291–6317; 28 U.S.C. 2461 note.

■ 2. Amend § 429.45 by revising paragraph (a)(2) and adding paragraph (a)(3) to read as follows:

§ 429.45 Automatic commercial ice makers.

(a) * * *

(2) For each basic model of automatic commercial ice maker selected for testing, a sample of sufficient size shall be randomly selected and tested to ensure that any represented value of energy use, condenser water use, or other measure of consumption of a basic model for which consumers would favor lower values shall be greater than or equal to the higher of

(i) The mean of the sample, where:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

and, $\bar{x}$ is the sample mean; n is the number of samples; and x_i is the i^{th} sample;

Or,

(ii) The upper 95 percent confidence limit (UCL) of the true mean divided by 1.10, where:

$$UCL = \bar{x} - t_{0.95}\left(\frac{s}{\sqrt{n}}\right)$$

and $\bar{x}$ is the sample mean; s is the sample standard deviation; n is the number of samples; and $t_{0.95}$ is the t statistic for a 95% two-tailed confidence interval with n-1 degrees of freedom (from appendix A).

(3) The harvest rate of a basic model is the mean of the measured harvest rates for each tested unit of the basic model, based on the same tests to determine energy use and condenser water use, if applicable. Round the mean harvest rate to the nearest pound of ice per 24 hours (lb/24 h) for harvest rates above 50 lb/24 h; round the mean harvest rate to the nearest 0.1 lb/24 h for harvest rates less than or equal to 50 lb/24 h.

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■ 3. Amend § 429.134 by adding paragraph (s) to read as follows:

§ 429.134 Product-specific enforcement provisions.

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(s) *Automatic commercial ice makers–verification of harvest rate.* The harvest rate will be measured pursuant to the test requirements of 10 CFR part 431 for each unit tested. The results of the measurement(s) will be averaged and compared to the value of harvest rate certified by the manufacturer of the basic model. The certified harvest rate will be considered valid only if the average measured harvest rate is within five percent of the certified harvest rate.

(1) If the certified harvest rate is found to be valid, the certified harvest rate will be used as the basis for determining the maximum energy use and maximum condenser water use, if applicable, allowed for the basic model.

(2) If the certified harvest rate is found to be invalid, the average measured harvest rate of the units in the sample will be used as the basis for determining the maximum energy use and maximum condenser water use, if applicable, allowed for the basic model.

PART 431—ENERGY EFFICIENCY PROGRAM FOR CERTAIN COMMERCIAL AND INDUSTRIAL EQUIPMENT

■ 4. The authority citation for part 431 continues to read as follows:

Authority: 42 U.S.C. 6291–6317; 28 U.S.C. 2461 note.

■ 5. Amend § 431.132 by:
■ a. Adding a definition in alphabetical order for ''Baffle'',
■ b. Revising the definition of ''Batch type ice maker'';
■ c. Adding a definition in alphabetical order for ''Condenser water use'';
■ d. Removing the definition of ''Cube type ice'';
■ e. Revising the definition of ''Energy use'';
■ f. Removing the definition of ''Maximum condenser water use''; and
■ g. Adding definitions in alphabetical order for ''Portable automatic commercial ice maker'', ''Potable water use'', and ''Refrigerated storage automatic commercial ice maker''.

The additions and revisions read as follows:

§ 431.132 Definitions concerning automatic commercial ice makers.

* * * * *

Baffle means a partition (usually made of flat material like cardboard, plastic, or sheet metal) that reduces or prevents recirculation of warm air from an ice maker's air outlet to its air inlet—or, for remote condensers, from the condenser's air outlet to its inlet.

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Batch type ice maker means an ice maker having alternate freezing and harvesting periods.

Condenser water use means the total amount of water used by the condensing unit (if water-cooled), stated in gallons per 100 pounds (gal/100 lb) of ice, in multiples of 1.

* * * * *

Energy use means the total energy consumed, stated in kilowatt hours per one-hundred pounds (kWh/100 lb) of ice, in multiples of 0.01. 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.

* * * * *

Portable automatic commercial ice maker means an automatic commercial ice maker that does not have a means to connect to a water supply line and has one or more reservoirs that are manually supplied with water.

Potable water use means 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, in multiples of 0.1, and excludes any condenser water use.

Refrigerated storage automatic commercial ice maker means an automatic commercial ice maker that has a refrigeration system that actively refrigerates the self-contained storage bin.

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■ 6. Amend § 431.133 by revising paragraphs (b)(1) and (c)(1) to read as follows:

§ 431.133 Materials incorporated by reference.

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(b) * * *

(1) AHRI Standard 810–2016, *Performance Rating of Automatic Commercial Ice-Makers,* approved January 2018; IBR approved for § 431.134.

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(c) * * *

(1) ANSI/ASHRAE Standard 29–2015, *Method of Testing Automatic Ice Makers,* approved April 30, 2015; IBR approved for § 431.134.

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■ 7. Revise § 431.134 to read as follows:

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

(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 810–2016, 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 810–2016 (incorporated by reference, see § 431.133) for all automatic commercial ice makers, except as noted in the following paragraphs. If any provision of the referenced test procedures conflicts with the requirements in this section or the definitions in § 431.132, the requirements 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) *Water hardness measurement.* Confirm water hardness either by using a water hardness meter with an accuracy within ±10 milligrams per liter (mg/L) of calcium carbonate or by referring to the most recent version of the applicable water quality report provided through the U.S. EPA Consumer Confidence Reports. See *ofmpub.epa.gov/apex/safewater/f?p=136:102.*

(5) *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)(5)(iv) of this section, with unweighted temperature sensors.

(ii) *Ambient relative humidity measurement.* Except as provided in paragraph (c)(5)(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 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.

(6) *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 ambient relative humidity of 35.0 percent ±5.0 percent throughout testing.

(2) *Water hardness.* Water supplied for testing shall have a maximum water hardness of 180 mg/L of calcium carbonate.

(3) *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:

$$Percent\ Difference = \frac{|A - B|}{\frac{A + B}{2}} x100\text{percent}$$

(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 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 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) *Capacity test.* Conduct the capacity test according to section 7.2.2 of ANSI/ASHRAE Standard 29–2015, except that the ice shall be captured for three durations of 15.0 minutes ±9.0 seconds instead of ±2.5 seconds as provided in the Standard.

(2) *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 °F ±1 °F, with an initial water temperature of 90 °F ±1 °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 °F ±1 °F, with an initial water temperature of 90 °F ±1 °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 810–2016.

(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 following equation:

$$Ice\ Hardness\ Adjustment\ Factor = \left[\frac{144\frac{Btu}{lb} + 38\frac{Btu}{lb}}{144\frac{Btu}{lb} \times \left(\frac{Ice\ Hardness\ Factor}{100}\right) + 38\frac{Btu}{lb}}\right]$$

(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 because 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 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 °F ±1.0 °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 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 the capacity test as specified in section 7.2 of 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).

[FR Doc. 2021–26814 Filed 12–20–21; 8:45 am]

BILLING CODE 6450–01–P