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: Final rule.

SUMMARY: In this final rule, the U.S. Department of Energy (''DOE'') amends the test procedure for automatic commercial ice makers to update incorporated references to the latest version of the industry standards; establish a relative humidity test condition; 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 final rule also provides additional detail to the DOE test procedure to improve the representativeness and repeatability of the current test procedure.

DATES: The effective date of this rule is December 1, 2022. The final rule changes will be mandatory for equipment testing starting October 27, 2023. The incorporation by reference of certain publications listed in the rule is approved by the Director of the Federal Register on December 1, 2022.

ADDRESSES: The docket, which includes **Federal Register** notices, public meeting attendee lists and transcripts, 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, not all documents listed in the index may be publicly available, such as those containing information that is exempt from public disclosure.

A link to the docket web page can be found at *www.regulations.gov/docket/EERE-2017-BT-TP-0006.* The docket web page contains instructions on how to access all documents, including public comments, in the docket.

For further information on how to review the docket contact the Appliance and Equipment Standards Program staff at (202) 287–1445 or by email: *ApplianceStandardsQuestions@ee.doe.gov.*

FOR FURTHER INFORMATION CONTACT:

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SUPPLEMENTARY INFORMATION: DOE incorporates by reference the following industry standards into part 431:

AHRI Standard 810 (I–P)–2016 with Addendum 1, ''Performance Rating of Automatic Commercial Ice-Makers,'' January 2018; and

ANSI/ASHRAE Standard 29–2015, ''Method of Testing Automatic Ice Makers,'' approved April 30, 2015.

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

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

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

Table of Contents

I. Authority and Background

Automatic commercial ice makers (''ACIMs'' or ''ice makers'') are included in the list of ''covered equipment'' for which the U.S. Department of Energy (''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 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 established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve energy

[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), which reflect the last statutory amendments that impact Parts A and A–1 of EPCA.

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

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 specifically 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; 42 U.S.C. 6296).

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 other representations about the efficiency of that equipment (42 U.S.C. 6314(d)). Similarly, DOE must use 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 42 U.S.C. 6316(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 (as determined by the Secretary) 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))

If the Secretary determines, on her own behalf or in response to a petition by any interested person, that a test procedure should be prescribed or amended, the Secretary shall promptly publish in the **Federal Register** proposed test procedures and afford interested persons an opportunity to present oral and written data, views, and arguments with respect to such procedures. The comment period on a proposed rule to amend a test procedure shall be at least 60 days and may not exceed 270 days. In prescribing or amending a test procedure, the Secretary shall take into account such information as the Secretary determines relevant to such procedure, including technological developments relating to energy use or energy efficiency of the type (or class) of covered products involved. (42 U.S.C. 6293(b)(2)) 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 final rule in satisfaction of the 7-year review requirement specified in EPCA. (42 U.S.C. 6314(b)(1))

B. Background

DOE's existing test procedures for ACIMs appear at title 10 of the Code of Federal Regulations (''CFR''), part 431, § 431.134.

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''). Following the RFI and in consideration of the comments received, DOE published a notice of proposed rulemaking (''NOPR'') on December 21, 2021, to seek feedback on initial proposals. 86 FR 72322 (''December 2021 NOPR''). In the December 2021 NOPR, DOE proposed the following amendments to the test procedure:

(1) Updating the referenced methods of test to AHRI Standard 810 (I–P)–2016 with Addendum 1 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 received comments in response to the December 2021 NOPR from the interested parties listed in Table I.1.

TABLE I.1—LIST OF COMMENTERS WITH WRITTEN SUBMISSIONS IN RESPONSE TO THE DECEMBER 2021 NOPR

Commenter(s)	Reference in this final rule	Comment No. in the docket	Commenter type
Air-Conditioning, Heating, and Refrigeration Institute	AHRI	13	Trade Association.
Appliance Standards Awareness Project; American Council for an Energy-Efficient Economy; Natural Resources Defense Council.	ASAP, ACEEE, NRDC (Joint Commenters).	15	Efficiency Advocacy Organizations.
Hoshizaki America, Inc	Hoshizaki	14	Manufacturer.
Mile High Equipment Co. DBA Ice-O-Matic	Ice-O-Matic (IOM)	11	Manufacturer.
Pacific Gas and Electric Company; San Diego Gas and Electric; and Southern California Edison; collectively, the California Investor-Owned Utilities.	CA IOUs	16	Utilities.
Association of Home Appliance Manufacturers	AHAM	[3] 18	Trade Association.

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.[4]

II. Synopsis of the Final Rule

In this final rule, DOE amends the representation provisions, product-specific enforcement provisions, and test procedure for ACIMs as follows:

(1) Updating the referenced methods of test to AHRI Standard 810 (I–P)–2016 with Addendum 1 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; clarifying the stability requirements that were updated in ASHRAE Standard 29–2015; and clarifying water pressure requirements;

(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.

The adopted amendments are summarized in Table II.1 compared to the test procedure provisions prior to the amendment, as well as the reason for the adopted change.

TABLE II.1—SUMMARY OF CHANGES ESTABLISHED IN THIS FINAL RULE

Current DOE approach	Amended approach	Attribution
References industry standard AHRI Standard 810–2007 with Addendum 1 "2007 Standard for Performance Rating of Automatic Commercial Ice Makers" ("AHRI Standard 810–2007"), which refers to 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").	Updates reference to industry standard AHRI Standard 810 (I–P)–2016 with Addendum 1, which refers to ASHRAE Standard 29–2015.	Adopts 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 include low-capacity ACIMs with capacity less than or equal to 50 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 (I–P)–2016 with Addendum 1.	Harmonizes with industry standard; improves representativeness, repeatability, and reproducibility.
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 liquid water on the block of ice must be wiped off the surface prior to placement in the calorimeter.	Improves representativeness, repeatability, and reproducibility.

[3] DOE received AHAM's late comment on September 1, 2022, which was past the comment deadline of February 22, 2022. Although this comment was received 191 days after the close of the comment period, DOE has included the comment and responses in this final rule. AHAM indicated it did not file timely comments on the proposed test procedure because AHAM was not aware that the proposed test procedure included AHAM products in its scope. DOE has determined that AHAM's comments may provide a unique stakeholder perspective not included in other comments received during this rulemaking, and therefore DOE has considered them in this final rule despite the late submission.

[4] The parenthetical reference provides a reference for information located in the docket of DOE's rulemaking to develop test procedures for ACIMs. (Docket No. EERE–2017–BT–TP–0006, which is maintained at *www.regulations.gov*) The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

TABLE II.1—SUMMARY OF CHANGES ESTABLISHED IN THIS FINAL RULE—Continued

Current DOE approach	Amended approach	Attribution
Capacity measurements begin after the unit has been stabilized.	All cycles or samples used for the capacity test must meet the stability criteria.	Clarifies industry test procedure ("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 ± 2.5 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.
Does not specify relative humidity test condition	Adds an average minimum relative humidity test condition of 30.0 percent.	Improves representativeness, repeatability, and reproducibility.
Use of baffles and purge setting addressed in guidance..	Incorporates existing guidance into the test procedure; allows 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 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 Standard 810 (I–P)–2016 with Addendum 1.	Harmonizes 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.	Harmonizes 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.
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 "maximum condenser water use" at 10 CFR 431.132.	Modifies the term and definition of "maximum condenser water use" to instead refer to the term "condenser water use".	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.

TABLE II.1—SUMMARY OF CHANGES ESTABLISHED IN THIS FINAL RULE—Continued

Current DOE approach	Amended approach	Attribution
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 energy consumption and 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 determined that while the amendments will introduce additional test requirements compared to the current approach, any impact to the measured efficiency of certified ACIMs is expected to be *de minimis.* For low-capacity ACIMs newly added within scope of the test procedure, testing according to the amended test procedure for purposes of certifications of compliance will not be required until the compliance date of any energy conservation standards for that equipment. However, if a manufacturer chooses to make representations of the energy efficiency or energy use of a low-capacity ACIM, beginning 360 days after publication of the final rule in the **Federal Register**, the manufacturer will be required to base such representations on the DOE test procedure. (42 U.S.C. 6314(d)(1)) While DOE does not expect that manufacturers will incur additional cost as a result of the amended test procedure, DOE provides a discussion of testing costs in section III.F.1 of this final rule. DOE has also determined that the amended test procedure will not be unduly burdensome to conduct. Discussion of DOE's amendments are addressed in detail in section III of this final rule.

The effective date for the amended test procedures adopted in this final rule is 30 days after publication of this document in the **Federal Register**. Representations of energy use or energy efficiency must be based by testing in accordance with the amended test procedures beginning 360 days after the publication of this final rule.

III. Discussion

In the following sections, DOE describes the amendments to the test procedures for ACIMs. This reflects DOE's review of the updates to the referenced industry test procedures, the comments received in response to the March 2019 RFI and the December 2021 NOPR, and other relevant information.

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 current DOE test procedure for ACIMs applies to both batch type and continuous type ice makers[5] 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 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 either 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 configurations, as well as several metrics related to ACIMs.

TABLE III.1—SUMMARY OF ACIM EQUIPMENT CLASSES

Equipment configuration	Condenser cooling fluid	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.

[5] 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—Continued

Equipment configuration	Condenser cooling fluid	Ice-making mechanism	Harvest rate (lb/24 h)
			≥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 (''MREFs''). 79 FR 74894 (''December 2014 MREF Test Procedure NOPR'').[6] 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 ice makers were significantly different from the other product categories considered, and ice makers were not included in the scope of coverage or test procedure for miscellaneous refrigeration products. 81 FR 46773 (July 18, 2016).

As discussed, EPCA defines ''covered equipment'' to include certain types of ''industrial equipment,'' including automatic commercial ice makers. 42 U.S.C. 6311(1). EPCA defines ''industrial equipment'' to mean equipment, including automatic commercial ice makers, (1) which in operation consumes, or is designed to consume, energy, (2) which, to any significant extent, is distributed in commerce for industrial or commercial use; and (3) which is not a ''covered product'' as defined in 42 U.S.C. 6291(a)(2), other than a component of a covered product with respect to which there is in effect a determination under 42 U.S.C. 6312(c); without regard to whether such article is in fact distributed in commerce for industrial or commercial use. 42 U.S.C. 6311(2).

As discussed, the regulatory and statutory definitions of ACIM are not limited by harvest rate (*see* 10 CFR 431.132 and 42 U.S.C. 6311(19), respectively) and low-capacity ACIMs are not a covered product as defined in 42 U.S.C. 6291–6292. DOE has determined that low-capacity ACIMs are, to a significant extent, distributed in commerce for commercial use. DOE reviewed the low-capacity ACIM market and found that manufacturers specifically market certain low-capacity ACIMs for commercial use and/or using commercial air and water ambient rating conditions (*i.e.,* 90 °F air temperature and 70 °F water temperature which are the same air and water ambient rating conditions used in DOE's test procedures for ACIMs currently prescribed at 10 CFR 431.134)[7] and distributors sell low-capacity ACIMs for commercial use.[8] As such, notwithstanding that low-capacity ACIMs may also be distributed in commerce for personal use or consumption by individuals, low-capacity ACIMs meet the definition of ''industrial equipment'' and therefore are covered under the EPCA definition of ''covered equipment.''

In the December 2014 MREF Test Procedure NOPR, DOE stated it is aware that manufacturers are using the DOE ACIM test procedure to represent the energy use of consumer ice makers (*i.e.,*

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

[7] See *www.scotsman-ice.com/service/Specs%20Sheets/2017/SIS-SS-CU0415_0117%20LR.pdf, http://www.hoshizaki.com/docs/color-specs/AM-50BAJ-(AD)DS.pdf, http://www.hoshizaki.com/docs/color-specs/IM-50BAA-Q.pdf, http://www.hoshizaki.com/docs/color-specs/C-80BAJ-(AD)DS.pdf, https://www.manitowocice.com/asset/?id=qsoqru&regions=us&prefLang=en, https://www.scotsman-ice.com/service/Specs%20Sheets/2018/SIS-SS-CU-CU50_0118%20LR.pdf, https://iom-stage.azurewebsites.net/getattachment/b06fdb7c-aaaa-4e5b-b5a6-b091e657a0d3/UCG060A-Spec-Sheet, and https://www.summitappliance.com/catalog/model/BIM44GCSS.*

[8] See *www.katom.com/cat/countertop-ice-makers.html?brand=Danby, https://www.katom.com/cat/undercounter-ice-makers.html?suggested_use=Commercial&production_range_lb%2Fday=1%20-%2099%20lbs, https://www.ckitchen.com/313767/ice-machine-with-bin.html?filter=type-of-cooling:air-cooled;4-hr-production:10-50lbs, https://www.webstaurantstore.com/13283/undercounter-ice-machines.html?filter=24-hour-ice-yield:38~102-pounds,* and *www.staples.com/ice+maker/directory_ice%2520maker.*

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.*

In the December 2021 NOPR, DOE proposed a test procedure for low-capacity ACIMs and requested comment on the proposal to include test procedure provisions for low-capacity ACIMs within the scope of the ACIM test procedure. 86 FR 72322,72328.

In response to the December 2021 NOPR, the Joint Commenters responded that there are many low-capacity models on the market, and these units currently are not subject to DOE efficiency standards or test procedures. (Joint Commenters, No. 15, p. 1)

The CA IOUs and the Joint Commenters expressed support for DOE's proposal to include ACIMs with daily harvest rates below 50 lb/day into the scope of the test procedure, with the Joint Commenters adding that this will ensure any manufacturer claims about capacity and efficiency will be based on standardized test procedures to help purchasers make informed choices. (CA IOUs, No. 16, p. 1; Joint Commenters, No. 15, p. 1)

The CA IOUs stated that they believe extending the scope of the test procedure to low-capacity ice makers is a reasonable first step to a future rulemaking to set minimum energy efficiency standards for these low-capacity ACIM units. (CA IOUs, No. 16, p. 1)

Hoshizaki and AHRI stated that they do not agree with adding provisions for low-capacity ACIMs. (Hoshizaki, No. 14, p. 1; AHRI, No. 13, p. 2) AHAM stated that they do not agree with adding provisions for low-capacity ACIMs to the extent that they include consumer or residential ice makers. (AHAM, No. 18, p. 2) IOM stated that it supports the goal of developing an industry standard to allow for the consistent testing of low-capacity ACIMs.. (IOM, No. 11, p. 1) However, IOM, AHRI, and Hoshizaki stated that such a standard should be developed by an industry organization (ASHRAE 29 or AHRI 810) to determine proper methodology for consistent testing. (IOM, No. 11, p. 1; AHRI, No. 13, p. 2; Hoshizaki, No. 14, p. 1)

AHAM stated that DOE first examined establishing coverage for consumer stand-alone ice makers as part of the rulemaking to establish coverage for miscellaneous refrigeration products. (AHAM, No. 18, p. 2) AHAM noted that, per the recommendation of an Appliance Standards Rulemaking Advisory Committee (ASRAC) working group and its agreed-upon term sheet, DOE declined to cover consumer stand-alone ice makers as part of that rulemaking with the stated reasoning that those products were too different from the other products over which DOE was proposing to establish coverage under the miscellaneous refrigeration product category. *Id.* AHAM noted that the ASRAC stakeholders never suggested or determined that the difference between stand-alone small capacity ice makers and other miscellaneous refrigeration products was that ice makers were commercial equipment. (AHAM, No. 18, p. 3)

AHAM stated that consumer stand-alone ice makers are not automatic commercial ice makers. *Id.* AHAM stated that Congress intended to include only commercial products under the scope of ''automatic commercial ice makers'' as demonstrated by the word ''commercial'' and did not intend to cover residential/consumer products. *Id.* AHAM stated that, in EPCA, automatic commercial ice makers are included in 42 U.S.C. Part A–1 for ''Certain Industrial Equipment'', not Part A, which is for ''Consumer Products other than Automobiles''. *Id.* AHAM stated that automatic commercial ice makers fall under the EPCA definition of ''covered equipment'' which means that, as a threshold matter, it is a type of ''industrial equipment''. *Id.* AHAM commented that DOE's guidance states that ''consumer products and industrial equipment are mutually exclusive categories. An appliance model can only be considered commercial under the Act if it does not fit the definition of 'consumer product' ''.[9] (AHAM, No. 18, p. 4) AHAM states that stand-alone ice makers that are capable of making 50 pounds per day or less more squarely fit under DOE's definition of a consumer product and that residential ice makers that fit under the counter or on the countertop are regularly distributed in commerce for personal use or consumption by individuals. (AHAM, No. 18, p. 3)

AHAM commented that there are several distinguishing design features or characteristics of stand-alone or under-counter ice makers with low capacities including: space constraints, ice quality (*i.e.,* clear, cubed ice or nugget type ice), countertop designs (portable ice makers only), lack of connection to the water supply (portable ice makers only), infrequent and low ice usage, different durability requirements, different sanitary considerations, lack of requirement for National Sanitation Foundation (''NSF'') certifications/listings, different manufacturer warranties, and different safety standards (*i.e.,* Underwriters' Laboratories (''UL'') 60335–2–89, Particular Requirements for Commercial Refrigerating Appliances and Ice makers with an Incorporated or Remote Refrigerant Unit or Motor-Compressor and UL 60335–2–24, Particular Requirements for Refrigerating Appliances, Ice-Cream Appliances, and Ice Makers). (AHAM, No. 18, p. 4–6)

Hoshizaki commented that repeatability is key with low-production models where one cube or chunk could cause the test to be out of tolerance. (Hoshizaki, No. 14, p. 1) Hoshizaki stated that a very low-production machine could have 31% stability swings and could prove impossible to meet the stability threshold in the ASHRAE 29 test. *Id.*

In the December 2021 NOPR, DOE also requested comment on whether there are any industry test procedures for testing and rating low-capacity ACIMs, specifically asking about features specific to low-capacity ACIMs that might need addressed to produce results representative of an average use cycle. 86 FR 72322,72328.

Hoshizaki, AHRI, and AHAM commented they are not aware of any test procedures for low-capacity ice makers. (Hoshizaki, No. 14, p. 1; AHRI, No. 13, p. 2; AHAM, No. 18, p. 8) AHRI and Hoshizaki added that a study would be needed to determine a repeatable process to accurately represent ice capacity and energy use. *Id.* AHRI recommended DOE bring this to the ASHRAE Standard Project Committee (''SPC'') 29 for consideration. (AHRI, No. 13, p. 2)

As stated in the December 2021 NOPR, the energy performance of low-capacity ACIMs are typically either not specified or based on the existing ACIM industry test procedures. 86 FR 72322,72328. 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. *Id.*

DOE is still unaware of an industry test procedure for testing and rating low-capacity ACIMs. Manufacturers continue to use the DOE ACIM test procedure to represent the energy use of low-capacity ACIMs or do not specify the energy use. DOE acknowledges the comments regarding including low-capacity ACIMs within scope of industry test standards and will consider any updated industry test

[9] *See https://www1.eere.energy.gov/buildings/appliance_standards/pdfs/cce_faq.pdf.*

standards, if available, during future ACIM test procedure rulemakings.

DOE discusses stability requirements for low-capacity ACIMs in section III.D.1 of this final rule.

In response to AHAM's comments regarding low-capacity ACIMs, as previously stated, EPCA defines ''industrial equipment'' to mean equipment (1) which in operation consumes, or is designed to consume, energy, (2) which, to any significant extent, is distributed in commerce for industrial or commercial use; and (3) which is not a ''covered product'' as defined in 42 U.S.C. 6291(a)(2), other than a component of a covered product with respect to which there is in effect a determination under 42 U.S.C. 6312(c); without regard to whether such article is in fact distributed in commerce for industrial or commercial use. 42 U.S.C. 6311(2). DOE has determined that low-capacity ACIMs (1) consume energy; (2) are, to a significant extent, distributed in commerce for commercial use; and (3) are not covered products. As such, notwithstanding that low-capacity ACIMs may also be distributed in commerce for personal use or consumption by individuals, low-capacity ACIMs meet the definition of ''industrial equipment'' and therefore are covered under the EPCA definition of ''covered equipment.'' DOE has determined that establishing a test procedure for low-capacity ACIMs will allow purchasers to make more informed decisions regarding the performance of low-capacity ACIMs. DOE is amending the scope of the ACIM test procedure to include all automatic commercial ice makers with capacities up to 4,000 lb/24 h (*i.e.,* to include within the scope of the test procedure, low-capacity ACIMs with a harvest rate less than 50 lb/24 h). Under the amended test procedure, were a manufacturer to choose to make representations of the energy efficiency or energy use of a low-capacity ACIM, beginning 360 days after publication of the final rule in the **Federal Register**, manufacturers would be required to base such representations on the DOE test procedure. (42 U.S.C. 6314(d)(1))

B. Definitions

As noted, 10 CFR 431.132 provides definitions concerning ACIMs. DOE adds new definitions to support test procedure amendments 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.

In the December 2021 NOPR, DOE proposed to define ''refrigerated storage automatic commercial ice maker'' as an automatic commercial ice maker that has a refrigeration system that actively refrigerates the self-contained storage bin in 10 CFR 431.132 for refrigerated storage ACIMs. 86 FR 72322, 72328.

In the December 2021 NOPR, DOE requested comment on the proposed definitions for refrigerated storage automatic commercial ice maker. 86 FR 72322, 72328.

In response to the December 2021 NOPR, Hoshizaki commented that it is not aware of any standard, self-contained refrigerated storage commercial ice makers. (Hoshizaki, No. 14, p. 1)

AHRI commented it was unable to categorize this equipment class with the information provided and would appreciate clarification on this equipment class and the desired intent behind its potential inclusion. (AHRI, No. 13, p. 2) Hoshizaki additionally requested examples of this product, and requested that this be addressed in AHRI 810 and ASHRAE 29 for definition. (Hoshizaki, No. 14, p. 1)

As stated in the December 2021 NOPR, DOE included a definition of refrigerated storage ACIMs to effectively differentiate refrigerated storage ACIMs from ACIMs with unrefrigerated storage bins, and to support the proposed test provisions for refrigerated storage ACIMs. 86 FR 72322, 72328. An example of a refrigerated storage ACIM is the Whynter UIM–155.[10] To clarify and provide more information on the scope of the refrigerated storage ACIM definition, DOE has added ''ice'' to the definition to differentiate refrigerated storage ACIMs from other refrigeration equipment that is not intended only for ice storage, so the phrase at the end of the definition reads ''self-contained ice storage bin''.

DOE will consider any updated industry standards, if available, during future ACIM test procedure rulemakings.

[10] *See www.whynter.com/product/uim-155/.*

DOE is modifying the definition of refrigerated storage automatic commercial ice maker in this final rule.

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 the December 2021 NOPR, DOE proposed a definition for a 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). 86 FR 72322, 72328. DOE proposed to define ''portable automatic commercial ice maker'' as 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 in 10 CFR 431.132. *Id.*

In the December 2021 NOPR, DOE requested comment on the proposed definition for portable automatic commercial ice maker. *Id.*

In response to the December 2021 NOPR, AHRI commented that the proposed definitions seemed reasonable. (AHRI, No. 13, p. 2–3) However, Hoshizaki and AHRI requested that DOE work with AHRI and ASHRAE to add this definition in both AHRI 810 and ASHRAE 29. (Hoshizaki, No. 14, p. 1–2; AHRI, No. 13, p. 2–3)

AHAM stated that portable ice makers are designed to fit on the countertop and rely on a reservoir instead of being plumbed into the water supply. (AHAM, No. 18, p.4)

The CA IOUs commented on two types of portable ACIMs: portable drawer ice machines and portable bin ice machines. (CA IOUs, No. 16, p. 3)

The CA IOUs commented that portable drawer ice machines are designed without a door, and the ice drops directly from the evaporator into a drawer. *Id.* The CA IOUs stated that in this design, the user does not have to open a door to access the drawer. *Id.* The CA IOUs commented that portable bin ice machines are similar to traditional self-contained machines where the evaporator is in the bin itself; however, the evaporator uses a pipe trickle design to create semi-hollow or gourmet ice. *Id.* The CA IOUs noted that water can be filled directly into the evaporator in the portable bin ice machines, but both portable drawer and portable bin low-capacity ice machine designs can reuse ice-melt water to feed the evaporator. *Id.*

DOE notes that the proposed definition of portable automatic commercial ice maker does not distinguish between portable ACIMs with and without doors. DOE has also not identified any need to differentiate between these portable ACIM configurations for the purposes of testing. Therefore, all portable ACIMs would be included under this definition and any further categorization of portable ACIM equipment classes could be investigated in any energy conservation standards rulemaking for portable ACIMs.

DOE is maintaining the definition of portable automatic commercial ice maker in this final rule, consistent with the December 2021 NOPR.

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 31.134. In the December 2021 NOPR, to avoid potential confusion regarding multiple definitions of similar terms, DOE proposed 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. 86 FR 72322, 72328–72329.

AHRI Standard 810 (I–P)–2016 with Addendum 1 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 proposed 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. 86 FR 72322, 72328.

AHRI Standard 810 (I–P)–2016 with Addendum 1 also deleted its definition of ''Cubes Type Ice Maker'' and replaced it with a definition of ''Batch Type Ice-Maker.'' 86 FR 72322, 72328. To be consistent with this industry update, DOE proposed to remove the reference to cubes type ice maker in the definition of ''batch type ice maker'' in 10 CFR 431.132. *Id.* DOE also proposed to remove ''cube type ice'' from the list of DOE definitions at 10 CFR 431.132, consistent with the industry standard update. 86 FR 72322, 72329.

In the December 2021 NOPR, DOE requested comment on its proposal to amend 10 CFR 431.132 to revise the previously described definitions, consistent with updates to AHRI Standard 810 (I–P)–2016 with Addendum 1, additionally requesting feedback on the proposed clarification that the DOE definitions take precedence over any conflicting industry standard definitions. 86 FR 72322, 72329.

Hoshizaki agreed with this proposal, but requested that AHRI 810, ASHRAE 29, and 10 CFR 431.132 definitions be consistent. (Hoshizaki, No. 14, p. 2)

AHRI commented that the proposed definitions seemed reasonable, but stated that this should go to ASHRAE SPC 29 and AHRI standard 810 for consideration and inclusion. (AHRI, No. 13, p. 2–3)

DOE is amending 10 CFR 431.132 to revise the previously described definitions in this final rule. These updates are consistent with updates in the current industry standard AHRI Standard 810 (I–P)–2016 with Addendum 1. DOE is also maintaining in this final rule the clarification that the DOE definitions take precedence over any conflicting industry standard definitions, consistent with the December 2021 NOPR.

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 11, 2012 test procedure final rule (''January 2012 final rule''), both AHRI and ASHRAE have published new versions of the referenced standards. 77 FR 1591. The most recent versions are AHRI Standard 810 (I–P)–2016 with Addendum 1 and ASHRAE Standard 29–2015 (reaffirmed in 2018). 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 ASRHAE 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 Specifications.	''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 pans.
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.

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

Requirement	ASHRAE standard 29–2009	ASHRAE standard 29–2015
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 sec after collection and continuous ice samples must be within 5 mins of each other.
Calorimetry Testing	(1) Room temperature is not specified. (2) To determine the calorimeter constant, 30 lbs of water must be added. (3) Rate of stirring is described as "vigorously". (4) To determine the calorimeter constant, 6 lbs of ice must be added. (5) The block of ice is seasoned at room temperature. A temperature measurement location is not specified for the block of ice. (6) To determine the calorimeter constant, it is not explicitly stated to continue stirring for 15 minutes after the ice has melted. (7) The calorimeter constant shall be determined twice, at the beginning and at the end of the daily tests. (8) The calorimeter constant shall be no greater than 1.02. (9) To determine the net cooling effect, the water must stand in the calorimeter for 1 min before adding 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.	(1) Room temperature shall be within 65–75°F during the entire procedure. (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 to be 1 ± 0.5 revolutions/second. (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 pure ice must reach an equilibrium temperature measured by a thermocouple embedded in the interior of the block and free of trapped water. (6) To determine the calorimeter constant, continue stirring for 15 minutes after ice has disappeared. (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 must be within 1.0–1.02. (9) To determine the net cooling effect, stir the water for 15 minutes prior to the addition of the harvested ice. (10) Section 7.2.4 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.

DOE also reviewed the updates to AHRI Standard 810 (I–P)–2016 with Addendum 1 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 (I–P)–2016 with Addendum 1 are primarily clerical in nature and provide greater consistency in the use of terms and specific definitions for those terms.

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 December 2021 NOPR, DOE 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. 86 FR 72322, 72331. 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, in the December 2021 NOPR, DOE did not propose to amend the 70 °F ± 1 °F ambient air temperature and 90 °F ± 1 °F initial water temperature requirements for calorimetry testing. 86 FR 72322, 72331. DOE proposed 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 (I–P)–2016 with Addendum 1. *Id.* 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.

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, in the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72331. Furthermore, DOE proposed 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. *Id.*

In the December 2021 NOPR, DOE proposed to adopt by reference AHRI Standard 810 (I–P)–2016 with Addendum 1 and ASHRAE Standard 29–2015 (note that AHRI Standard 810 (I–P)–2016 with Addendum 1 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 as specified in the December 2021 NOPR. 86 FR 72322, 72331.

In the December 2021 NOPR, DOE requested comment on its proposal to maintain the current specifications for ambient air temperature and initial water temperature for calorimetry testing. 86 FR 72322, 72331. DOE additionally requested 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 (I–P)–2016 with Addendum 1. *Id.*

In response to the December 2021 NOPR, Hoshizaki commented that it does not agree with this change, and requested that any changes to the test procedure be brought to the ASHRAE 29 standard committee for clarification and acceptance. (Hoshizaki, No. 14, p. 2)

Similarly, AHRI commented that members are not opposed to this change but note that such a change must follow the proper channels and first be incorporated into the ASHRAE 29 method of test before being adopted into federal regulation. (AHRI, No. 13, p. 3)

AHAM commented that requiring the ice sample to be used for calorimetry testing be intercepted using a non-perforated container, precooled to ice temperature is not necessary because the measurement of ice sample weight is very quick (about five seconds) and will not reduce the accuracy due to the ice sample melting or evaporating. (AHAM, No. 18, p. 13) AHAM stated that this requirement does not add a large burden, but it is an unnecessary burden. *Id.*

The test approach proposed in the December 2021 NOPR is consistent with the industry test standard requirements and 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.

DOE is maintaining in this final rule the current specifications for ambient air temperature and initial water temperature for calorimetry testing and clarifying 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 (I–P)–2016 with Addendum 1.

Additionally, DOE requested 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. 86 FR 72322, 72331. DOE also requested 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. *Id.*

In response to the December 2021 NOPR, Hoshizaki requested that any clarification of wording in ASHRAE 29 be brought to the ASHRAE 29 standard committee for discussion and acceptance. (Hoshizaki, No. 14, p. 2)

AHRI encouraged DOE to bring any requests for clarification or interpretation to the proper industry working groups for consideration, since consistency and repeatability are of utmost importance to ensure that all original equipment manufacturers (''OEMs'') and testing bodies address these provisions in a constant manner. (AHRI, No. 13, p. 3)

The test approach proposed in the December 2021 NOPR is consistent with the industry test standard requirements and would limit variation in determining the calorimeter constant. Therefore, DOE is maintaining these clarifications in this final rule, consistent with the December 2021 NOPR.

Additionally, DOE requested comment on its proposal to adopt by reference AHRI Standard 810 (I–P)–2016 with Addendum 1 and ASHRAE Standard 29–2015, except for the provisions for calorimetry testing as discussed previously, for all ACIMs. 86 FR 72322, 72331.

Hoshizaki and AHRI agreed to the adoption of AHRI Standard 810 (I–P)–2016 with Addendum 1 and ASHRAE 29–2015. (Hoshizaki, No. 14, p. 2; AHRI, No. 13, p. 3) However, Hoshizaki supports adoption of the standards in their entirety with no exceptions, otherwise there is a risk that changes not reflected in the standards will not be realized by testers. (Hoshizaki, No. 14, p. 2) Hoshizaki and AHRI requested that any proposed changes be brought before the relevant standard committees for discussion and acceptance. (Hoshizaki, No. 14, p. 2)

DOE is adopting by reference AHRI Standard 810 (I–P)–2016 with Addendum 1 and ASHRAE Standard 29–2015, except for the additional amendments as specified in this final rule. DOE has determined that the additional amendments are consistent with the test requirements in the industry standards but provide added specificity to limit variation in testing. These modifications are consistent with section 8(c) of 10 CFR part 430, subpart

C, appendix A (the ''Process Rule''), applicable to ACIMs under 10 CFR 431.4, which states that DOE may adopt industry test procedure standards with modifications, or craft its own procedures as necessary to ensure compatibility with the relevant statutory requirements, as well as DOE's compliance, certification, and enforcement requirements. Additional modifications to the industry standard test methods are discussed in the following sections.

D. Additional Amendments

As part of this rulemaking, DOE conducted testing to identify whether ASHRAE Standard 29–2015 and AHRI Standard 810 (I–P)–2016 with Addendum 1 could potentially benefit from additional detail and to investigate topics discussed in the March 2019 RFI and December 2021 NOPR. The testing and initial findings are discussed along with any corresponding amendments in the following sections.

1. Low-Capacity ACIMs

DOE examined the comments received in response to the December 2014 MREF Test Procedure NOPR to consider what test method would be appropriate for low-capacity ACIMs. During the December 2014 MREF Test Procedure 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 Test Procedure 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)

In the December 2021 NOPR, 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. 86 FR 72322, 72331. DOE also evaluated the provisions in AHRI Standard 810 (I–P)–2016 with Addendum 1 and ASHRAE Standard 29–2015 to determine their applicability to low-capacity ACIMs. *Id.* 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, in the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72332.

During the January 24, 2022, webinar to discuss the December 2021 NOPR, AHRI commented that the water retention weight requirement for low-capacity ACIMs and DOE's test data should be considered by the method of test committee (*e.g.,* ASHRAE 29). (AHRI, January 24, 2022, webinar to discuss the December 2021 NOPR[11])

DOE will consider any updated industry standards, if available, during future ACIM test procedure rulemakings.

DOE is maintaining that the water retention requirement in section 5.5.2(a) of ASHRAE Standard 29–2015 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, consistent with the December 2021 NOPR.

a. Portable ACIMs

For portable ACIMs, DOE has 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 does 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 (I–P)–2016 with Addendum 1 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 determined that additional instructions are needed regarding supply water characteristics and filling the water reservoirs in portable ACIMs.

Section 5.2.1 of AHRI Standard 810 (I–P)–2016 with Addendum 1 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 determined that specifying only the initial fill temperature of the water supplied to the reservoir is most representative of typical use. In the December 2021 NOPR, DOE proposed to establish the initial water temperature in a separate external container before transferring the water to the water reservoir. 86 FR 72322, 72332. 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, in the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72332. 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 (I–P)–2016 with Addendum 1 and the tolerance as

[11] *See* pages 19–20; *www.regulations.gov/document/EERE-2017-BT-TP-0006-0012.*

specified in section 6.2 of ASHRAE Standard 29–2015. *Id.*

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 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, in the December 2021 NOPR, DOE proposed that portable ACIMs be subject to the test procedure as proposed in the NOPR, except that sections 5.4, 5.6, 6.2, and 6.3 of ASHRAE Standard 29–2015 would not apply. 86 FR 72322, 72332. DOE proposed 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 that is consistent with the requirements of section 5.2.1 of AHRI Standard 810 (I–P)–2016 with Addendum 1 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. *Id.*

DOE also 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, in the December 2021 NOPR DOE proposed 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). 86 FR 72322, 72333. DOE proposed to define one-half full as half of the vertical dimension of the storage bin, based on the maximum possible fill level. *Id.* 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. *Id.*

In the December 2021 NOPR, DOE requested comment on its proposal regarding reservoir water and ice storage bin instructions for portable ACIMs. 86 FR 72322, 72332–72333.

Hoshizaki agreed with the proposal if the portable units have a way to collect the ice in a way not to confuse the ice made in each cycle from the ½ full bin. (Hoshizaki, No. 14, p. 2–3) Hoshizaki and AHRI requested that this be brought to the ASHRAE 29 standard committee for consideration. (Hoshizaki, No. 14, p. 2–3; AHRI, No. 13, p. 3)

AHRI commented that consistency and repeatability are of utmost importance to ensure that all manufacturers and testing bodies address these provisions in a constant manner. (AHRI, No. 14, p. 3)

AHAM commented that the 70 °F ± 1.0 °F tolerance requirement for the initial water temperature is unnecessarily tight for low-capacity ACIMs, including portable ACIMs, which adds unnecessary test burden. (AHAM, No. 18, p. 10–11) AHAM commented that the test procedure should specify that the water should be stirred to eliminate gradients that would naturally occur because some models recirculate melt water to the reservoir and that, for all low-capacity ACIMs, the temperature of the inlet water will vary throughout the entire test with little effect on the ultimate result. *Id.*

AHAM commented that the DOE's proposed test procedure for portable ACIMs does not specify that the bin should be emptied and dried out before the first 15-minute run, which AHAM suggests may be implicit in the proposed test procedure but should be stated clearly. (AHAM, No. 18, p. 12)

DOE notes that, in the December 2021 NOPR, DOE proposed that the ice storage bin is empty prior to the initial potable water reservoir fill and that the initial water temperature of 70 °F ± 1.0 °F for testing portable ACIMs is only required to be verified in an external container immediately before filling the portable ACIM water reservoir. 86 FR 72322, 72332–72333.

DOE testing has shown that portable ACIMs are able to have ice collected in a similar manner to non-portable ACIMs which distinguish the ice made in each cycle from the ice already present in the ice storage bin. DOE has additionally determined that the additional provisions regarding reservoir water fill are necessary to allow for testing of portable ACIMs.

DOE is maintaining the test requirements as proposed in the December 2021 NOPR for portable ACIMs in this final rule.

b. Refrigerated Storage ACIMs

DOE has determined that refrigerated storage ACIMs can be tested according to the current DOE ACIM test procedure as well as AHRI Standard 810 (I–P)–2016 with Addendum 1 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. Therefore, in the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72333. DOE proposed 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.'' *Id.* To ensure a consistent number of door openings, DOE also proposed 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). *Id.*

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 proposed in the December 2021 NOPR that the refrigeration set point for testing a refrigerated storage ACIM be consistent with section 4.1.4 of AHRI Standard 810 (I–P)–2016 with Addendum 1 (*i.e.,* per the manufacturer's written instructions with no adjustment prior to or during the test). 86 FR 72322, 72333.

In the December 2021 NOPR, DOE requested comment on its proposal to test refrigerated storage ACIMs consistent with AHRI Standard 810 (I–P)–2016 with Addendum 1, with the specified proposed door opening duration and frequency. 86 FR 72322, 72333. DOE requested comment on whether a specific refrigeration set point or internal air temperature should be specified instead of the manufacturer's factory preset. *Id.*

In response to the December 2021 NOPR, Hoshizaki and AHRI both requested DOE clarify refrigerated storage ACIMs and share examples before feedback can be given. (Hoshizaki, No. 14, p. 3; AHRI, No. 13, p. 4)

AHRI commented that ASHRAE 29 does not cover products installed in residential refrigerators or freezers, and if these are the type of systems being referred to as self-contained refrigerated storage ACIMs, the scope of both ASHRAE 29 and the DOE rulemaking would need to be expanded to cover such equipment. (AHRI, No. 13, p. 4) AHRI suggested that DOE clarify the equipment type and bring this issue to ASHRAE SPC 29 for consideration. *Id.* AHAM commented that DOE's proposed test procedure draws heavily from AHRI Standard 810 (I–P)–2016 with Addendum 1 and ASHRAE Standard 29–2015 that were not developed with residential products in mind. (AHAM, No. 18, p. 9)

DOE is not referring to products installed in residential refrigerators or freezers in this Final rule. Refrigerated storage ACIMs are explicitly excluded from the freezer definition at 10 CFR 430.2 and differ from the refrigerator-freezer definition at 10 CFR 430.2 because refrigerated storage ACIMs only produce and store ice in a single compartment. Section III.B.1 provides further clarity and an example of refrigerated storage ACIMs.

Because DOE did not receive any comments regarding the refrigerated storage ACIM proposals, DOE is maintaining the test requirements as proposed in the December 2021 NOPR for refrigerated storage ACIMs in this final rule.

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.

a. Capacity Test Cycles or Samples

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 the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72334. 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. *Id.*

In the December 2021 NOPR, DOE requested 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. 86 FR 72322, 72334.

Hoshizaki agreed that all cycles should meet the stability criteria. (Hoshizaki, No. 14, p. 3) AHRI commented that the stability criteria should match the requirements of ASHRAE 29. (AHRI, No. 13, p. 4)

AHRI commented that some units vary in performance each cycle due to water dump frequency by design, and DOE should ask the ASHRAE committee for an interpretation if DOE is concerned about ambiguity in ASHRAE 29. (AHRI, No. 13, p. 4)

IOM commented that this proposal would take the stabilization criteria further than ASHRAE Standard 29–2009 and ASHRAE Standard 29–2015, requiring that all cycles not differ by more than 2%. (Ice-O-Matic, No. 11, p. 1) IOM added that a dataset with small linear growth (100, 102, and 104 lb/24 hr) would not be considered stabilized under this DOE rule, while it would be considered stabilized under ASHRAE Standard 29–2015. *Id.* IOM commented that in practice it is not uncommon for units which achieved stabilization under ASHRAE Standard 29–2009 to produce capacity test samples which vary in excess of ±2 percent. *Id.* IOM stated that because allowable variance during capacity tests is already being reduced by changing from ASHRAE 29–2009 to ASHRAE 29–2015, IOM finds DOE's proposal to further reduce potential variance excessive, and believes it has the potential to increase test burden on manufacturers. *Id.* IOM generally supported using test cycles to also confirm stability following the requirements for stability as defined in ASHRAE Standard 29–2015. (IOM, No. 11, p. 3)

DOE has determined that clarifying the stability criteria specified in ASHRAE 29–2015 will produce test results that are more representative, repeatable, and reproducible. As indicated in the IOM comment, the current ASHRAE 29–2009 approach may introduce potential variability in test results. Additionally, reducing the number of cycles or samples required for the capacity test will reduce test burden by reducing total test time. DOE discusses test burden in section III.F.1 of this final rule.

Therefore, DOE is maintaining in this final rule its interpretation of section 7.1.1 of ASHRAE Standard 29–2015 and requirement that all cycles or samples used for the capacity test meet the stability criteria, consistent with the December 2021 NOPR.

b. Test Sample Duration

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.

In the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72334. 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. *Id.* 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. *Id.* DOE expected 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. *Id.* Additionally, in the December 2021 NOPR, DOE did 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. *Id.*

In the December 2021 NOPR, DOE requested comment on the proposal to increase the tolerance for continuous ice makers to collect samples to 15.0 minutes ± 9.0 seconds. 86 FR 72322, 72334.

In response to the December 2021 NOPR, IOM commented in support of the proposal to increase the tolerance on sample collection for continuous ice makers. (Ice-O-Matic, No. 11, p. 1)

Hoshizaki and AHRI commented that they do not agree with the proposed change. (Hoshizaki, No. 14, p. 3; AHRI, No. 13, p. 4) Hoshizaki commented such time could impact high-capacity continuous models and have a significant impact on capacity and energy totals, and AHRI added that the proposed changes could impact the output depending on the capacity of the unit. *Id.* AHRI stated that this proposal could change the integrity of the test and would need further evaluation prior to being considered. *Id.*

AHRI added that the increase to ±9.0 seconds would allow high-capacity units to potentially collect a greater sample and while the test was not designed to be applied to low-capacity machines, the impact of this proposed change could be substantially less. *Id.*

Hoshizaki requests that further discussion be put through the ASHRAE 29 committee. (Hoshizaki, No. 14, p. 3)

DOE has re-evaluated its proposal and determined that although a greater tolerance would reduce test burden on manufacturers to test continuous ACIMs, the collection duration tolerance in ASHRAE 29–2015 provides a repeatable and reproducible method of test. DOE has determined that the specified tolerance included in ASHRAE 29–2015 demonstrates that manufacturers can meet the specified tolerance without the need for an increased tolerance. Therefore, DOE is declining to allow for a greater collection duration tolerance than the tolerance specified for continuous ACIMs in ASHRAE 29–2015 (*i.e.,* ±2.5 seconds).

c. Low-Capacity ACIM Stability Criterion

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 conducted as part of this rulemaking, 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 proposed in the December 2021 NOPR to not apply the absolute stability criteria specified in ASHRAE 29–2015 to the proposed test procedure for low-capacity ACIMs. 86 FR 72322, 72334.

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 (*i.e.,* 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). In the December 2021 NOPR, DOE 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. 86 FR 72322, 72334. DOE observed through testing that low-capacity ACIMs are able to achieve stability based on a 4 percent requirement. *Id.*

Therefore, for consistency (on a percentage basis) with the ASHRAE 29–2015 test requirements for the lowest capacity ACIMs currently in scope and to limit test burden, in the December 2021 NOPR, DOE proposed to require a ±4 percent stability criterion (without an absolute stability criterion) for testing low-capacity ACIMs. 86 FR 72322, 72334.

In the December 2021 NOPR, DOE requested 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. 86 FR 72322, 72334.

In response to the December 2021 NOPR, Hoshizaki and AHRI requested that this proposal be brought to the ASHRAE 29 standard committee with supporting testing to show that this stability is necessary and adequate for these products since currently they are outside of the scope, and that ASHRAE 29 was not developed for low-capacity ACIMs. (Hoshizaki, No. 14, p. 3; AHRI, No. 13, p. 4–5) AHRI added that the units should not be allowed to bypass stability requirements currently in the standard simply because the method of test has not been designed to incorporate such units. (AHRI, No. 13, p. 4–5) AHRI commented that members do not currently have testing data to show that 4 percent would be accurate or comparable for this equipment type. *Id.*

AHAM commented in support of the ±4 percent stability criterion for low-capacity ice makers. (AHAM, No. 18, p. 11) AHAM stated that DOE's ACIM energy conservation standards or test procedure need a method to account for this planned variation such that the variation does not penalize manufacturers when the test procedure is used for enforcement purposes. *Id.*

DOE observed from testing of low-capacity ACIMs to support the December 2021 NOPR that a ±4 percent stability criterion is appropriate and ensures representative, repeatable, and reproducible measures of performance for low-capacity ACIMs. A ±4 percent stability criterion is consistent with the absolute stability requirements from ASHRAE 29–2015 for the lowest capacity ACIMs currently in scope (*i.e.,* 2.2 lb/24 h divided by 50 lb/24 h). A ±4 percent stability criterion does not bypass any requirement because low-capacity ACIMs are not currently subject to the DOE test procedure and are not within the scope of ASHRAE 29–2009 or ASHRAE 29–2015. DOE will consider any updated industry standards, if available, during future ACIM test procedure rulemakings. DOE discusses enforcement provisions for ACIMs in section III.E.3 of this final rule.

DOE is maintaining in this final rule the requirement 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, consistent with the December 2021 NOPR.

3. Test Conditions

The DOE test procedure specifies standard test conditions to ensure that test results reflect energy use during a representative average use cycle and are not unduly burdensome for manufacturers to perform.

DOE discusses 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 automatic commercial ice makers. However, neither the current DOE test procedure, nor AHRI Standard 810 (I–P)–2016 with Addendum 1 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 December 2021 NOPR, DOE presented data from three ACIMs tested at relative humidity levels of 35, 55, and 75 percent at the standard rating conditions to investigate the effect of relative humidity on energy use, as replicated in Table III.3. 86 FR 72322, 72335. The results showed a wide range of impacts on energy use among the three tested units when relative humidity is varied. *Id.* Test Unit 1 showed less than 1 percent variation in energy use among the three relative humidity test conditions. *Id.* Whereas, Test Unit 2 showed a 35 percent difference in energy use between the 35 percent and 75 percent relative humidity test conditions. *Id.* Test Unit 3 showed a 4 percent difference in energy use between the 35 percent and 75 percent relative humidity conditions. *Id.* DOE stated in the December 2021 NOPR that it was unable to determine why Test Unit 2 showed significantly greater variation in performance compared to the other test units. *Id.* In summary, these results indicated that for certain ACIM models, relative humidity has a significant impact on measured energy use.

TABLE III.3—COMPARISON OF ENERGY USE RATES AT DIFFERENT RELATIVE HUMIDITY TEST CONDITIONS AS PRESENTED IN THE DECEMBER 2021 NOPR

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

In the December 2021 NOPR, DOE considered relative humidity test conditions for ACIMs by comparing the test conditions required for testing other types of commercial food service equipment, including CRE, BVMs, and refrigerated buffet and preparation tables. 86 FR 72322, 72335. In particular, DOE compared the moisture content level corresponding to the combination of ambient temperature and relative humidity specified for these other equipment types. *Id.* DOE summarized these test condition requirements along with the proposed relative humidity test condition of 35 percent for ACIMs, as replicated in Table III.4. *Id.*

TABLE III.4—COMPARISON OF RELATIVE HUMIDITY TEST CONDITIONS AS PRESENTED IN THE DECEMBER 2021 NOPR

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
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.

Based on these considerations, DOE proposed to require a relative humidity test condition of 35 percent for ACIM testing. 86 FR 72322, 72335. As indicated in Table III.4, the proposed relative humidity condition of 35 percent, in combination with the ambient air condition of 90 °F, would correspond to a moisture content of 0.011 lbs water vapor/lbs dry air. This would closely match the moisture contents associated with the test procedures for the other types of commercial food service equipment.

In the December 2021 NOPR, DOE also investigated appropriate tolerances to specify for the relative humidity test condition. 86 FR 72322, 72336. DOE considered a test condition tolerance and test operating tolerance on relative humidity. *Id.* A test condition tolerance is a tolerance that is calculated based on the average of all relative humidity measurements during each freeze cycle. *Id.* In contrast, a test operating tolerance would apply to all individual measurements during each cycle. *Id.* 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. *Id.* ASHRAE 72–2018 is the only standard mentioned in Table III.4 that also requires a test operating tolerance. *Id.*

DOE also investigated typical accuracies of relative humidity sensors, finding that accuracies of ±2.0 percent are typical for relative humidity sensors. *Id.* Additionally, DOE noted that its test procedure for BVMs requires a relative humidity instrument accuracy of ±2.0 percent for a test condition tolerance of ±5.0 percent. See section 1.1 of appendix B to subpart Q of 10 CFR part 431. *Id.* Similarly, section 6.3 of ASTM Standard F2143–2016 also requires a relative humidity instrument accuracy of ±2.0 percent for a test condition tolerance of ±5.0 percent. *Id.*

Based on this analysis, DOE proposed a relative humidity test condition tolerance of ±5.0 percent. *Id.* DOE also proposed to require a relative humidity instrument accuracy of ±2.0 percent. *Id.*

In summary, DOE proposed to require a relative humidity test condition of 35 percent. 86 FR 72322, 72335. DOE proposed 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. 86 FR 72322, 72336. DOE proposed to add a test condition tolerance on the proposed relative humidity test condition of ±5.0 percent. *Id.* DOE proposed to require a relative humidity instrument accuracy of ±2.0 percent. *Id.* DOE stated in the December 2021 NOPR that it did not expect the proposal to affect measured performance of existing ACIM models. *Id.*

DOE requested comment on the proposal to control relative humidity at

35 ± 5.0 percent. 86 FR 72322, 72336. Specifically, DOE requested 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. *Id.*

In response to the December 2021 NOPR, Hoshizaki and AHRI commented that due to inherent humidity caused by ice makers in the production of ice, the control of relative humidity has been left out of the test protocols currently used (*e.g.,* ASHRAE 29). (Hoshizaki, No. 14, p. 3; AHRI, No. 13, p. 5) AHRI, Joint Commenters, Hoshizaki, IOM, The Legacy Companies, and Manitowoc Ice commented that ACIMs respond differently to the humidity of ambient air than other refrigerated equipment because the evaporator is in a wetted setting, so units are not greatly affected by humidity changes during testing. (AHRI, No. 13, p. 5; Joint Commenters, No. 15, p. 1; Hoshizaki, No. 14, p. 3; IOM, No. 11, p. 2; The Legacy Companies, January 24, 2022 webinar to discuss the December 2021 NOPR; [12] Manitowoc Ice, January 24, 2022 webinar to discuss the December 2021 NOPR) [13] AHRI and added that units are designed to handle these conditions and that humidity control is not necessary (AHRI, No. 13, p. 5; AHAM, No. 18, p. 12).

IOM and The Legacy Companies commented that they do not support the proposal to control humidity. (IOM, No. 11, p. 2; The Legacy Companies, January 24, 2022 webinar to discuss the December 2021 NOPR) [14] Joint Commenters commented that ACIM test chambers typically do not control the relative humidity of ambient air. (Joint Commenters, No. 15, p. 1) IOM commented that they do not control for or measure humidity levels in its environmental chambers. (IOM, No. 11, p. 2) Welbilt commented that they do not have humidity control in their test chambers and that ACIM test chambers are often very specialized because of the range of ambient conditions that are needed to test ACIMs whereas CRE test chambers are typically used for testing at one or two ambient conditions. (Welbilt, January 24, 2022 webinar to discuss the December 2021 NOPR) [15]

AHRI, Hoshizaki, IOM, Joint Commenters, and Manitowoc Ice commented that test data should be reviewed and validated to confirm the need for relative humidity control. (AHRI, Public Meeting Transcript, No. EERE–2017–BT–TP–0006–0012 at p. 29; Hoshizaki, No. 14, p. 3; IOM, No. 11, p. 2; Joint Commenters, No. 15, p. 1–2; Manitowoc Ice, January 24, 2022 webinar to discuss the December 2021 NOPR) [16] AHAM commented that DOE's testing is not sufficient to justify its proposed requirement. AHAM, No. 18, p. 13. Joint Commenters added that DOE should conduct additional relative humidity testing and if a large performance difference for some units is confirmed, then a relative humidity requirement is needed to ensure the reproducibility of the test procedure. (Joint Commenters, No. 15, p. 1–2)

AHRI, Hoshizaki, IOM, Welbilt, and Joint Commenters commented that a relative humidity of 35 percent may be unrepresentative of the variety of environments housing ACIMs. (AHRI, No. 13, p. 5; Hoshizaki, No. 14, p. 3; IOM, No. 11, p. 2; Welbilt, January 24, 2022 webinar to discuss the December 2021 NOPR; [17] Joint Commenters, No. 15, p. 2) IOM added that commercial kitchens may have humidity much higher than 35 percent, front-of-house locations may be lower than 35 percent, and ACIMs utilizing a remote condenser may see humidity anywhere between 15 and100 percent. (IOM, No. 11, p. 2)

AHRI commented that the ambient temperatures would also vary greatly by application and such a humidity would be difficult to control while entering the test chamber for sample collection. (AHRI, No. 13, p. 5) IOM believes that a ±5 percent tolerance is too narrow and would be difficult to control during tests. (IOM, No. 11, p. 2) IOM suggested a ±10 percent tolerance if humidity is controlled. *Id.*

AHRI, IOM, and Welbilt asserted that the addition of humidity control requirements would impose undue burden to OEMs and testing facilities without benefiting the efficiency or testing of ACIMs. (AHRI, No. 13, p. 5; IOM, No. 11, p. 2; Welbilt, January 24, 2022 webinar to discuss the December 2021 NOPR [18]) AHRI, IOM, and Welbilt commented that it would also be extremely costly to add humidity control upgrades to testing laboratories for little wielded benefit. *Id.* Hoshizaki commented that full costs should be considered in adding this to the test criteria along with the cost to retest all products that currently do not have humidity control in their test. (Hoshizaki, No. 14, p. 3)

Hoshizaki requested that this be addressed in the ASHRAE 29 standard committee for consensus. (Hoshizaki, No. 14, p. 3)

DOE has reviewed and confirmed the validity of the test data from the three units presented in the December 2021 NOPR.

DOE has also conducted further analysis of the test data from Test Unit 2 to further investigate that unit's significant variation in energy use among the different relative humidity test conditions. DOE notes that during the January 24, 2022 webinar to discuss the December 2021 NOPR, True Manufacturing commented in response to a request for comment about the relative humidity test condition that some ACIMs that have poor insulation may inadvertently make ice on the back side of the evaporator plate or other unwanted areas, which could possibly decrease the harvest rate.[19] Indeed, DOE observed for Test Unit 2 that the 75 percent relative humidity test had additional drain water collected during the freeze cycles compared to the 35 percent relative humidity test. DOE investigated whether this additional drain water could have resulted from additional condensation of moisture at the higher relative humidity, and whether the higher energy use for Test Unit 2 at the 75 percent relative humidity test condition may correspond to such additional condensate being produced at that test condition. If so, this would indicate that the higher energy use was directly related to the relative humidity test condition.

Based on the technical characteristics of Test Unit 2, DOE calculated the theoretical amount of additional energy use that would be required by Test Unit 2 to condense the amount of additional drain water measured.[20] DOE compared

[12] *See* pages 30–31; *www.regulations.gov/document/EERE-2017-BT-TP-0006-0012.*

[13] *See* pages 32–33; *www.regulations.gov/document/EERE-2017-BT-TP-0006-0012.*

[14] *See* pages 30–31; *www.regulations.gov/document/EERE-2017-BT-TP-0006-0012.*

[15] *See* pages 29–30; *www.regulations.gov/document/EERE-2017-BT-TP-0006-0012.*

[16] *See* pages 32–33; *www.regulations.gov/document/EERE-2017-BT-TP-0006-0012.*

[17] *See* pages 29–30; *www.regulations.gov/document/EERE-2017-BT-TP-0006–0012.*

[18] *See* pages 29–30; *www.regulations.gov/document/EERE-2017-BT-TP-0006-0012.*

[19] *See* pages 34–35; *www.regulations.gov/document/EERE-2017-BT-TP-0006-0012.*

[20] DOE calculated the additional amount of heat removal required from the evaporator of Test Unit 2 to condense the same amount of moisture from the surrounding air that was observed in the additional drain water from the 75% relative humidity test. Subsequently, DOE calculated the additional amount of compressor, sump pump, and condenser fan motor energy and additional freeze cycle duration that would be necessary to remove this additional heat based on the Test Unit 2's compressor specification data at an assumed

Continued

the resulting theoretical amount of additional energy use to the measured amount of additional energy use. Table III.5 shows the average measured drain water (in lbs) and the average measured energy use (in kWh) of the freeze cycles for Test Unit 2. Table III.6 shows the comparison of these measured values to the theoretical amount of additional energy use that would be required by Test Unit 2 to condense this amount of additional drain water, as calculated by DOE.

TABLE III.5—SUMMARY OF DRAIN WATER AND ENERGY USE MEASUREMENTS FOR TEST UNIT 2

Cycle description	35% relative humidity	75% relative humidity	Difference between 35% and 75% relative humidity
Freeze cycle drain water (lbs)	0.59	1.01	0.43
Freeze cycle energy use (kWh)	0.21	0.32	0.11

TABLE III.6—COMPARISON OF THEORETICAL ADDITIONAL ENERGY USE TO MEASURED ADDITIONAL ENERGY USE FOR TEST UNIT 2

Cycle description	Measured difference between 35% and 75% relative humidity	Theoretical energy use required to produce 0.43 lbs of condensate
Freeze cycle energy use (kWh)	0.11	0.12

As indicated in Table III.6, DOE's calculated approach to determine the additional energy use required to condense the amount of additional drain water measured closely matched the measured approach. This indicates that the additional energy use at the 75 percent relative humidity test condition was likely due to the difference in condensed moisture accumulated at the 75 percent test condition, thus supporting that the relative humidity level during the test may have a direct impact on measured energy performance.

DOE also evaluated additional test data from previous investigative ACIM testing to further confirm the effects of relative humidity on measured energy use. DOE previously tested four batch style ACIMs at 55 and 75 percent relative humidity using the standard rating conditions specified in AHRI 810. Although this testing was not conducted at 35 percent relative humidity, the test data is instructive on whether a difference in relative humidity affects ACIM performance. Table III.7 summarizes the results of this previous testing.

TABLE III.7—COMPARISON OF ENERGY USE RATES AT DIFFERENT RELATIVE HUMIDITY TEST CONDITIONS

Test unit	Type	55% relative humidity (kWh/100 lb)	75% relative humidity (kWh/100 lb)	Difference from 55% relative humidity to 75% relative humidity (%)
4	Batch	9.45	9.30	−1.6
5	Batch	17.47	21.58	+23.5
6	Batch	30.33	30.56	+0.8
7	Batch	40.46	40.49	+0.1

These results show that for some ACIM models, a difference in relative humidity makes very little impact on ACIM performance, but for other models, a difference in relative humidity makes a significant impact on ACIM performance. Considering the three tested units presented in the December 2021 NOPR in addition to these four units, out of a total test sample of 7 ACIMs, relative humidity had a significant impact on ACIM performance for at least two ACIMs. This suggests that a difference in relative humidity may affect a substantial portion of the ACIM market.

As summarized previously in this section, comments received in response to the December 2021 NOPR indicate that certain manufacturers do not measure relative humidity of the ambient air during testing, and that ACIM test chambers typically do not control the relative humidity of the ambient air. Commenters also generally suggested defining a broader tolerance as compared to the proposed tolerance of ±5 percent, asserting that controlling relative humidity to within ±5 percent during testing would be difficult.

Based on the additional analysis discussed in this final rule, including consideration of comments received in

evaporator temperature of 15 °F and condenser temperature of 115 °F, and sump pump and condenser fan motor specification data with an assumed power factor of 80%.

response to the December 2021 NOPR, DOE is modifying the relative humidity test conditions adopted in this final rule, as compared to the provisions as proposed in the December 2021 NOPR, to instead specify a minimum threshold rather than a defined range. Specifically, this final rule adopts a requirement to maintain an average minimum ambient relative humidity of 30.0 percent throughout testing. This revised specification represents the minimum of the relative humidity tolerance, 35.0 ± 5.0 percent, as proposed in the December 2021 NOPR and will allow for a broader range of relative humidity values that will be easier to control during testing. Furthermore, DOE notes that its test data indicated that higher humidity levels are associated with higher measured energy use for certain ACIM models—suggesting that manufacturers of such models will be incentivized to test with relative humidity levels as close to the minimum defined threshold as possible.

See section III.F.1 of this final rule for a discussion of DOE's analysis of any expected costs or impacts on measured performance as a result of this amendment.

b. Water Hardness

ASHRAE Standard 29–2015 and AHRI Standard 810 (I–P)–2016 with Addendum 1 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.[21] 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 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. 77 FR 1591, 1605–1606. 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. *Id.*

As part of this rulemaking, 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 three batch type ice makers and one continuous type ice maker.

According to the USGS, the vast majority of water hardness in the United States ranges from 0 mg/L to 250 mg/L of calcium carbonate.[22] 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). The ''soft water'' test at 42 mg/L of calcium carbonate was based on the water hardness of the potable water at the testing facility where the tests were conducted and therefore no additional preparation of the potable water was required to meet the 42 mg/L of calcium carbonate water hardness level. The ''very hard water'' test at 342 mg/L of calcium carbonate was prepared by adding calcium chloride and magnesium chloride hexahydrate with a mass ratio of 304:139 to the potable water at the testing facility to reach the water hardness level of 342 mg/L of calcium carbonate and the resulting mixture was recirculated for sixteen hours to ensure even mixing. 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.8.

TABLE III.8—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

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).

In the December 2021 NOPR, DOE proposed to require that water used for testing have a maximum hardness of 180 mg/L of calcium carbonate. 86 FR 72322, 72337. DOE stated that 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. *Id.*

In the December 2021 NOPR, DOE proposed 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.* 86 FR 72322, 72337. DOE

[21] *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.*

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

expected 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. *Id.* For this same reason, DOE did not expect that this proposal would impact rated performance for any ACIMs tested under the current DOE test procedure. *Id.*

In the December 2021 NOPR, DOE also noted that this proposal would 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. 86 FR 72322, 72337.

In the December 2021 NOPR, DOE requested 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. 86 FR 72322, 72337. DOE requested 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. 86 FR 72322, 72337–72338. Additionally, DOE requested information on whether this requirement should only be applicable to potable water used to make ice (and not any condenser cooling water). 86 FR 72322, 72338.

In response to the December 2021 NOPR, Hoshizaki agreed that water hardness would be good to investigate for the test standard. (Hoshizaki, No. 14, p. 4) However, Hoshizaki and AHRI requested that water hardness be brought to the ASHRAE 29 committee for consideration. (Hoshizaki, No. 14, p. 4; AHRI, No. 14, p. 5)

Joint Commenters supported DOE's proposal to introduce a water hardness requirement to improve the reproducibility of the test procedure. (Joint Commenters, No. 15, p. 2) The Joint Commenters added that since the hardness of tap water varies throughout the U.S., DOE's proposal to establish a water hardness condition will likely increase the reproducibility of the test procedure, and therefore stated support for DOE's proposal to establish a maximum water hardness for testing of 180 mg/L, which will exclude very hard water. *Id.*

AHRI commented that different regions experience hard water that can consistently exceed 180 mg/L, so this issue would need to be evaluated across regions to ensure that undue burden is not being unfairly inflicted on specific areas of the country. (AHRI, No. 14, p. 5) During the January 24, 2022 ACIM test procedure public meeting, True Manufacturing commented that their test facilities have potable water that is approximately 300 mg/L all year long.[23]

IOM commented that although DOE's test data showed that harvest rate increases and energy use decreases when increasing calcium carbonate concentration, DOE does not provide any details on the characteristics of their test water besides calcium carbonate concentration. (IOM, No. 11, p. 2) If the ''very soft'' water was created by softening the ''very hard'' sample water using a salt-based ion-exchange water softener, the total dissolved solids (TDS) of the test water would remain the same, as ion-exchange systems simply replace calcium and magnesium with sodium chloride. *Id.* The act of softening ''very hard'' water creates a high salinity solution which might affect the freezing point of water, causing the diminished performance seen with ''very soft'' water. *Id.*

IOM commented the only way to reliably supply consistent test water to IOM's laboratory with specifications around calcium carbonate concentration would be to implement reverse osmosis systems, which are costly to install and maintain, and consume a significant amount of energy during use. (IOM, No. 11, p. 2)

IOM requested that if DOE were to implement this rule, it should only be applicable to the potable water used to make ice, unless DOE is able to demonstrate that hardness has an effect on energy consumption in water-cooled ACIMs. (IOM, No. 11, p. 2)

Comments from interested parties indicated that some ACIM test facilities have potable water with water hardness above of 180 mg/L of calcium carbonate and that softening or controlling the water hardness would impose a burden on certain manufacturers. DOE acknowledges that DOE's expectation in the December 2021 NOPR that any test facilities in locations with water supply hardness greater than 180 mg/L would likely already incorporate water softening controls was incorrect and therefore, updates to certain existing test facilities would be needed to control for water hardness. Although the USGS designates water hardness above of 180 mg/L of calcium carbonate as very hard water, DOE has determined that further investigation is necessary before establishing a water hardness test condition and is declining to specify a water hardness range for ACIM testing in this final rule. DOE notes that because a specific water hardness range is not specified, all water hardness levels will be considered valid for ACIM testing.

[23] *See* page 40; *www.regulations.gov/document/EERE-2017-BT-TP-0006-0012.*

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 December 2021 NOPR, DOE did not propose any changes to the ambient temperature gradient requirements, except through an updated reference to ASHRAE Standard 29–2015, and requested comment on this approach and on whether any modifications would improve test accuracy or decrease test burden. 86 FR 72322, 72338.

In response to the December 2021 NOPR, Hoshizaki commented that if ASHRAE 29–2015 is adopted, it supports use of the ambient temperature gradient requirements in that edition. (Hoshizaki, No. 14, p. 4) AHRI agreed with the adoption of ASHRAE Standard 29–2015 and its gradient requirements. (AHRI, No. 13, p. 5)

DOE is maintaining in this final rule the existing ambient temperature gradient requirements, through an updated reference to ASHRAE Standard 29–2015.

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 Standard 810 (I–P)–2016 with Addendum 1 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 December 2021 NOPR, DOE proposed to maintain the single set of rating conditions currently required in the DOE test procedure. 86 FR 72322,72338. Specifically, DOE proposed to maintain the reference to AHRI Standard 810, through AHRI Standard 810 (I–P)–2016 with Addendum 1, for rating conditions because those were selected as representative, repeatable rating conditions of this equipment. *Id.* 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 (I–P)–2016 with Addendum 1.

In addition, the response of ACIM refrigeration systems to varying ambient conditions is different than the response of refrigeration systems in other refrigeration and heating, ventilation, and air-conditioning (''HVAC'') equipment. Other refrigeration or HVAC equipment are 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, in the December 2021 NOPR, DOE tentatively determined that the existing test conditions provide representative, repeatable rating conditions for this equipment, and DOE expected that the burden of introducing a second test condition (which would approximately double test duration) would not be justified. 86 FR 72322,72339.

In the December 2021 NOPR, DOE requested 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 requested supporting data and information. 86 FR 72322,72339.

In response to the December 2021 NOPR, AHRI commented that the current 90 °F ambient temperature (which includes 90 °F for both the indoor ambient temperature and the condenser air inlet temperature for ACIMs with remote condensing units) and 70 °F water inlet temperature test conditions are representative for much of the installed base. (AHRI, No. 13, p. 6) AHRI stated that changing the test point would disrupt historical data and understanding of the performance of the equipment, for both manufacturers and consumers. (*Id.*) Hoshizaki stated that the existing ambient temperature and water supply temperature requirements provide representative, repeatable rating conditions for this equipment. (Hoshizaki, No. 14, p. 4)

AHAM commented that the 90 °F ambient temperature is applicable to commercial settings but not residential settings and that any measured energy use at a 90 °F ambient temperature is not representative of real-world use because most residential ice makers are installed in air-conditioned spaces with ambient temperature closer to 70 °F. (AHAM, No. 18, p. 10) AHAM clarified that they are not suggesting that DOE lower the proposed ambient temperature because most of the test chambers used for residential ice maker manufacturers are set to 90 °F because that is the test condition required for other refrigeration products. *Id.* AHAM stated that a second ambient condition would create undue burden through additional resource, personnel, and time requirements for testing. *Id.*

DOE is maintaining in this final rule the existing ambient temperature and water supply temperature requirements.

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 begins to open 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), in the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72339.

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 part 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, in the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72339. DOE did 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. *Id.*

In the December 2021 NOPR, DOE requested 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. 86 FR 72322, 72339.

In response to the December 2021 NOPR, IOM supported DOE's proposal to allow 5 seconds after opening the water supply valve for water pressure to be in the allowable range. (IOM, No. 11, p. 3) Hoshizaki and AHRI commented they see the benefit to having an allowable range for water supply pressure but requests this be addressed by the ASHRAE 29 standard committee to ensure a consensus of the committee to change such requirements. (Hoshizaki, No. 14, p. 4; AHRI, No. 13, p. 6)

AHAM commented that the maximum five second sampling rate for water pressure is unnecessary, impractical, burdensome, and adds difficulty and complexity to the test procedure. (AHAM, No. 18, p. 12) AHAM commented that energy measurement only needs a timestamp and Watt-hour reading at the beginning and end of the test and that the intermediate scans check for ambient and gradient temperatures which can have a sampling rate of 30 seconds to one minute which is similar to the test procedure for refrigeration products.[24] *Id.* The sampling rate proposed in the December 2021 NOPR is consistent with the industry test standard requirements. DOE has determined that the industry standard approach is appropriate because ACIMs typically have a shorter overall test duration as compared to other refrigeration products, and for batch type ACIMs, the water fills may represent only a portion of the test period. Therefore, the more frequent sampling interval is appropriate to ensure the required water pressure is maintained throughout the water fill period, except for within the initial 5 seconds after opening the water supply valve.

DOE is maintaining in this final rule the requirement 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, consistent with the December 2021 NOPR.

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 determined that the representativeness and repeatability of the test procedure could be further improved through certain test setup and equipment configuration amendments as discussed in the following paragraphs.

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.[25] 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.'' [26] 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.

Based on the final guidance document, DOE proposed in the December 2021 NOPR 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. 86 FR 72322, 72340. In the December 2021 NOPR, DOE stated 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. *Id.* DOE added that this proposal would 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. *Id.*

In the December 2021 NOPR, DOE requested 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. 86 FR 72322, 72340.

In response to the December 2021 NOPR, Hoshizaki and AHRI agreed that the unit should be installed in accordance with the manufacturer's installation instructions, and that baffles should only be used if instructed to do so in installation instructions. (Hoshizaki, No. 14, p. 4; AHRI, No. 13, p. 6)

AHAM commented that DOE's 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 fails to account for the differences between built-in and freestanding ice makers (*i.e.,* built-in products must be counter depth to be incorporated into kitchen designs and be flush with cabinetry). (AHAM, No. 18, p. 12) AHAM commented that applying the test as written may penalize manufacturers of built-in products, as it is not representative of their real-world use. *Id.*

The 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 is representative because a baffle is permitted to be used in testing if it is integral to the ice maker or shipped with the ice maker and instructed to be installed in the manufacturer's installation instructions. Regarding other installation requirements, DOE provides a

[24] *See* 10 CFR part 430, subpart B, appendices A and B.

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

[26] Section 4.1.4, ''Test Set Up,'' of AHRI Standard 810–2007 and AHRI Standard 810 (I–P)–2016 with Addendum 1.

discussion of clearances in section III.D.4.c of this final rule.

DOE is maintaining in this final rule the requirement 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, consistent with the December 2021 NOPR.

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, in the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72340. DOE further proposed that if shields are used, they must not block recirculation of the warm discharge air into the condenser or ice maker inlet. *Id.* DOE did not expect this proposal to impact measured ACIM performance compared to the existing test procedure, as it is consistent with the existing test approach. *Id.*

In the December 2021 NOPR, DOE requested 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. 86 FR 72322, 72340.

In response to the December 2021 NOPR, Hoshizaki and AHRI agreed with DOE's proposal to specify that temperature measuring devices may be shielded to limit the impact of intermittent warm discharge air at the measurement locations. (Hoshizaki, No. 14, p. 4; AHRI, No. 13, p. 6) However, Hoshizaki requested that this be addressed in the ASHRAE 29 standard committee. (Hoshizaki, No. 14, p. 4)

DOE is maintaining in this final rule the requirement that temperature and relative humidity 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, consistent with the December 2021 NOPR.

In the December 2021 NOPR, DOE also requested 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. 86 FR 72322, 72340. If so, DOE requested 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. *Id.*

In response to the December 2021 NOPR, Hoshizaki and AHRI commented that they are not aware of a need for alternate ambient temperature locations. (Hoshizaki, No. 14, p. 4; AHRI, No. 13, p. 6)

Based on comments from interested parties that alternate ambient air temperature and relative humidity measurement locations are not necessary, DOE is maintaining the current ambient measurement locations for ACIM testing in this final rule, except as discussed in section III.D.4.d.

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.[27] DOE further stated that the automatic purge setting should not be used for testing.

Consistent with DOE's existing guidance, in the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72341. 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 also proposed 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. *Id.*

DOE stated that this proposal would not conflict with any of the setup or installation requirements in AHRI Standard 810 (I–P)–2016 with Addendum 1. 86 FR 72322, 72341. 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,

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

specifying use of a fixed purge setting. *Id.*

In the December 2021 NOPR, DOE requested 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. 86 FR 72322, 72342.

In response to the December 2021 NOPR, Hoshizaki and AHRI requested that units be tested per normal operating instructions in accordance with manufacturer installation instructions. (Hoshizaki, No. 14, p. 5; AHRI, No. 13, p. 7)

DOE is maintaining in this final rule the requirement that ACIMs with automatic purge water control 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, consistent with the December 2021 NOPR.

In support of the December 2021 NOPR, DOE conducted testing to investigate the energy and water consumption associated with flush or purge cycles. 86 FR 72322, 72341. 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. *Id.* Table III.9 summarizes how a purge cycle contributes to the energy and water consumption of a continuous ACIM. *Id.* Table III.10 presents DOE's estimates of the test durations under the existing test approach and under an approach that would account for purge operation. *Id.*

TABLE III.9—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.

TABLE III.10—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

DOE observed that purge cycles for both batch and continuous ACIMs did not significantly contribute to the energy consumption over a period of normal operation.

Accounting for purge cycle operation would require extending the test period to capture both stable ice production and normal purge operation.

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, in the December 2021 NOPR, DOE did not propose to address flush or purge cycles in its test procedure. 86 FR 72322, 72342.

In the December 2021 NOPR, DOE requested comment on its initial determination to not directly account for energy or water used during intermittent flush or purge cycles. 86 FR 72322, 72342. DOE also requested data regarding the energy and water use impacts of purge cycles. *Id.*

In response to the December 2021 NOPR, Hoshizaki agreed with DOE that the test should not be changed to account for intermittent flush or purge cycles. (Hoshizaki, No. 14, p. 5) Hoshizaki added that accounting for purge cycles would require a significant increase in total test time, resulting in significant increase in test burden with only a small amount of energy and water contribution. (Hoshizaki, No. 14, p. 5) During the January 24, 2022 ACIM test procedure public meeting, Hoshizaki stated that for continuous ACIMs, a normal purge cycle contains less than five ounces of water and occurs once every 12 hours.[28]

Joint Commenters stated that DOE may have underestimated the frequency of purge cycles, citing the DOE's test of a batch type ACIM with a default purge setting of a purge every 5 hours (coinciding with the start of a harvest, resulting in no separate purge cycle). (Joint Commenters, No. 15, p. 2) However, Joint Commenters added that for batch type ACIMs, the purge water setting used in the field may differ from that in the manufacturer's instructions or default settings and may be set such that a separate purge cycle occurs as frequently as every batch cycle. *Id.* Joint Commenters encouraged DOE to investigate how the purge cycle settings in field installations may differ from the manufacturer default settings for ACIMs and to consider capturing the purge cycle energy in the test procedures. *Id.*

DOE is not aware of and did not receive any data to indicate how purge water settings used in the field may differ from that in the manufacturer's instructions or default settings. However, if a default purge setting was as frequent as every batch cycle, purges would be accounted for in the amended ACIM test procedure because the batches would likely be consistent even with the purge occurring every cycle and therefore the batches would meet the stability criteria as amended in this final rule.

DOE is maintaining in this final rule its determination to not directly account for energy or water used during intermittent flush or purge cycles, consistent with the December 2021 NOPR.

[28] *See* page 47; *www.regulations.gov/document/EERE-2017-BT-TP-0006-0012.*

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 Corporation (''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)

In support of the December 2021 NOPR, DOE conducted testing to assess how different clearance requirements could affect the measured energy consumption and harvest rate of ACIMs. 86 FR 72322, 72342. 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. *Id.* Table III.11 summarizes how four test units performed under the four clearance setups. *Id.*

TABLE III.11—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%
	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. *Id.* 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. *Id.* 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. *Id.*

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. *Id.* 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. *Id.*

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. *Id.* 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. *Id.* Based on the test data in Table III.10, testing according to the manufacturer-specified minimum rear clearance has little to no measured impact on ACIM performance for the four test units. *Id.* 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. *Id.*

Therefore, in the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72343. DOE proposed 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. *Id.* 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. *Id.* DOE expected 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. *Id.*

In the December 2021 NOPR, DOE did not propose specific requirements for the wall used to maintain the rear clearance when conducting the test. 86 FR 72322, 72343. 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. *Id.*

In the December 2021 NOPR, DOE requested 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, and that 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. 86 FR 72322, 72343. DOE also requested comment on whether this proposal would affect measured energy use and harvest rate compared to the existing DOE test procedure. *Id.*

In response to the December 2021 NOPR, Hoshizaki requested that this be explored in the ASHRAE 29 standard committee to clarify any changes to the current test specifications. (Hoshizaki, No. 14, p. 5) IOM did not support this proposal to change clearance requirements. (IOM, No. 11, p. 3)

AHRI commented that depending on the condenser location and air discharge, changes to the clearance requirements could impact performance of the unit. (AHRI, No. 13, p. 7) IOM commented that reducing the rear minimum clearance will very likely increase measured energy use and decrease measured harvest rate. (IOM, No. 11, p. 3) IOM added that minimum clearances are established to provide guidelines for installation from a product safety standpoint, not a performance standpoint, and it is well understood in the industry that increasing clearance around the unit will result in improved performance and efficiency. *Id.*

IOM commented that measuring performance and efficiency of a product in its worst possible installation configuration is unfair to manufacturers. (IOM, No. 11, p. 3) AHRI added that the requirements in ASHRAE Standard 29 are clear and effective regarding the clearance allowed and changes to these requirements could result in undue burden to test facilities that have already setup for ASHRAE 29 requirements. (AHRI, No. 13, p. 7)

DOE notes that, in response to the March 2019 RFI, Howe commented that it is reasonable for customers to expect ACIMs to perform at their certified ratings when using the minimum clearances as described in the manufacturer literature. (Howe, No. 6 at p. 4) While manufacturers might provide minimum clearances for all sides of an ACIM, the expectation may be that ACIMs are installed such that one or more of the sides have clearances exceeding the manufacturer minimum.

ACIMs may have different condenser locations and air discharge but because ACIMs are typically installed in commercial food service applications with space constraints, end users likely install their ACIMs against at least a rear wall using the manufacturer minimum clearance to maximize available working space and, therefore, the manufacturer's minimum rear clearance should be accounted for in the tested performance. Based on the test data in Table III.10, 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.

DOE notes that, in the December 2021 NOPR, DOE did not propose specific requirements for the wall used to maintain the rear clearance, which is the only change from the ASHRAE 29–2015 clearance requirements, when conducting the test and that test facilities would be able to setup the clearance requirements in any way they choose, as long as the test installation meets the proposed requirements, in order to limit any potential test burden.

DOE will consider any updated industry standards, if available, during future ACIM test procedure rulemakings.

DOE is maintaining in this final rule 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, consistent with the December 2021 NOPR. On all other sides of the ACIM and all sides of the remote condenser, if applicable, testing shall be conducted with a minimum clearance of 3 feet or the minimum clearance specified by the manufacturer, whichever is greater. Test laboratories may satisfy the clearance requirements in any way they choose, as long as the test installation meets the amended requirements.

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.

i. Ambient Temperature Sensors

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 test condition tolerances, whereas an unweighted sensor could indicate temperature extremes exceeding the required temperature test condition tolerances. This difference in function of the sensors impacts the application of the required temperature test condition 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 support of the December 2021 NOPR, DOE conducted testing to evaluate the ability to meet the specified tolerances of ASHRAE Standard 29–2015 using both weighted and unweighted temperature sensors. 86 FR 72322, 72344. 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. *Id.* As such, weighted sensors may give the false impression that ambient temperature test condition tolerances of ±2 °F during the first 5 minutes of each freeze cycle, and not more than ±1 °F thereafter, are met during testing. *Id.* The measurement of ambient temperature using unweighted sensors provides more representative measures of actual instantaneous ambient temperature conditions than the measurement of weighted sensors. *Id.* DOE observed in its testing in support of the December 2021 NOPR that the ambient temperature was within the test condition tolerances specified in ASHRAE Standard 29–2015 for all freeze cycles when using either weighted or unweighted sensors. *Id.*

Therefore, in the December 2021 NOPR, DOE proposed to specify that unweighted sensors be used to make all ambient temperature measurements. 86 FR 72322, 72344. Based on comments received in the March 2019 RFI, this proposal reflects current industry practice and would not add any burden. *Id.* This proposal is consistent with AHRI Standard 810 (I–P)–2016 with Addendum 1 because it specifies the instrumentation for measuring ambient temperature, but does not otherwise change the existing requirements. *Id.*

In the December 2021 NOPR, DOE requested comment on its proposal to specify that ambient temperature measurements be made using unweighted sensors. 86 FR 72322, 72344.

In response to the December 2021 NOPR, Hoshizaki agreed with the proposal, but noted that if a clarification is needed that this be addressed by the ASHRAE 29 standard committee. (Hoshizaki, No. 14, p. 5) AHRI commented that the testing location is currently allowed to designate the sensor type used, and this has not negatively impacted ratings or product performance and therefore should not be changed without further clarification of issues that it may resolve and discussion at the method of test level. (AHRI, No. 13, p. 7) AHRI added that the change to requiring unweighted sensors could incur associated costs without providing benefits to the test results, but if such a change is to be considered, it should go through the ASHRAE 29 standards committee. *Id.* AHRI noted that this issue has been debated within other refrigeration ASHRAE committees continuously without conclusions being reached that unweighted sensors should be required. *Id.*

AHAM commented that in DOE's proposed test procedure the mean of the ambient temperatures is more important than a momentary fluctuation of temperature. (AHAM, No. 18, p. 13) AHAM commented in support of weighted sensors because they would dampen the influence of other units being simultaneously tested on the ambient and gradient measurements and disagreed with the use of unweighted sensors because they are more easily influenced by changes in temperature, including those resulting from opening and closing the test room door. *Id.* AHAM stated that, similar to DOE's test procedure for refrigeration products, weighted sensors are appropriate for testing residential ice makers in order to compensate for the fluctuations occurring during testing. *Id.*

Based on DOE's analysis indicating that the specified test conditions can be met with an unweighted sensor, which was presented in the December 2021 NOPR, DOE is maintaining in this final rule that ambient temperature measurements be made using unweighted sensors, consistent with the December 2021 NOPR.

ii. Alternative Ambient Measurement Locations

The current DOE guidance and proposal in the December 2021 NOPR regarding the use of temporary baffles, as discussed in section III.D.4.a, illustrates 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 (I–P)–2016 with Addendum 1 and relative humidity within the range proposed in the December 2021 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, in support of the December 2021 NOPR, an ACIM which exhausted its warm condenser air on the side of the ACIM adjacent to the side with the air intake. 86 FR 72322, 72344. 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. *Id.* 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 (I–P)–2016 with Addendum 1 (*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). *Id.* Table III.12 summarizes the results of this testing.

TABLE III.12—AVERAGE AMBIENT TEMPERATURES MEASURED ON EACH SIDE AROUND AND 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.12, 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. *Id.* 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. *Id.*

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. *Id.* 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, as discussed in section III.D.4.a., in the December 2021 NOPR, DOE proposed that the ambient temperature may be recorded at an alternative location. *Id.* DOE proposed 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. *Id.* DOE expected that this proposal would not impact measured ACIM performance compared to the existing test approach. 86 FR 72322, 72344–72345. DOE also proposed that the relative humidity measurement, as proposed in the December 2021 NOPR, would also be made at the same alternative locations. 86 FR 72322, 72345.

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 one 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. *Id.* Additionally, the alternate measurement location, as proposed in the December 2021 NOPR, 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. *Id.*

In the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72345. DOE similarly did 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. 86 FR 72322, 72345.

In the December 2021 NOPR, DOE requested 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. 86 FR 72322, 72345. DOE also requested 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. *Id.*

In response to the December 2021 NOPR, Hoshizaki and AHRI commented that if manufacturers need an alternate location for ambient temperatures, this can either be addressed by waiver or addressed through the ASHRAE 29 standard committee to change the requirements. (Hoshizaki, No. 14, p. 5; AHRI, No. 13, p. 7) AHRI added it does not feel that a dictated alternative measurement location will address any concerns that may arise with a particular model. (AHRI, No. 13, p. 7)

As discussed in section III.D.4.c, DOE is maintaining 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. The alternate measurement location is necessary to allow for testing certain equipment configurations—for example, 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. Therefore, DOE is maintaining in this final rule to allow for an alternate ambient temperature (and relative humidity) measurement location, consistent with the December 2021 NOPR.

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 (I–P)–2016 with Addendum 1 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 the December 2021 NOPR, DOE did not propose any change to the existing industry requirement to determine ratings under the largest and smallest cube settings for ACIMs with adjustable ice cube settings. 86 FR 72322, 72345. 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. As such, DOE did not propose 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 (I–P)–2016 with Addendum 1. *Id.*

In the December 2021 NOPR, DOE requested comment on maintaining the current requirement to test at the largest and smallest ice cube size settings, consistent with AHRI Standard 810 (I–P)–2016 with Addendum 1. 86 FR 72322, 72345. DOE also requested information on the ice cube size setting typically used by customers with ACIMs with multiple size settings (largest, smallest, default, *etc.*). 86 FR 72322, 72345.

In response to the December 2021 NOPR, Hoshizaki and AHRI agreed with maintaining the requirements set by AHRI Standard 810 (I–P)–2016 with Addendum 1 for cube size settings. (Hoshizaki, No. 14, p. 5; AHRI, No. 13, p. 8)

DOE is maintaining in this final rule the current requirement to test at the largest and smallest ice cube size settings, consistent with AHRI Standard 810 (I–P)–2016 with Addendum 1.

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 the December 2021 NOPR may be difficult or impossible for certain ACIM configurations with automatic dispensers. 86 FR 72322, 72345.

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 (I–P)–2016 with Addendum 1 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 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).[29] 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. 85 FR 68315.

The decision and order requires, prior to the start of the test, removing the front panel of the unit under test and inserting 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 ice and is connected to the outlet of the ice dispenser through the minimum length of conduit that can be used. *Id.*

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, in the December 2021 NOPR, DOE proposed to add general test instructions to the proposed DOE test procedure at 10 CFR 431.134(b)(6) to allow for testing such models. 86 FR 72322, 72346. DOE proposed that ACIMs with a dispenser be tested with continuous production and dispensing of ice throughout the stabilization and test periods. *Id.* As noted in the December 2021 NOPR, 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. *Id.* For example, this would allow for the temporary removal of panels or overriding of certain controls, if necessary. *Id.* 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. *Id.* 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. *Id.* 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). *Id.* 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. *Id.* 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). *Id.*

In the December 2021 NOPR, DOE requested 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. 86 FR 72322, 72346. DOE also requested 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. *Id.* DOE sought 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. *Id.*

In response to the December 2021 NOPR, Hoshizaki and AHRI agreed with adopting the approach stated, and AHRI noted that this process is also being proposed to the ASHRAE 29 committee for consideration. (Hoshizaki, No. 14, p. 6; AHRI, No. 13, p. 8)

AHAM commented that DOE's proposed test procedure does not account for integrated dispensing, such as for a dispenser ice maker with ice internal to the unit (a feature offered in certain residential products). (AHAM, No. 18, p. 11) AHAM states that, for these products, there is no way to determine if the bin is half full during the run-in portion of the test, and that DOE proposes to override the dispensing function so that it continually dispenses, which is not possible on all units that have this feature. *Id.*

The CA IOUs commented that a self-contained ice maker category type that DOE recognized needs specialized test methodology is the ice dispenser ice maker. (CA IOUs, No. 16, p. 4) The CA IOUs noted that the ice is made inside the ice bin and an automated ice dispenser is located underneath the bin to dispense ice into a cup. *Id.* The CA IOUs described that usually these machines have automated water dispensers integrated into them, the bins range between 10 and 100 lb, and the production capacity ranges between 200 and 500 lb per day. *Id.* The CA IOUs stated that there are 18 different models on the market, which are purchased by foodservice establishments and offices. *Id.* The CA IOUs recommended separating these ice machines into different classes to allow the test methodology to be refined for each category, resulting in testing consistency within each category. *Id.*

In the December 2021 NOPR, DOE proposed that mechanisms must be overridden to the minimum extent which allows for the continuous production and dispensing of ice (*e.g.,* insert a bracket to hold the shutter (which allows for the dispensing of ice

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

during the test) completely open for the duration of the test). 86 FR 72322, 72345–72346. DOE also proposed that the internal storage bin be empty at the beginning of the test period and that the intercepted ice samples be obtained from a container in an external ice bin that is filled one-half full of ice. *Id.* 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).

DOE notes that the test method proposed in the December 2021 NOPR would apply to all ACIMs with dispensers, not just the basic model for which there is a test procedure waiver. DOE has not identified the need for additional test instructions for any other ACIMs with dispensers and DOE has not received any additional petitions for waiver for other ACIMs with dispensers. Therefore, DOE is maintaining in this final rule the test method proposed in the December 2021 NOPR for ACIMs with dispensers. Further categorization of equipment may be discussed in any amended energy conservation standards for ACIMs with dispensers.

g. Remote ACIMs

DOE did not propose amendments to the existing test procedures for testing remote condensing ACIMs in the December 2021 NOPR. 86 FR 72322, 72346. 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 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. 86 FR 72322, 72347. DOE also did not propose any amendments to its test procedure to address ACIMs installed with a compressor rack because it lacked information on typical installation locations, operation, and market availability, and because any ACIMs designed only for connection to remote compressor racks are out of the scope of DOE's regulations. 86 FR 72322, 72344.

In the December 2021 NOPR, DOE requested comment on its initial determination that additional test setup and installation instructions are not required for testing remote condensing ACIMs. 86 FR 72322, 72347.

In response to the December 2021 NOPR, Hoshizaki and AHRI agreed that no additional test setup or installation instructions are required for units with dedicated remote condensing units. (Hoshizaki, No. 14, p. 6; AHRI, No. 13, p. 8) Hoshizaki added that if a manufacturer has further requests that are different from its instructions, it could file that with DOE so it is in the record of special instructions or taken through the waiver process for clarification. (Hoshizaki, No. 14, p. 6)

In response to the December 2021 NOPR, Hoshizaki and AHRI agreed with DOE in not establishing test procedures for ACIMs for rack units. (Hoshizaki, No. 14, p. 6; AHRI, No. 13, p. 8) Hoshizaki added that the sector is very small, and a new test criterion would need to be addressed in the ASHRAE 29 standard. (Hoshizaki, No. 14, p. 6)

DOE is maintaining in this final rule that additional test setup and installation instructions are not required for testing ACIMs with dedicated remote condensing units, consistent with the December 2021 NOPR. DOE is also not establishing separate test procedures for ACIMs intended for installation with a compressor rack.

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.*

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, in the December 2021 NOPR, DOE did not propose test procedures for modulating capacity ice makers. 86 FR 72322, 72347.

In the December 2021 NOPR, DOE requested comment on its initial determination regarding the lack of availability of modulating capacity ice makers on the market. 86 FR 72322, 72347.

In response to the December 2021 NOPR, AHRI agreed with DOE's determination. (AHRI, No. 13, p. 8) Hoshizaki commented it is not aware of any modulating capacity ice makers on the market. (Hoshizaki, No. 14, p. 6) Hoshizaki requested that DOE share examples of modulating capacity ACIMs, and if examples exist, Hoshizaki will review and then offer comment. *Id.*

DOE continues to not be aware of any modulating capacity ice makers available on the market. Therefore, DOE is not establishing test instructions for modulating capacity ice makers in this final rule.

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.

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.[30] [31] 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

[30] 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.

[31] 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).

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.

In the December 2021 NOPR, DOE initially determined that the energy use of ACIMs in standby mode is likely very low compared to active mode ice making energy use. 86 FR 72322, 72348. 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. *Id.*

At the time of the December 2021 NOPR, DOE did not have sufficient data and information to establish test procedures for standby energy use or energy use associated with ice storage. 86 FR 72322, 72348. 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 did not propose to amend its test procedures to account for standby or ice storage energy use in the December 2021 NOPR. *Id.*

In the December 2021 NOPR, DOE requested comment on its proposal to not amend its test procedures to account for standby or ice storage energy use. 86 FR 72322, 72348. DOE also requested 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. *Id.*

In response to the December 2021 NOPR, Hoshizaki and AHRI agreed that DOE should not amend the test procedure to account for standby energy use. (Hoshizaki, No. 14, p. 6; AHRI, No. 13, p. 8)

Hoshizaki commented the normal bin control switch in low-voltage test data shows very little power used to communicate with the control board. (Hoshizaki, No. 14, p. 6) Hoshizaki added that accounting for standby energy would require a significant increase in total test time, which would be a significant increase in test burden to measure a very small amount of energy. *Id.*

Joint Commenters commented that the standby power associated with powered controls outside of active icemaking can be around 25–50 kWh per year. (Joint Commenters, No. 15, p. 2) Joint Commenters noted that in the 2015 Final Rule Technical Support Document (''TSD'') for ACIM standards, DOE assumed a utilization factor (*i.e.,* the percent of time the ice maker is actively producing ice) of 42 percent, and assumed the unit was in standby mode 58 percent of the time, adding that DOE stated that the utilization factor was based on data provided by manufacturers and a field study. *Id.* Joint Commenters stated that despite the information cited in the 2015 Final Rule TSD, DOE cites insufficient information as a reason not to amend the test procedures to capture standby power, therefore, the Joint Commenters encouraged DOE to capture standby energy use in the test procedure to improve representativeness by more fully capturing the total energy consumption of ACIMs. *Id.*

The CA IOUs recommended that for self-contained machines the ice-melt rate procedure from AHRI 820 should be integrated into the method of test, and the ice-melt rate should be reported or integrated into the daily energy and harvest rate. (CA IOUs, No. 16, p. 7) The CA IOUs added that self-contained ice machines have an ice bin that is integral to the unit, and ice-melt rate should be reported for these units or have the ice-melt rate accounted for in the reported energy consumption. *Id.*

Joint Commenters urged DOE to capture the energy use associated with ice storage due to replacement cycles in the test procedures for self-contained units (SCU), which include an integrated storage bin, as well as for ice-making heads (IMH) and remote-condensing units (RCU). (Joint Commenters, No. 15, p. 3) Joint Commenters noted that in a NOPR published on December 16, 2014, regarding the miscellaneous refrigeration products (''MREFs'') test procedure (''December 2014 MREF Test Procedure NOPR''; 79 FR 74894), DOE proposed a test procedure that included a measurement of both the energy consumed during active ice production and the energy use associated with replenishing the ice supply to replace melted ice during ice storage. *Id.* For SCUs, Joint Commenters encouraged DOE to investigate the appropriateness of a procedure similar to the one it proposed for ice makers in the December 2014 MREF Test Procedure NOPR. *Id.*

Joint Commenters commented that the operation of ice makers includes replacement cycles (*i.e.,* when additional ice is produced to replenish the storage bin due to ice melt), and the effectiveness of the storage bin at keeping the stored ice cold (*i.e.,* slowing the melt) drives the frequency of the replacement cycles, and thus impacts the energy consumed over a period of time, such as a day or a year. (Joint Commenters, No. 15, p. 2–3) Joint Commenters noted that DOE previously found that the energy use associated with replacement of melted ice from ice storage bins ranged from 30 to 75% of total ice maker energy consumption. *Id.*

For IMHs and RCUs, Joint Commenters encouraged DOE to consider an approach that could involve establishing default values that represent the energy use associated with ice replacement. (Joint Commenters, No. 15, p. 3) Joint Commenters added the melt rates associated with the least-efficient storage bins on the market could be used to determine the extent of replacement cycle operation during a fixed period, such as 24 hours, noting that the default value of replacement cycle energy would take the form of an adder to measured energy consumption in the normal icemaking cycle. *Id.* Joint Commenters stated that a manufacturer could then choose to either use the default value or, if they wanted to demonstrate improved storage bin effectiveness, they could conduct a similar test to that used for SCUs. *Id.* Specifically, Joint Commenters addressed DOE's statements in the NOPR that many IMH and RCU models are advertised as compatible with a list of specific bins, stating they believe that it could make sense in these cases for the manufacturer to test with the least-efficient storage bin of those advertised in their literature. *Id.* If no bin is specified, the manufacturer would instead use the default values. *Id.*

In the December 2021 NOPR, DOE initially determined that 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. 86 FR 72322, 72348. Because ACIMs may be installed and operated in a range of end uses (*e.g.,* commercial kitchens, offices, schools, hospitals, hotels, and convenience stores), determining the performance based on the metric of energy use per 100 pounds of ice during an ACIM's active mode best reflects energy efficiency, energy use, or estimated annual operating cost of a given type of covered equipment during a representative average use cycle while not being unduly burdensome to conduct, consistent with 42 U.S.C. 6314(a)(2).

DOE also initially determined that IMHs and RCU ice makers are typically paired in the field with a storage bin chosen by the end user, rather than the manufacturer, which can result in IMHs and RCU ice makers paired with storage bins from a different manufacturer. 86 FR 72322, 72348. DOE acknowledges that self-contained ice makers contain a storage bin that is integral to the ACIM. However, the energy use associated with ice storage of all ACIMs, including self-contained ice makers, can vary significantly depending on the specific installation and end use of the ACIM.

DOE acknowledges the comments regarding DOE's utilization factor from the 2015 Final Rule TSD for ACIM standards.[32] The utilization factor estimates the percent of time ice makers actively produce ice. The assumed utilization factor in the 2015 Final Rule TSD for ACIM standards was 42 percent across all equipment classes and efficiency levels and was based on data provided by manufacturers and data obtained from a field study.[33] The assumed utilization factor was used to estimate the annual energy consumption of each equipment class and efficiency level considered in the 2015 Final Rule TSD for ACIM standards and does not represent the utilization factor for an individual test unit. As noted by the field study, ice maker usage can vary dramatically from one installation to another as illustrated by the results of the field study in which the duty cycles of tested units averaged between 34.5 percent and 86.6 percent.

DOE has determined that the measurement of active mode energy use, when an ice maker is actively producing ice, and the metric of energy use per 100 pounds of ice represent a repeatable and reproducible test method that is reasonably designed to produce test results which reflect energy use during a representative average use cycle. Therefore, DOE is maintaining in this final rule to not amend its test procedures to account for standby or ice storage energy use.

7. Calculations and Rounding Requirements

As compared to ASHRAE Standard 29–2009, section 9.1.1 of ASHRAE Standard 29–2015 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.

In the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72348. DOE added that this clarification would not affect the measured performance of ACIMs but would more explicitly present the calculation approach. *Id.*

In the December 2021 NOPR, DOE requested 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. 86 FR 72322, 72348.

In response to the December 2021 NOPR, AHRI agreed with DOE that these could be valid proposed changes. (AHRI, No. 13, p. 9) However, AHRI and Hoshizaki requested that any clarifications to the ASHRAE 29 be addressed by the ASHRAE 29 standard committee. (AHRI, No. 13, p. 9; Hoshizaki, No. 14, p. 6).

DOE has determined to amend the test procedure in this final rule 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.

The regulations in 10 CFR 431.132 specify 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 (I–P)–2016 with Addendum 1, which was proposed for use in the December 2021 NOPR, specify rounding requirements for the following quantities:

TABLE III.13—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).

In the December 2021 NOPR, DOE proposed to incorporate by reference AHRI Standard 810 (I–P)–2016 with Addendum 1, which would include the rounding requirements shown in Table III.12, with the exception of the provision for harvest rate. 86 FR 72322, 72349. 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 proposed 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. 86 FR 72322, 72349. DOE further discusses rounding requirements in section III.E.2.

DOE has determined to amend the test procedure in this final rule to require the rounding requirements specified in AHRI Standard 810 (I–P)–2016 with Addendum 1 except that for ACIMs with harvest rates less than or equal to 50 lb/24 h, the harvest rate shall be rounded to the nearest 0.1 lb/24 h.

DOE also proposed in the December 2021 NOPR 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. 86 FR 72322, 72349.

In response to the December 2021 NOPR, Hoshizaki and AHRI agreed with this assessment, but requested that any clarification be addressed by the ASHRAE 29 standard committee.

[32] *See https://www.regulations.gov/document/EERE-2010-BT-STD-0037-0136.*

[33] *See https://p2infohouse.org/ref/50/49015.pdf.*

(Hoshizaki, No. 14, p. 6; AHRI, No. 13, p. 9)

DOE has determined to amend the test procedure in this final rule to require 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. In the December 2021 NOPR, DOE proposed to apply the following equation to calculate the percent difference between any two measurements. 86 FR 72322, 72349. This includes any calculation to determine if the ice production rate has stabilized between cycles or samples, as described in section III.D.2.

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

The proposed equation for calculating percent difference may affect when a unit meets the stability criteria, but DOE determined it would not affect the stabilization determination for any of the over 50 ice maker tests conducted prior to this rulemaking. 86 FR 72322, 72344.

In the December 2021 NOPR, DOE requested comment on its proposal to clarify that percent difference shall be calculated based on the average of the two measured values. 86 FR 72322, 72349.

In response to the December 2021 NOPR, Hoshizaki agreed that this proposal can help in understanding of how percent difference is calculated and should be spelled out in the Code of Federal Regulation's language but requested that this be addressed by the ASHRAE 29 standard committee. (Hoshizaki, No. 14, p. 7) AHRI agreed with DOE that these could be valid proposed changes. (AHRI, No. 13, p. 9)

To ensure consistency in stability determinations, DOE is amending the test procedure in this final rule to require that percent difference 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 2,500 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 (I–P)–2016 with Addendum 1 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 [34] and the AHRI certification program.[35]

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.[36] [37] 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. 86 FR 72322, 72350. Although the exact

[34] 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.*

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

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

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

relationship between potable water use and energy use is not understood, potable water use does impact energy use. *Id.* An ACIM must chill the entering potable water to some extent. *Id.* The extent to which potable water is not directly converted to ice, it still is likely cooled to 32 °F. *Id.* Cooled potable water that is not directly converted to ice and is drained from the unit represents lost refrigeration capacity. *Id.* As such, reducing potable water use may provide the potential for reduced energy consumption. *Id.*

In the December 2021 NOPR, DOE initially determined that 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. 86 FR 72322, 72350. 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. *Id.* 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 the December 2021 NOPR for energy use, harvest rate, and condenser water use, DOE proposed in the December 2021 NOPR to include measurement of potable water use in the DOE ACIM test procedure at 10 CFR 431.134. *Id.* Because DOE does not regulate ACIM potable water use, testing for the potable water measurements under the proposed approach would be voluntary. *Id.* Specifically, DOE did not propose 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. *Id.* In addition, DOE stated that manufacturers would not be required to use the voluntary test procedure as the basis of any representations of potable water use. *Id.*

DOE proposed that the measurement of potable water use would generally follow the test methods in AHRI Standard 810 (I–P)–2016 with Addendum 1 and ASHRAE Standard 29–2015, but with the additional test procedure amendments as proposed in the December 2021 NOPR. 86 FR 72322, 72350. 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 the December 2021 NOPR would impact performance as measured under the existing approaches used by AHRI (AHRI Standard 810 (I–P)–2016 with Addendum 1) or ENERGY STAR (AHRI Standard 810–2007). *Id.*

DOE also proposed to add a definition of ''potable water use'' in 10 CFR 431.132. 86 FR 72322, 72350. DOE proposed 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. *Id.* This definition is generally consistent with the term ''potable water use rate'' in AHRI Standard 810 (I–P)–2016 with Addendum 1, with the clarification that condenser water use is not considered potable water use. *Id.*

In the December 2021 NOPR, DOE noted that AHRI Standard 810 (I–P)–2016 with Addendum 1 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.[38] 86 FR 72322, 72350. Thus, the industry standard appears to currently be used for measuring potable water use for both batch and continuous ice makers. *Id.*

In the December 2021 NOPR, DOE requested 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 the NOPR. 86 FR 72322, 72350.

In response to the December 2021 NOPR, Hoshizaki and AHRI commented that potable water requirements are not covered by the regulation today and added that potable water restrictions should be reviewed against sanitation requirements to ensure no issues or impact on performance. (Hoshizaki, No. 13, p. 9; AHRI, No. 13, p. 9) Hoshizaki added that ASHRAE 29 and AHRI 810 account for the collected water use. (Hoshizaki, No. 14, p. 7)

The Joint Commenters and CA IOUs encouraged DOE to require that potable water use be measured and reported, which would ensure that information about the potable water use of all ice maker models is available to purchasers so that they can make informed decisions. (Joint Commenters, No. 15, p. 3; CA IOUs, No. 16, p. 4) The CA IOUs added that due to the ambiguous relationship between potable water use and efficiency, more reporting from manufacturers will elucidate these impacts. (CA IOUs, No. 16, p. 7) The CA IOUs supported DOE's potable water usage measurement. (CA IOUs, No. 16, p. 4)

The Joint Commenters stated that manufacturers are already measuring potable water use as part of the ENERGY STAR and AHRI certification and programs. (Joint Commenters, No. 15, p. 3) The CA IOUs commented that ASHRAE 29 covers water consumption methodology; however, manufacturers only report water consumption data to ENERGY STAR, which covers approximately 30 percent of the market. (CA IOUs, No. 16, p. 4) The Joint Commenters added that while most ACIM models in the AHRI directory meet the ENERGY STAR potable water use requirements, the three highest water-consuming models consume 120%, 97%, and 72% more potable water than the ENERGY STAR requirements. *Id.* The CA IOUs commented that two major manufacturers represent most models in the ENERGY STAR database, with harvest rates ranging from approximately 200 lb/day to 1800 lb/day. (CA IOUs, No. 16, p. 5–6) The CA IOUs further added that one of the manufacturer's machines consistently use more water, and this water use does not appear to correlate with energy use. *Id.* The CA IOUs stated that there is only a strong relationship between water and energy use for smaller self-contained ice machine categories and did not show a relationship for ice making heads and remote condensed units. *Id.*

The CA IOUs commented that DOE's NOPR cites ''Prohibited Representations,'' to avoid imposing a mandate for representations with regard to potable water use (86 FR 72322, 72350); however, CA IOUs stated that nowhere in this provision does Congress bar DOE from imposing a representation requirement for water use. *Id.*

CA IOUs commented that currently, the ASHRAE 29 test method does not adequately capture water consumption from purge cycles, which may occur every one to twelve harvest cycles and can be adjusted by a technician in the field, and recommended that purge cycle water consumption should be measured for batch machines and integrated into the reported total water consumption of the machine. (CA IOUs, No. 16, p. 4) The CA IOUs added that the results for energy use may differ; energy use may increase as pre-cooled water near the freezing point is lost as purge water, or it may decrease if additional dump and purge water leads to lessened scaling in the ice maker. *Id.*

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

Because DOE does not regulate ACIM potable water use and because the DOE test procedures are used to determine compliance with energy and condenser water use (as applicable) standards, the harvest rate, energy use, and condenser water use (as applicable) are the relevant required metrics. DOE acknowledges that potable water use may be a useful measurement as part of characterizing the performance of an ACIM and is providing a repeatable and reproducible test method that allows potable water use to be tested consistently with the other performance metrics. DOE is maintaining in this final rule a voluntary method for measuring potable water use in 10 CFR 431.134 that generally follows the test methods in AHRI Standard 810 (I–P)–2016 with Addendum 1 and ASHRAE Standard 29–2015 with some modifications, consistent with the December 2021 NOPR.

In the December 2021 NOPR, DOE did not propose to adjust potable water use based on ice hardness factor, as is currently required for energy use and condenser water use. 86 FR 72322, 72351. Both energy use and condenser water use correspond to the amount of heat removed from the potable water in producing ice. *Id.* Ice that is more completely frozen will require more energy use and more heat rejection (via condenser water use, if applicable). *Id.* However, potable water use does not similarly vary depending on the ice hardness. *Id.* The same amount of potable water is used to make partially frozen ice as completely frozen ice. *Id.* 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. *Id.*

In the December 2021 NOPR, DOE requested comment on its proposal that potable water use is not adjusted based on ice hardness factor. 86 FR 72322, 72351.

In response to the December 2021 NOPR, Hoshizaki and AHRI agreed that potable water should not be adjusted based on ice hardness. (Hoshizaki, No. 14, p. 7; AHRI, No. 13, p. 9)

DOE has determined in this final rule to not adjust the potable water use based on ice hardness.

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, in the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72351.

In the December 2021 NOPR, DOE requested 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. 86 FR 72322, 72351.

In response to the December 2021 NOPR, Hoshizaki agreed to the calculation method if the ASHRAE 29–2015 standard is adopted at this time. (Hoshizaki, No. 14, p. 7)

DOE is maintaining in this final rule 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, consistent with the December 2021 NOPR.

E. Representations of Energy Use and Energy Efficiency

In addition to updates to the ACIM test procedure, DOE proposed in the December 2021 NOPR revisions to the provisions related to the sampling plan and the determination of represented values currently specified at 10 CFR 429.45. 86 FR 72322, 72351. DOE also proposed to add equipment-specific enforcement provisions for ACIMs to 10 CFR 429.134. *Id.*

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, in the December 2021 NOPR, for consistency and clarity, DOE proposed 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.'' 86 FR 72322, 72351. In addition, values of both energy and condenser water consumption are relevant for ACIMs. As such, DOE proposed 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. *Id.*

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, in the December 2021 NOPR, DOE proposed to modify the term and definition of ''maximum condenser water use'' to instead refer to the term ''condenser water use.'' 86 FR 72322, 72351. 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 proposed to remove this provision in the December 2021 NOPR. 86 FR 72322, 72351.

In addition to energy related metrics, 10 CFR 429.45 mandates the reporting of harvest rate, a key non-energy metric associated with determining energy and condenser water standards for ACIM equipment, as applicable. However, 10 CFR 429.45 does 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 proposed in the December 2021 NOPR 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. 86 FR 72322, 72351. Although not specified in 10 CFR 429.45, DOE expected manufacturers are currently certifying ACIM performance based on the tested harvest rates. *Id.*

In the December 2021 NOPR, DOE requested comment on its proposal to amend the sampling plan and reporting requirements for ACIMs in 10 CFR 429.45. 86 FR 72322, 72351. DOE sought 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. *Id.* DOE also requested comment on its proposal to modify the term and definition of ''maximum condenser water use'' to instead refer to ''condenser water use''. *Id.*

In response to the December 2021 NOPR, Hoshizaki and AHRI commented that further clarification is needed for this proposal. (Hoshizaki, No. 14, p. 7; AHRI, No. 13, p. 9) Hoshizaki requested that this be brought to the ASHRAE 29 standard committee for clarification and comment. (Hoshizaki, No. 14, p. 7)

AHRI commented that the definitions used by the method of test and rating standards are accurate today and should be adopted by DOE without modification. (AHRI, No. 13, p. 9–10) AHRI added that there are differences between reporting for some certification programs and DOE reporting although all values are determined per the current method of test and rating standard. (AHRI, No. 13, p. 9–10)

The sampling plan and determination of represented values amendments proposed in the December 2021 NOPR would clarify the terminology and requirements and would not impose any additional burden on manufacturers because DOE believes the clarifications are consistent with how manufacturers are currently testing.

DOE is maintaining in this final rule the amends to the sampling plan and reporting requirements for ACIMs in 10 CFR 429.45, replacing the term ''maximum energy use'' and ''maximum condenser water use'' in 10 CFR 429.45 with the term ''energy use'' and ''condenser water use'', respectively, and modifying the term and definition of ''maximum condenser water use'' at 10 CFR 431.132 to instead refer to ''condenser water use'', consistent with the December 2021 NOPR.

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 proposed, in the December 2021 NOPR, that any calculations according to 10 CFR 429.45 be rounded consistent with the rounding requirements for individual test results. 86 FR 72322, 72351–72352. Specifically, DOE proposed 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). 86 FR 72322, 72352.

In the December 2021 NOPR, DOE requested 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). 86 FR 72322, 72352.

In response to the December 2021 NOPR, Hoshizaki and AHRI requested that any changes to the calculation of values be addressed by the AHRI 810 standard committee. (Hoshizaki, No. 14, p. 7; AHRI, No. 13, p. 10) AHRI added that changes made during this rulemaking should be consistent with the current version of AHRI Standard 810, and DOE is welcome to participate in any AHRI standard working groups to provide suggestions for consideration. (AHRI, No. 13, p. 10)

As discussed in section III.D.7, DOE is amending the rounding requirements in this final rule to be consistent with AHRI Standard 810 (I–P)–2016 with Addendum 1, except that for ACIMs with harvest rates less than or equal to 50 lb/24 h, the harvest rate shall be rounded to the nearest 0.1 lb/24 h.

DOE is maintaining in this final rule that values calculated from a test sample are required to 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), consistent with the December 2021 NOPR.

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 condenser 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 (I–P)–2016 with Addendum 1. In the December 2021 NOPR, DOE proposed 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. 86 FR 72322, 72352. 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. *Id.*

In the December 2021 NOPR, DOE requested comment on its proposal to include a new paragraph 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. 86 FR 72322, 72352. DOE also requested 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. *Id.*

In response to the December 2021 NOPR, Hoshizaki commented that further clarification is needed to determine a response. (Hoshizaki, No. 14, p. 7) Hoshizaki requested that this be brought to the ASHRAE 29 standard committee for clarification and comment. (Hoshizaki, No. 14, p. 7)

Subpart C of 10 CFR 429.134 establishes product-specific enforcement provisions applicable to covered products and covered equipment. 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. DOE's enforcement provisions are outside the scope of industry standards and, therefore, ASHRAE 29 does not apply to DOE's enforcement provisions.

DOE is maintaining in this final rule the inclusion of a new paragraph 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 and to establish a five percent tolerance for the average measured harvest rate compared to the certified harvest rate, consistent with the December 2021 NOPR.

F. Test Procedure Costs and Harmonization

1. Test Procedure Costs and Impact

In this final rule, DOE amends the ACIM test procedure to include low-capacity ACIMs in the scope of the test procedure; references the most recent versions of the test procedures incorporated by reference; clarifies the stability criteria; revises clearances for test installations; includes additional updates to clarify appropriate test measurements, conditions, settings, and setup requirements; establishes provisions for the voluntary measurement of potable water use; and updates calculation instructions. The following paragraphs discuss DOE's determination of any impacts on testing costs or measured performance resulting from these amendments.

a. Testing Cost Impacts

i. Per-Test Cost

In the January 2012 final rule, DOE estimated a per-test cost of $5,000 to $7,500 for the current ACIM test procedure. 77 FR 1591, 1610. In the December 2021 NOPR, DOE initially determined that the low end of that range, or $5,000, is representative of current ACIM per test cost. 86 FR 72322, 72352.

As discussed in section III.D.2, the current test procedure requires multiple cycles to determine stability, after which additional cycles are performed to measure performance. In this final rule, DOE references the updated version of ASHRAE Standard 29–2015, which includes updated stabilization requirements, and expressly requires that the cycles or samples used for the capacity test are stable, thus eliminating the need to perform separate cycles for meeting the stability criteria and for testing performance (*i.e.,* reducing the total number of cycles required for testing). For batch ice makers, this amendment will eliminate the need for testing two cycles prior to the test. For continuous ice makers, this amendment will eliminate the need for measuring three consecutive 14.4 min samples taken within a 1.5-hour period prior to the test.

In the December 2021 NOPR, DOE estimated that total ice maker test duration, including set up, pull-down, and test operation currently requires 8 hours. 86 FR 72322, 72352. Under the amended approach, consistent with the December 2021 NOPR, DOE estimates that the total test time will decrease by approximately 1 hour, representing a 12.5-percent reduction in test duration. Taking overhead costs into account, consistent with the December 2021 NOPR, DOE estimates that the proposed stabilization requirement will 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, testing will cost manufacturers approximately $600 less per basic model for all future basic models tested in accordance with this amended test procedure, resulting in a total test cost of $9,400 per basic model.[39]

In response to the December 2021 NOPR, Hoshizaki commented that the use of test cycles to confirm stability is already done, so no additional cost is associated. (Hoshizaki, No. 14, p. 7)

AHRI commented that stability should be determined in accordance with ASHRAE Standard 29 Provisions to avoid any incurred cost to testing. (AHRI, No. 13, p. 10)

IOM commented that DOE's proposal to further restrict the definition of ''stability'' has the potential to increase burden and cost, as all test cycles must have ice harvest rates within 2% rather than consecutive test cycles. (IOM, No. 11, p. 3)

AHAM commented that DOE deviated from ASHRAE and AHRI standards in some ways in order to create a test procedure that could be applicable to residential products but that the proposed test and its deviations are unworkable, unrealistic, and burdensome given the way residential appliance manufacturers carry out testing and the test facilities residential ice maker manufacturers have. (AHAM, No. 18, p. 9) AHAM also stated that since the proposed test requires complete attention to the test once it starts, the technician must be dedicated to this test due to the time requirements of 15 minutes for the fill, plus-or-minus nine seconds to empty the bin, and the five minute requirement to start the next test. (AHAM, No. 18, p. 13–14) AHAM states that this is a burdensome requirement because it will require active monitoring by the test technician as opposed to a test that can be largely automated, which may require manufacturers to hire additional technicians. *Id.*

DOE acknowledges the comment regarding the potential for the amended stability requirements to increase burden and cost. Although it is possible a test unit will require additional cycles to meet the amended stability requirements, based on investigative testing using the amended stability requirements, DOE observed that the average number of cycles or samples required to reach stability was 3.0 based on a sample of 39 batch ACIM tests and 6 continuous ACIM tests which indicates that unstable operation would represent a minority of tests conducted. DOE estimates that the total test time will decrease by approximately 1 hour, representing a 12.5-percent reduction in

[39] Based on a new per-test cost of $4,700.

test duration, for the majority of tests conducted. The amended stability requirements address unstable operation to ensure repeatable and reproducible test results.

DOE reaffirms its determination that testing will cost manufacturers approximately $600 less per basic model for all future basic models tested in accordance with this amended test procedure, as compared to the existing test procedure. DOE recognizes that testing does require facilities and technician labor, and maintains the cost estimate of $4,700 per individual test or $9,400 when testing to certify performance of a basic model (requiring at least two test units).

ii. One-Time Cost

As discussed in section III.D.3.a, this final rule implements a relative humidity test condition.

In the December 2021 NOPR, DOE estimated the one-time cost for purchasing relative humidity controls to range from $1,000 to $5,000, depending on the method that is chosen. 86 FR 72322, 72353. DOE estimated 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, although less expensive options could be used, such as a dedicated coil with reheat, steam generators, humidifiers, and dehumidifiers. *Id.* In addition, DOE also estimated that instrumentation to measure relative humidity at an accuracy of ±2 percent costs around $500.[40] *Id.*

Hoshizaki and AHRI stated that upgrading facilities for water hardness and relative humidity could incur significant facility upgrade costs. (Hoshizaki, No. 14, p. 8; AHRI, No. 13, p. 10–11) AHAM stated that the relative humidity requirement is unduly burdensome for manufacturers. (AHAM, No. 18, p. 12–13) AHAM commented that unless the test chamber was initially designed with dehumidification capabilities and appropriately sealed, there is a significant investment to achieve the 35.0 ± 5.0 percent levels required in the proposed test procedure. *Id.* Residential ice maker manufacturers have not built test chambers with these capabilities in mind and, thus, this provision would likely require all manufacturers to overhaul their test facilities. *Id.*

Hoshizaki stated that extending tests for purge water and/or standby energy would require additional test time that would hamper design cycles. (Hoshizaki, No. 14, p. 8)

This final rule does not implement water hardness requirements as proposed in the December 2021 NOPR. Similarly, this final rule does not directly account for energy or water used during intermittent flush or purge cycles nor accounts for standby or ice storage energy use. Regarding humidity controls, DOE has reviewed and maintains its estimates from the December 2021 NOPR regarding the costs associated with purchasing relative humidity controls and instrumentation, as described in this section.

As discussed in section III.A, this final rule expands the scope of the test procedure to include low-capacity ACIMs. This final rule incorporates additional test procedure requirements to ensure appropriate testing of low-capacity ACIMs, as discussed in section III.D.1. In the December 2021 NOPR, DOE requested comment on any expected costs associated with the proposed amendment to expand test procedure scope to include low-capacity ACIMs. 86 FR 72322, 72353. Specifically, DOE requested 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 the December 2021 NOPR. 86 FR 72322, 72353–72354.

DOE stated in the December 2021 NOPR that based on a review of low-capacity ACIMs available on the market, DOE preliminarily 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). DOE stated that it expects that the manufacturers currently electing to make no claims regarding low-capacity ACIM energy consumption will continue to do so even after a test procedure is established.

In response to the December 2021 NOPR, Hoshizaki commented there are representations of low-capacity ACIM energy consumption. (Hoshizaki, No. 14, p. 8) However, Hoshizaki and AHRI commented that low-capacity ACIMs were not included in the scope for DOE's 2010 or 2018 ACIM energy conservation standards. (Hoshizaki, No. 14, p. 8; AHRI, No. 13, p. 11) AHRI urged DOE to exclude low-capacity units until they are included into the appropriate method of test because including these units would require significant testing to factor the energy use and any changes to meet the current standards designed for units above 50 pounds. (AHRI, No. 13, p. 11)

Hoshizaki requested that this be brought up in the ASHRAE 29 standard committee to discuss test method options for low-capacity ACIMs. (Hoshizaki, No. 14, p. 8)

As discussed, DOE estimates that the amended test procedure has a per-test cost of $4,700, and that testing two basic models for certification purposes would have a total cost of $9,400. To the extent that manufacturers are currently voluntarily making representations of low-capacity ACIM energy consumption based on test methods inconsistent with the DOE test procedure as amended by this final rule, such manufacturers would incur a one-time cost of $9,400 per basic model to make voluntary representations consistent with the DOE test procedure as amended by this final rule.

Low-capacity ACIMs are not currently subject to DOE testing or energy conservation standards. Manufacturers will not be required to test low-capacity ACIMs until such time as the compliance date for any newly established energy conservation standards for such equipment. Under the amended test procedure, were a manufacturer to choose to make representations of the energy efficiency or energy use of a low-capacity ACIM, beginning 360 days after publication of the final rule in the **Federal Register**, manufacturers would be required to base such representations on the DOE test procedure. (42 U.S.C. 6314(d)(1))

b. Impact on Measured Performance

DOE expects that any impact from the other amendments to the measured efficiency of certified ACIMs is *de minimis* as compared to the current test procedure, as discussed in detail for each proposal in section III in this final rule. The amendments will generally improve representativeness, repeatability, and reproducibility of DOE's test procedure. Additionally, certain amendments will also incorporate test requirements consistent with DOE guidance or test procedure waivers already in effect for testing ACIMs.

Specifically, DOE incorporated the following amendments: (1) updating references to the latest versions of the relevant industry standards (see section III.C); (2) clarifying stabilization criteria; (3) incorporating a test condition for relative humidity and a clarification regarding water pressure (see section

[40] For example, see Campbell Scientific model EE181–L at *www.campbellsci.com/ee181-l.*

III.D.3); (4) establishing and 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).

In response to the December 2021 NOPR, Hoshizaki and AHRI commented that addressing all the proposed amendments would necessitate retesting most ACIM units, placing undue burden on manufacturers. (Hoshizaki, No. 14, p. 8; AHRI, No. 13, p. 10–11) Hoshizaki added that the proposals would require testing of 190 models with multiple samples of each. (Hoshizaki, No. 14, p. 8)

DOE does not agree with Hoshizaki and AHRI's assertions that the amended test procedure would necessitate retesting most ACIM units. As this final rule discusses within each relevant section, DOE expects that any impact on measured performance from these amendments is expected to be *de minimis* as compared to the current test procedure. Equipment with no measurable change to energy use under the amended test procedure would not need to be retested. To the extent that a manufacturer determines that a particular test procedure amendment would impact the existing measured energy use for a specific basic model, DOE estimates a re-testing cost of $9,400 per basic model.

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 to subpart C of part 430. 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 January 2018, AHRI released an updated version of the 810 Standard which DOE evaluated as part of this rulemaking. In January 2015, ASHRAE released an updated version of the 29 Standard which DOE evaluated as part of this rulemaking. The industry standards DOE is incorporating by reference via amendments described in this final rule are discussed in further detail in section IV.N.

G. Effective and Compliance Dates

The effective date for the adopted test procedure amendment will be 30 days after publication of this final rule in the **Federal Register**. EPCA prescribes that all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with an amended test procedure, beginning 360 days after publication of the final rule in the **Federal Register**. (42 U.S.C. 6314(d)(1)) EPCA provides an allowance for individual manufacturers to petition DOE for an extension of the 360-day period if the manufacturer may experience undue hardship in meeting the deadline. (42 U.S.C. 6314(d)(2)) To receive such an extension, petitions must be filed with DOE no later than 60 days before the end of the 360-day period and must detail how the manufacturer will experience undue hardship. (*Id.*) To the extent the modified test procedure adopted in this final rule is required only for the evaluation and issuance of updated efficiency standards, compliance with the amended test procedure does not require use of such modified test procedure provisions until the compliance date of updated standards.

Upon the compliance date of test procedure provisions in this final rule any waivers that had been previously issued and are in effect that pertain to issues addressed by such provisions are terminated. 10 CFR 431.404(h)(3). Recipients of any such waivers are 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 adopted in this document pertain to issues addressed by a waiver granted to Hoshizaki in Case No. 2020–001. 85 FR 68315.

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Orders 12866 and 13563

Executive Order (''E.O.'') 12866, ''Regulatory Planning and Review,'' as supplemented and reaffirmed by E.O. 13563, ''Improving Regulation and Regulatory Review,'' 76 FR 3821 (Jan. 21, 2011), requires agencies, to the extent permitted by law, to (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public. DOE emphasizes as well that E.O. 13563 requires agencies to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. In its guidance, the Office of Information and Regulatory Affairs (''OIRA'') in the Office of Management and Budget (''OMB'') has emphasized that such techniques may include identifying changing future compliance costs that might result from technological innovation or anticipated behavioral changes. For the reasons stated in the preamble, this final regulatory action is consistent with these principles.

Section 6(a) of E.O. 12866 also requires agencies to submit ''significant regulatory actions'' to OIRA for review. OIRA has determined that this final regulatory action does not constitute a ''significant regulatory action'' under section 3(f) of E.O. 12866. Accordingly, this action was not submitted to OIRA for review under E.O. 12866.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of a final regulatory flexibility analysis (FRFA) for any final rule where the agency was first required by law to publish a proposed rule 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: *www.energy.gov/gc/office-general-counsel.*

DOE reviewed this final rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. DOE has concluded that this rule would not have a significant impact on a substantial number of small entities. The factual basis for this certification is as follows: 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.[41] 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 small business manufacturers of the equipment covered by this rulemaking. To identify companies that import or otherwise manufacture ACIMs with harvest rates greater than 50 lb/24h, DOE expanded on the analysis conducted for the December 2021 NOPR. This updated analysis included a review of DOE's Compliance Certification Database (''CCD''),[42] California Energy Commission's Modernized Appliance Efficiency Database System (''MAEDbS''),[43] the Air-Conditioning, Heating, and Refrigeration Institute's (''AHRI's'') Directory of Certified Product Performance,[44] and retailer websites. DOE relied on retailer websites and other public sources to identify companies that import or otherwise manufacture low-capacity ACIMs, consistent with the December 2021 NOPR. Since the December 2021 NOPR, and consistent with the approach detailed in the Preliminary Analysis Technical Support Document published on March 24, 2022,[45] DOE conducted additional research to determine which companies selling ACIMs in the United States are original equipment manufacturers (''OEMs'') of the equipment covered by this rulemaking. Using publicly available information from manufacturer websites, import and export data (*e.g.,* bills of lading from Panjiva)[46] and basic model numbers, DOE identified 22 ACIM OEMs.

DOE then consulted publicly available data, such as individual company websites and subscription-based market research tools (*e.g.,* Dun & Bradstreet)[47] to determine company location, headcount, and annual revenue. DOE screened out companies that do not offer equipment covered by this rulemaking, do not meet the SBA's definition of a ''small business,'' or are foreign-owned and operated. Of the 22 OEMs identified, DOE determined that two domestic OEMs qualify as ''small businesses.'' DOE estimates that one small OEM has an annual revenue of approximately $11.2 million and the other has an annual revenue of approximately $186.5 million.

Consistent with its preliminary determination in the December 2021 NOPR, DOE does not expect small domestic ACIM OEMs to incur costs as a result of the amended test procedure. However, in the event that any test facilities require upgrade to meet the amended test conditions for relative humidity, DOE has estimated the costs of this potential upgrade to be $5,500, as discussed in section III.F.1.a of this final rule.[48] DOE estimates that this potential cost would represent less than 0.1 percent of annual revenues for both identified small businesses.

In response to the December 2021 NOPR, Hoshizaki commented that the proposed changes would necessitate re-testing of ACIM models by many manufacturers. Hoshizaki suggested that small entities may not have the means to test their models in house and would have to send units to test at third party labs. (Hoshizaki, No. 14, p. 8) AHRI noted that the changes outlined in the December 2021 NOPR would necessitate retesting of existing models and would therefore ''most definitely place undue burden and additional cost on OEMs.'' Specifically, they stated that the humidity control requirement would require retesting of every model and would also necessitate facility upgrade costs. AHRI also asserted that this requirement may limit the ability to find external test labs with appropriate test chambers and thereby disadvantage small entities who do not have the means to test in house and would be subject to scheduling at third party testing facilities. AHRI noted that the costs associated with the proposal ''would not be miniscule'' and such testing would not be advantageous with all the third-party testing needed to verify safety for ACIM's that are changing to flammable refrigerants. AHRI also noted that the proposed 3-foot side clearance requirement could also impact the ability of small entities participating in this market. (AHRI, No. 13, p. 11)

As detailed in section III.F.1 of this final rule, DOE expects that the impact from these amendments to the measured efficiency of certified ACIMs is expected to be *de minimis* as compared to the current test procedure. DOE expects that it is unlikely that a substantial portion of ACIM units would need to be retested or recertified as a result of this final rule, and therefore that manufacturers will be able to rely on data generated under the existing test procedure. If a manufacturer re-tests models according to the amended test procedure, DOE estimates a testing cost of $9,400 per re-rated basic model.[49] DOE notes that the small OEM with an annual revenue of approximately $11.2 million offers four basic models. The other small OEM

[41] The SBA Size Standards are available at: *www.sba.gov/document/support-table-size-standards* (last accessed June 2, 2022).

[42] U.S. Department of Energy Compliance Certification Database, available at: *www.regulations.doe.gov/certification-data/products.html#q=Product_Group_s%3A** (last accessed November 11, 2021).

[43] California Energy Commission. Modernized Appliance Efficiency Database System. Available at: *cacertappliances.energy.ca.gov/Pages/ApplianceSearch.aspx* (accessed November 17, 2021).

[44] The Air Conditioning, Heating, and Refrigeration Institute. Directory of Certified Product Performance. Available at: *www.ahridirectory.org/* (accessed November 17, 2021).

[45] ''2022–03 Technical Support Document: Energy Efficiency Program For Consumer Products And Commercial And Industrial Equipment: Automatic Commercial Ice Makers.'' See chapter 12, section 12.3.3 (published on March 24, 2022). Available at: *www.regulations.gov/document/EERE-2017-BT-STD-0022-0009.*

[46] Panjiva. S&P Global Supply Chain Intelligence. Available at: *panjiva.com/import-export/United-States* (last accessed June 5, 2022).

[47] The Dun & Bradstreet Hoovers subscription login is accessible at: */app.dnbhoovers.com/* (last accessed June 2, 2022).

[48] DOE estimates the cost for purchasing relative humidity controls to range from $1,000 to $5,000, depending on the method that is chosen, and an additional cost of $500 for a relative humidity sensor.

[49] Based on the $5,000 per unit test cost estimate and the $300 savings due to the stability criteria, as detailed in this final rule. Each basic model is tested twice: ($5,000 − $300) × 2 = $9,400.

with an annual revenue of approximately $186.5 million offers two basic models.[50] Therefore, DOE expects that any re-testing would account for less than 0.1 percent of each company's annual revenue.[51]

Therefore, DOE concludes that the cost effects accruing from the final rule would not have a ''significant economic impact on a substantial number of small entities,'' and that the preparation of a FRFA is not warranted. DOE has submitted a certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the Small Business Administration for review under 5 U.S.C. 605(b).

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.

DOE is not amending the certification or reporting requirements for ACIMs in this final rule. Instead, DOE may consider proposals to amend the certification requirements and reporting for ACIMs under a separate rulemaking regarding appliance and equipment certification. DOE will address changes to OMB Control Number 1910–1400 at that time, as necessary.

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 final rule, DOE establishes 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 examined this final rule and determined that it will 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 final 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. 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, this final 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. (Pub. L. 104–4, sec. 201 (codified at 2 U.S.C. 1531)). For a regulatory action resulting 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

[50] DOE used the estimated annual revenue figures from the Dun & Bradstreet Hoovers subscription-based market research tool. The Dun & Bradstreet login is accessible at: */app.dnbhoovers.com/* (last accessed June 2, 2022).

[51] One small OEM may incur testing costs of $37,600, if they choose to re-test their 4 models according to the amended test procedure. (4 × $9,400 = $37,600) The other small OEM may incur testing costs of $18,800, if they choose to re-test their 2 models according to the amended test procedure. (2 × $9,400 = $18,800)

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 *www.energy.gov/gc/office-general-counsel.* DOE examined this final 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 final rule will 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 regulation will 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 final 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 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 significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use if the regulation is implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

This regulatory action 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 modifications to the test procedure for ACIMs adopted in this final rule incorporates testing methods contained in certain sections of the following commercial standards: AHRI Standard 810 (I–P)–2016 with Addendum 1 and ASHRAE Standard 29–2015. DOE has evaluated these standards and is unable to conclude whether it fully complies 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 has consulted with both the Attorney General and the Chairman of the FTC about the impact on competition of using the methods contained in these standards and has received no comments objecting to their use.

M. Congressional Notification

As required by 5 U.S.C. 801, DOE will report to Congress on the promulgation of this rule before its effective date. The report will state that it has been determined that the rule is not a ''major rule'' as defined by 5 U.S.C. 804(2).

N. Description of Materials Incorporated by Reference

DOE incorporates by reference the following standards:

AHRI Standard 810 (I–P)–2016 with Addendum 1. Specifically, the test procedure codified by this final rule references section 3, ''Definitions,'' section 4, ''Test Requirements,'' and section 5.2, ''Standard Ratings''. AHRI Standard 810 (I–P)–2016 with Addendum 1 is an industry-accepted standard that provides a method to rate the performance of automatic commercial ice makers.

AHRI standards are reasonably available from the Air-Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Blvd., Suite 500, Arlington, VA 22201, 703–524–8800, *ahri@ahrinet.org,* or *www.ahrinet.org.*

ASHRAE Standard 29–2015. ASHRAE Standard 29–2015 is an industry-accepted standard that provides a method of test to measure the performance of automatic commercial ice makers.

Copies of ASHRAE standards are reasonably available 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.*

V. Approval of the Office of the Secretary

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

List of Subjects

10 CFR Part 429

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Intergovernmental relations, Reporting and recordkeeping requirements, Small businesses.

10 CFR Part 431

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

Signing Authority

This document of the Department of Energy was signed on October 6, 2022, by Francisco Alejandro Moreno, Acting 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 October 18, 2022.

Treena V. Garrett,

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

For the reasons stated in the preamble, DOE amends 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 percent two-tailed confidence interval with n-1 degrees of freedom (from appendix A to this subpart).

(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.

* * * * *

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

§ 429.134 Product-specific enforcement provisions.

* * * * *

(w) *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.

* * * * *

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 ice storage bin.

* * * * *

■ 6. Revise § 431.133 to read as follows:

§ 431.133 Materials incorporated by reference.

Certain material is incorporated by reference into this subpart with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, the U.S. Department of Energy (DOE) must publish a document in the **Federal Register** and the material must be available to the public. All approved incorporation by reference (IBR) material is available for inspection at DOE and at the National Archives and Records Administration (NARA). Contact DOE at: the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Sixth Floor, 950 L'Enfant Plaza SW, Washington, DC 20024, (202)-586–9127, *Buildings@ee.doe.gov, www.energy.gov/eere/buildings/building-technologies-office.* For information on the availability of this material at NARA, email: *fr.inspection@nara.gov,* or go to: *www.archives.gov/federal-register/cfr/ibr-locations.html.* The material may be obtained from the following sources:

(a) *AHRI.* Air-Conditioning, Heating, and Refrigeration Institute, 2111 Wilson Blvd., Suite 500, Arlington, VA 22201; (703) 524–8800; *ahri@ahrinet.org; www.ahrinet.org.*

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

(2) [Reserved]

(b) *ASHRAE.* American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 1791 Tullie Circle NE, Atlanta, GA 30329; (404) 636–8400; *ashrae@ashrae.org; www.ashrae.org.*

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

(2) [Reserved]

■ 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.

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

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

(b) *Testing and calculations.* Measure the harvest rate, the energy use, the condenser water use, and, to the extent elected, the potable water use of each covered automatic commercial ice maker by conducting the test procedures set forth in AHRI Standard 810 (I–P)–2016 with Addendum 1, section 3, ''Definitions,'' section 4, ''Test Requirements,'' and section 5.2, ''Standard Ratings'' (incorporated by reference, *see* § 431.133), and according to the provisions of this section. Use ANSI/ASHRAE Standard 29–2015 (incorporated by reference, see § 431.133) referenced by AHRI Standard 810 (I–P)–2016 with Addendum 1 for all automatic commercial ice makers, except as noted in paragraphs (c) through (k) of this section. If any provision of the referenced test procedures conflicts with the requirements in this section or the definitions in § 431.132, the 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) *Ambient conditions measurement*—(i) *Ambient temperature sensors.* Measure all ambient temperatures according to section 6.4 of ANSI/ASHRAE Standard 29–2015, except as provided in paragraph (c)(4)(iv) of this section, with unweighted temperature sensors.

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

(iii) *Ambient conditions sensors shielding.* Ambient temperature and relative humidity sensors may be shielded if the ambient test conditions cannot be maintained within the specified tolerances because of warm discharge air from the condenser exhaust affecting the ambient measurements. If shields are used, the shields must not inhibit recirculation of the warm discharge air into the condenser or automatic commercial ice maker inlet.

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

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

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

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

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

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

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

(3) *Automatic commercial ice makers with harvest rates less than or equal to 50 lb/24 h.* The three or more consecutive cycles or samples used to calculate harvest rate, energy use, condenser water use, and potable water use, must meet the stability criteria in section 7.1.1 of ANSI/ASHRAE Standard 29–2015, except that the weights of the samples (for continuous type automatic commercial ice makers (ACIMs)) or 24-hour calculated ice production (for batch type ACIMs) must not vary by more than ±4 percent, and the 25 g (for continuous type ACIMs) and 1 kg (for batch type ACIMs) criteria do not apply.

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

(g) *Rounding.* Round the reported values as follows: Harvest rate to the nearest 1 lb/24 h for harvest rates above 50 lb/24 h; harvest rate to the nearest 0.1 lb/24 h for harvest rates less than or equal to 50 lb/24 h; condenser water use to the nearest 1 gal/100 lb; and energy use to the nearest 0.01 kWh/100 lb. Round final potable water use value to the nearest 0.1 gal/100 lb.

(h) *Continuous type automatic commercial ice makers*—(1) *Ice hardness adjustment*—(i) *Calorimeter constant.* Determine the calorimeter constant according to the requirements in section A1 and A2 of Normative Annex A Method of Calorimetry in ANSI/ASHRAE Standard 29–2015, except that the trials shall be conducted at an ambient air temperature (room temperature) of 70 °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 (I–P)–2016 with Addendum 1.

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

(2) [Reserved]

(i) *Automatic commercial ice makers with automatic dispensers.* Allow for the continuous production and dispensing of ice throughout testing. If an automatic commercial ice maker with an automatic dispenser is not able to continuously produce and dispense ice 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 ANSI/ASHRAE Standard 29–2015 do not apply. Ensure that the ice storage bin is empty prior to the initial potable water reservoir fill. Fill an external container with water to be supplied to the portable automatic commercial ice maker water reservoir. Establish an initial water temperature of 70 °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 ANSI/ASHRAE Standard 29–2015. The potable water use is equal to the sum of the weight of ice and any corresponding melt water collected for the capacity test as specified in section 7.2 of ANSI/ASHRAE Standard 29–2015.

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

[FR Doc. 2022–22927 Filed 10–31–22; 8:45 am]

BILLING CODE 6450–01–P