[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 431

[EERE–2017–BT–TP–0006]

Energy Conservation Program: Test Procedure for Automatic Commercial Ice Makers

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

ACTION: Request for information.

SUMMARY: The U.S. Department of Energy ("DOE") is initiating a data collection process through this request for information ("RFI") to consider whether to amend DOE's test procedure for automatic commercial ice makers ("ACIM" or "ice makers"). To inform interested parties and to facilitate this process, DOE has gathered data, identifying several issues associated with the currently applicable test procedure on which DOE is interested in receiving comment. The issues outlined in this document mainly concern new versions of the industry standards that the current DOE test procedure incorporates by reference; consideration of additional specifications and amendments that may improve the accuracy of the test procedure or reduce the testing burden on manufacturers; and any additional topics that may inform DOE's decisions in a future test procedure rulemaking, including methods to reduce regulatory burden while

ensuring the procedure's accuracy. DOE welcomes written comments from the public on any subject within the scope of this document (including topics not raised in this RFI).

DATES: Written comments and information are requested and will be accepted on or before **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

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

1. *Federal eRulemaking Portal*: *http://www.regulations.gov*. Follow the instructions for submitting comments.
2. *E-mail*: to *ACIM2017TP0006@ee.DOE.gov*. Include docket number EERE–2017–BT–TP–0006 in the subject line of the message.
3. *Postal Mail*: Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 287-1445. If possible, please submit all items on a compact disc ("CD"), in which case it is not necessary to include printed copies.
4. *Hand Delivery/Courier*: Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC 20024. Phone: (202) 287-1445. If possible,

please submit all items on a CD, in which case it is not necessary to include printed copies.

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

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

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

FOR FURTHER INFORMATION CONTACT:

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Avenue, SW., Washington, DC 20585–0121. Telephone: (202) 287-1943. E-mail: *ApplianceStandardsQuestions@ee.doe.gov*.

Mr. Pete Cochran, U.S. Department of Energy, Office of the General Counsel, GC–33, 1000 Independence Avenue, SW, Washington, DC 20585-0121. Telephone: (202) 586-9496. E-mail: *Peter.Cochran@hq.doe.gov*.

For further information on how to submit a comment or review other public comments and the docket contact the Appliance and Equipment Standards Program staff at (202) 287-1445 or by e-mail: *ApplianceStandardsQuestions@ee.doe.gov*.

SUPPLEMENTARY INFORMATION:

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I. Introduction

ACIM are included in the list of "covered products" for which DOE is authorized to establish and amend energy conservation standards and test procedures. (42 U.S.C. 6311(1)(F)) DOE's test procedure for ACIM is prescribed at 10 CFR 431.134. The

following sections discuss DOE's authority to establish and amend the test procedure for ACIM, as well as relevant background information regarding DOE's consideration of test procedures for this equipment.

A. *Authority and Background*

The Energy Policy and Conservation Act of 1975, as amended ("EPCA"), Public Law 94-163 (42 U.S.C. 6291-6317, as codified), among other things, authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment.[1] Title III, Part C of EPCA established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve energy efficiency.[2] This equipment includes ACIM, the subject of this RFI. (42 U.S.C. 6311(1)(F))

Under EPCA, DOE's energy conservation program consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Federal testing requirements consist of test procedures that manufacturers of covered equipment must use as the basis for: (1) certifying to DOE that their equipment complies with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6316(a); 42 U.S.C. 6295(s)), and (2) making representations about the efficiency of that equipment (42 U.S.C. 6314(d)). Similarly, DOE must use these test procedures to determine whether the equipment

[1] All references to EPCA in this document refer to the statute as amended through America's Water Infrastructure Act of 2018, Public Law 115-270 (October23, 2018).
[2] For editorial reasons, upon codification in the U.S. Code, Part C was redesignated Part A-1.

complies with relevant standards promulgated under EPCA. (42 U.S.C. 6316(a); 42 U.S.C. 6295(s))

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

EPCA also requires that, at least once every 7 years, DOE evaluate the test procedures for each type of covered equipment, including ACIM, to determine whether amended test procedures would more accurately or fully comply with the requirements for test procedures not to be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating costs during a representative average use cycle. (42 U.S.C. 6314(a)(1)) In addition, if the Secretary determines that a test procedure amendment is warranted, the Secretary must publish proposed test procedures in the *Federal Register*, and afford interested persons an opportunity (of not less than 45 days' duration) to present oral and written data, views, and arguments on the proposed test procedures. (42 U.S.C. 6314(b)) If DOE determines that test procedure revisions are not appropriate, DOE must publish its determination not to amend the test procedures. DOE is publishing this RFI to collect

data and information to inform its decision in satisfaction of the 7-year review requirement specified in EPCA. (42 U.S.C. 6314(a)(1))

B. *Rulemaking History*

EPCA prescribed the first Federal test procedure for ice makers, directing that the ACIM test procedure is the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Standard 810-2003, "Performance Rating of Automatic Commercial Ice-Makers." (42 U.S.C. 6314(a)(7)(A)) EPCA further stipulated that if AHRI 810-2003 was revised, DOE must amend the DOE test procedure as necessary to be consistent with the amended AHRI Standard unless DOE determines, by rule and supported by clear and convincing evidence, that to do so would not meet the requirements for test procedures set forth in EPCA. (42 U.S.C. 6314(a)(7)(B)) If DOE determines that a test procedure amendment is warranted, it must publish proposed test procedures and offer the public an opportunity to present oral and written comments on them. (42 U.S.C. 6314(b))

Pursuant to these provisions, on December 8, 2006, DOE published a final rule ("the 2006 *en masse* final rule") that, among other things, adopted the test procedure specified in AHRI Standard 810-2003 as the Federal test procedure for ice makers. 71 FR 71339. DOE also adopted a clarified energy use rate equation to specify that energy use be calculated using the entire mass of ice produced during the testing period, normalized to 100 pounds of ice produced. *Id.* at 71 FR 71350. The DOE test procedure also incorporated by reference the American National Standards Institute ("ANSI")/American Society of Heating, Refrigerating and Air-Conditioning Engineers ("ASHRAE") Standard 29-1988 (Reaffirmed 2005) ("ASHRAE Standard 29-1988 (RA

2005)"), "Method of Testing Automatic Ice Makers," as the method of testing. The 2006 *en masse* final rule preamble stated that the adopted test procedure was applicable to ACIM that produce cube type ice with capacities between 50 and 2,500 lb/24 h. *Id.* at 71 FR 71351.

Subsequently, on January 11, 2012, DOE satisfied its statutory obligation under 42 U.S.C. 6314(a)(7)(B) to amend the ACIM test procedure by incorporating by reference AHRI Standard 810-2007 with Addendum 1 "2007 Standard for Performance Rating of Automatic Commercial Ice Makers" ("AHRI 810-2007") and ANSI/ASHRAE Standard 29-2009 "Method of Testing Automatic Ice Makers," (including Errata Sheets issued April 8, 2010 and April 21, 2010), approved January 28, 2009 ("ASHRAE 29-2009"). 77 FR 1591 ("January 2012 ACIM TP final rule"). Consistent with the statutory definition of ACIM and the updated AHRI 810-2007, the amended DOE test procedure expanded the scope of the test procedure to include equipment with capacities from 50 to 4,000 lb/24 h. The updated DOE test procedure also (1) provided test methods for continuous type ice makers and batch type ice makers that produce other than cube type ice, (2) standardized the measurement of energy and water use for continuous type ice makers with respect to ice hardness, (3) clarified the test method and reporting requirements for remote condensing automatic commercial ice makers designed for connection to remote compressor racks, and (4) discontinued the use of a clarified energy use rate calculation to instead reference the calculation of energy use per 100 pounds of ice as specified in ASHRAE 29-2009. *Id.* The amended test procedure became mandatory for equipment testing beginning on January 7, 2013. *Id*.

II. Request for Information

In the following sections, DOE has identified a variety of issues on which it seeks input to aid in the development of the technical and economic analyses regarding whether amended test procedures for ACIM would more accurately or fully comply with the requirements in EPCA that test procedures: (1) be reasonably designed to produce test results which reflect energy use during a representative average use cycle, and (2) not be unduly burdensome to conduct. (42 U.S.C. 6314(a)(2)) Specifically, DOE is requesting comment on any opportunities to streamline and simplify testing requirements for ACIM.

Additionally, DOE welcomes comments on other issues relevant to the conduct of this process that may not specifically be identified in this document. In particular, DOE notes that under Executive Order 13771, "Reducing Regulation and Controlling Regulatory Costs," Executive Branch agencies such as DOE are directed to manage the costs associated with the imposition of expenditures required to comply with Federal regulations. 82 FR 9339 (Feb. 3, 2017). Consistent with that Executive Order, DOE encourages the public to provide input on measures DOE could take to lower the cost of its regulations applicable to ACIM consistent with the requirements of EPCA.

A. *Scope and Definition*

DOE defines an automatic commercial ice maker as a factory-made assembly (not necessarily shipped in one 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.

1. Modulating Capacity Ice Maker

A modulating capacity ice maker is one designed to be capable of operating at multiple capacity levels. This modulation presumably could be accomplished by using a single compressor with multiple or variable capacity, using multiple compressors, or in some other manner. In the January 2012 ACIM TP final rule, DOE did not set 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 (Jan. 11, 2012). The decision to exclude modulating capacity ice makers was based on the lack of existing automatic commercial ice makers with modulating capacity, as well as limited information regarding how such equipment would function. At this time, DOE is unaware of any such products that are currently available in the market. DOE is interested in whether modulating capacity ice makers are currently sold in the market and, if so, the design characteristics, operation, and testing of such equipment.

Issue 1: DOE requests comment on whether any modulating capacity ice makers are currently available in the market. If such products are currently available, DOE requests information on how such equipment functions, such as typical capacity ranges and the relative frequency of use at different capacity ranges, and how such equipment is currently tested.

B. Test Procedure

In accordance with the review process under 42 U.S.C. 6314(a)(1)(A), DOE has determined the test procedure potentially could be improved by modifying some of its provisions to more accurately or fully comply with the requirements in EPCA that a test procedure be reasonably designed to reflect energy use during a representative average use cycle and not be unduly burdensome to conduct.

1. Updates to Industry Standards

The existing DOE ACIM test procedure incorporates by reference AHRI 810-2007, which refers to test methods in ASHRAE Standard 29. The DOE test procedure additionally specifies that references to ASHRAE 29 in AHRI 810-2007 refer to ASHRAE 29-2009.[3] 10 CFR 431.134(b).

Since publication of the January 2012 ACIM TP final rule, both AHRI and ASHRAE have published new versions of the referenced standards. The most recent versions are AHRI 810-2016 and ASHRAE 29-2015. DOE has reviewed the most recent versions of both AHRI 810 and ASHRAE 29 and has compared the updated versions of these industry standards to those currently incorporated by reference in the ACIM test procedure. The updates published in ASHRAE 29-2015 provide additional specificity to several aspects of the test method. In general, DOE has tentatively determined that these updates increase the precision and improve the repeatability of the test method, but do not fundamentally change the testing process, ambient test conditions, or test results. In

[3] The DOE ACIM test procedure also incorporates by reference ASHRAE 29-2009. 10 CFR 431.133.

addition, ASHRAE made several grammatical, editorial, and formatting changes to improve the clarity of the test method. DOE has tentatively determined that these changes would not affect how the test is conducted. Table II.1 summarizes the primary substantive changes between ASHRAE 29-2009 and ASHRAE 29-2015.

Table II.1 Summary of Changes Between ASHRAE 29-2009 and ASHRAE 29-2015

Requirement	ASHRAE 29-2009	ASHRAE 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 pan.
Pressure Measuring Instruments	None.	Accuracy of and resolution of ±2.0% of the quantity measured.
Sampling Rate	None.	Maximum interval between data samples of 5 sec.
Supply Water Temperature and Pressure	±1 °F (water supply temperature).	±1 °F (water supply temperature) and "within 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.
Minimum 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 minute samples (continuous) taken within a 1.5 hr period or two consecutive batches (batch-type) where amount of harvested ice does not vary by more than ±2%.	Two consecutive 15.0 min ± 2.5 sec samples taken within 5 mins of each other (continuous) within 2% or 0.055 lbs or two consecutive 24-hr calculated ice production rate from two consecutive batches (batch) where harvested ice is within ±2% or 2.2 lb.
Capacity Test Ice Collection	Three consecutive 14.4 min samples (continuous) or batches (batch).	Clarify that batch ice should be weighed 30 ± 2.5 s after collection and continuous ice samples must be within 5 mins of each other.
Calorimetry Testing	For continuous type ice makers, collect sample size "suitable for test" and conduct calorimetry testing described in Appendix A.	Clarified that ice must be collected with non-perforated bin and that the sample size must be 6 lb or 15 mins of ice production, whichever is achieved first. Also, significant changes made to Appendix A to clarify the calibration of the calorimeter, test process, and calculation methods.
Recorded Data		Clarified that ambient temperature gradient (at rest), maximum air-circulation velocity (at rest), and water pressure must also be collected.

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

AHRI 810-2016 was also updated to include a definition, measurement, and reporting requirements for potable water use rate. These are discussed in more detail in section II.C.in this RFI. The other changes to AHRI 810-2016 are primarily clerical in nature, intended to provide greater consistency in the use of terms and specific definitions for those terms. The primary changes include updating the defined equipment varieties to be more consistent with DOE definitions, using the defined terms more consistently throughout the standard, and adding definitions for many of the reported quantities. AHRI 810-2016 also references the latest version of ASHRAE 29, ASHRAE 29-2015.

Based on DOE's review, the changes to AHRI 810-2016 and ASHRAE 29-2015 serve primarily to improve the consistency and specificity of the test procedure and would not fundamentally alter the test method or test parameters. As such, these updates would not result in a change to the measured energy consumption of covered equipment. DOE seeks comment and data on this preliminary determination.

Issue 2: DOE seeks comment on updating the DOE test procedure to incorporate by reference the latest industry standards: AHRI 810-2016 and ASHRAE 29-2015. Specifically, DOE requests comment on whether incorporating by reference these industry standards would more accurately reflect energy efficiency during a representative average use cycle or reduce testing burden. Additionally, DOE seeks comment on the benefits and burdens of adopting any industry/voluntary consensus-based or other appropriate test procedure, without modification.

DOE is aware of one aspect of ASHRAE 29 found in both the 2009 and 2015 versions that may need further instruction. For continuous type ACIM, the energy use and condenser water use are determined by multiplying the measured values by the ice hardness adjustment factor. The ice hardness factor is determined by following the procedure specified in the "Method of Calorimetry" in Normative Annex A of ANSI/ASHRAE 29-2009. Section A2 specifies that the calorimeter constant shall be no greater than 1.02. ASHRAE 29-2015 specifies that the calorimeter constant must be in the range of 1.0 to 1.02. DOE is aware that some third-party labs have had difficulty achieving the calorimeter constant requirements specified in ASHRAE 29-2009 (and therefore, also those specified in ASHRAE 29-2015). Amended instructions regarding the calorimeter constant may reduce testing burden while maintaining the accuracy of the test procedure.

Issue 3: DOE requests comment on whether further instruction is necessary to achieve the required calorimeter constant as specified in ASHRAE 29-2009 and ASHRAE 29-2015. DOE also seeks information on how manufacturers and third-party labs are currently testing and measuring the calorimeter constant for the ice hardness adjustment factor and if there are any best practices to ensure the calorimeter constant remains in the required range. Alternatively, DOE requests feedback on whether a wider range of allowable calorimeter constant would allow for less burden on manufacturers while still accurately measuring energy use during a representative average use cycle.

2. Other Updates to the Federal Test Method

a. Test Setup and Equipment Configuration

DOE is interested in learning if additional direction on how certain equipment should be configured for and operated during testing, including installation of temporary baffles and purge settings, may improve the accuracy of the test procedure and reduce testing burden.

Temporary Baffles

After publication of the January 2012 TP final rule, DOE received an inquiry as to whether the DOE test procedure allows for temporary air baffles to be installed between the ACIM condenser air discharge and condenser air inlet. DOE issued final test procedure guidance on September 24, 2013 ("2013 baffle guidance"), regarding the use of temporary baffles during testing.[4] As described in the 2013 baffle 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. 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 cooling air inlet. The purpose of installing a temporary baffle could be, for example, to limit potential temperature fluctuations at the condenser air inlet, where the ambient temperature is measured and maintained within the required conditions. However, such a baffle could also reduce the average temperature of the air entering the inlet, thereby resulting in lower measured energy use compared to testing without a baffle. Therefore,

[4] See *https://www1.eere.energy.gov/buildings/appliance_standards/pdfs/acim_baffles_faq_2013-9-24final.pdf* (2013 baffle guidance).

installing a temporary baffle for testing may result in a measured energy use that is not representative of the energy use of the unit as operated by the end user. DOE also determined that installing such temporary baffles is inconsistent with the ACIM test procedure, which states that the unit must be "set up for testing per 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."[5] Further, "heat exchangers and other accessories shall be used only if they are part of standard equipment furnished with the model tested."[6] Therefore, DOE's final guidance states that the use of temporary 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. The guidance also states that temperature measuring devices may be shielded so that the indicated temperature will not be affected by the intermittent passing of warm discharge air at the measurement location. However, the shields must not block recirculation of this air into the condenser or ice maker inlet.

Issue 4: DOE is considering amending the ACIM test procedure to explicitly state that temporary baffles may not be used for testing, unless the baffle is (a) part of the ice maker or (b) shipped with the ice maker to be installed according to manufacturers' installation instructions. DOE requests comment on whether manufacturers and test

[5] Section 4.1.4, "Test Set Up," of AHRI 810-2016.
[6] Section 6.9, "Test Methods," of ASHRAE 29-2015.

laboratories currently test consistent with the 2013 baffle guidance and whether any further instructions are needed.

Purge Settings

Purge water refers to water that is introduced into the ice maker during an ice-making cycle, in addition to the water that becomes ice, in order 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 locations based on the level of 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. Neither AHRI 810-2016 nor ASHRAE 29-2015 indicate how to set a purge water control that provides multiple purge water settings.

Since purge water is cooled by the ice maker, it contributes to energy use during a representative average use cycle. To ensure accurate, representative 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[7] that is described in the automatic commercial ice

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

maker's written instructions shipped with the unit as being appropriate for water of normal, typical, or average hardness.

DOE also recognizes that some ice makers, both batch and continuous type models, may introduce additional purges outside of regular cycling (for batch ice makers) or continuous operation (for continuous ice makers). This may occasionally increase the purge water quantity in a way that may not be captured by the current ACIM test procedure. For example, batch ice makers might initiate an extra flush or purge cycle every 12 hours, and continuous ice makers might pause the ice making operation periodically to accomplish the additional purge. Testing according to the current test procedure may not include such a purge cycle, and thus the resulting tested energy use may not accurately represent an average use cycle. Neither ASHRAE 29-2015, nor the prior version, AHSRAE 29-2009, which is incorporated by reference in the DOE test procedure, addresses the possibility of operational events that do not occur continuously or with every cycle. ASHRAE 29-2015 states only in section 7.1.1 that the ice maker must be stable for capacity test data to be valid, and defining this stability as two consecutive cycles (for batch ice makers) or two consecutive 15-minute periods (for continuous ice makers) with a harvest weight difference of no more than 2 percent.

Issue 5: DOE requests comment on whether purge settings affect measured energy use during a representative average use cycle. If purge settings do affect measured energy use, DOE also requests comment on (1) what purge settings should be considered for testing for ACIM equipment with multiple or automatic purge settings, and (2) whether any ACIM models exist that have automatic purge settings but do not have a fixed purge

setting appropriate for "normal" water hardness and, if such a unit exists, how it should be tested.

Issue 6: DOE requests comment on the presence and frequency of any "additional" or "increased-water" purge cycles and their impact on energy and potable water use and/or condenser water use. DOE also requests comment on how the test procedure could be modified, if necessary, to more accurately measure this energy use during a representative average use cycle.

Remote Condensing Ice Makers

Remote condensing ice maker means a type of automatic commercial ice maker in which the ice-making mechanism and condenser or condensing unit are in separate sections. 10 CFR 431.132. This includes both "Remote Condensing (but not remote compressor)," and "Remote Condensing and Remote Compressor" ice makers. The DOE test procedure and industry test procedures, both those currently incorporated by reference and the most recently updated standards, require setting up the ice maker in accordance with the manufacturer's recommendations. AHRI 810 includes the requirement to install remote condensing ice makers with at least 25 feet of interconnection tubing on each line. Otherwise, there are no specific instructions for remote condensing ice makers. Certain remote ice makers are typically paired with pre-charged refrigerant lines for installation with the condenser or condensing unit. However, if a pre-charged line set is not recommended by the manufacturer, additional line set specifications and charging instructions may be needed for testing.

Additionally, it is possible that manufacturers may not always recommend a specific condensing unit to be paired with each remote condensing ice maker model. Based on a review of the market, DOE is aware of continuous remote condensing ice makers that are meant to be connected to a compressor rack instead of a single paired condensing unit. For other remote condensing equipment with a similar setup, for example, commercial refrigeration equipment, the test procedure relies on a refrigerant enthalpy calculation and assumed compressor efficiency based on evaporator temperature to estimate the energy consumption of a compressor rack refrigeration system. A similar approach may be appropriate for remote condensing ice makers intended to be installed without a dedicated condensing unit. Such a configuration would also require additional test instructions regarding appropriate refrigerants and representative refrigerant conditions.

Issue 7: DOE requests comment on whether the current test procedure could be improved to more accurately measure energy use during a representative average use cycle for remote condensing ice makers with dedicated condensing units. For example, DOE requests feedback on whether default refrigerant charging and line set specifications would be necessary absent manufacturer recommendations. DOE also seeks information on whether any additional test instructions would be needed for remote condensing ice makers.

Issue 8: DOE also requests comment on the appropriate test approach for those ice makers intended to be installed without a dedicated condensing unit. DOE seeks feedback on what types of these units are available on the market (*i.e.*, batch vs.

continuous), whether an enthalpy test approach similar to that used for commercial refrigeration equipment would be appropriate for testing these ice makers, and if so, any additional instructions that would be needed for such testing.

b. Test Conditions

The ACIM test procedure specifies standard test conditions to ensure that results reflect energy use during a representative average use cycle and are not unduly burdensome for manufacturers to perform. DOE seeks comment on whether modifications to these standard test conditions could improve the accuracy of the test procedure or reduce testing burden, as discussed further in the following sections.

Relative Humidity

Variation in the moisture content of ambient air may affect the energy consumption of ice makers. However, AHRI 810 and ASHRAE 29 do not specify a standard condition or tolerance for relative humidity or wet bulb temperature. In contrast, test procedures for most other refrigeration equipment specify these values. Table II.2 summarizes relative humidity and wet bulb temperature specifications for commercial refrigeration equipment and refrigerated beverage vending machines. DOE is interested in understanding: (1) whether specifying a standard condition or tolerance for relative humidity or wet bulb temperature may improve the accuracy of the test procedure, and (2) how adding this test condition may affect testing burden.

Table II.2 Relative Humidity & Wet Bulb Temperature Specifications for Refrigeration Equipment

Equipment Type	Test Standard	Relative Humidity	Wet Bulb Temperature
Commercial Refrigeration Equipment	ASHRAE 72	49–62%*	62.6–66.2 °F
Refrigerated Beverage Vending Machines	ASHRAE 32.1	40–50%	59–63 °F*

* Equivalent value. ASHRAE 72 specifies wet bulb temperature, while ASHRAE 32.1 specifies relative humidity.

Issue 9: DOE requests comment on (1) how moisture content of ambient air impacts ACIM performance, and (2) the burden of specifying a humidity range during testing.

Water Hardness

Currently, water hardness is not a specified test condition under AHRI 810 and ASHRAE 29. Based on testing observed and reviewed by DOE and industry feedback, hard water can affect energy consumption in the field due to variation in purge settings and scale build up on the heat exchanger surfaces over time. However, hard water may also impact the tested performance, as harder water has a greater concentration of total dissolved solids and chemical ions, which decreases the freezing temperature of water and could potentially increase energy use. DOE is interested in whether specifying water hardness (the quantity of dissolved solids in the water) as a testing condition is necessary to ensure the test procedure is reasonably designed to produce test results that measure energy efficiency during a representative average use cycle or period of use.

In the January 2012 ACIM TP final rule, DOE declined to set requirements for water hardness as DOE did not have sufficient information to allow proper consideration of such a requirement. Specifically, DOE did not have information regarding the impact of variation in water hardness on as-tested performance of ACIM equipment and, as such,

did not believe the additional burden associated with establishing a standardized water hardness requirement could be justified at that time. 77 FR 1591, 1605–1606 (Jan. 11, 2012). Through testing conducted since the January 2012 ACIM TP final rule, DOE has found that water hardness may impact the tested results for an ACIM basic model and is interested in seeking feedback from interested parties on how it should be considered, if at all, in any potential test procedure revisions. Recognizing that including specifications for water hardness in the test procedure could add burden, DOE is also interested in determining the relative benefits of determining an appropriate target value or range for testing as compared to the test burden it might add.

Issue 10: DOE requests information regarding (1) the impact of total dissolved solids and ion concentration on measured energy and water use during the limited operation associated with testing during a representative average use cycle (*i.e.*, before significant scaling of solids onto ice maker surfaces has occurred), (2) any experience manufacturers have testing ACIM equipment with prepared solutions of known water hardness, and (3) the effect a water hardness test condition would have on testing burden.

Ambient and Inlet Water Temperatures

The current ACIM test procedure incorporates by reference AHRI 810-2007, which specifies an ambient temperature of 90 °F and a supply water temperature of 70 °F. AHRI 810-2016 provides the same specifications. However, many ice makers may be installed in conditioned environments such as offices, schools, hospitals, hotels, and convenience stores (see 80 FR 4646, 4700; Jan. 28, 2015), which may have ambient air temperatures closer to 70 °F and supply water temperatures closer to 50 °F.

Issue 11: DOE requests comment on the whether the ambient air temperature and water supply temperature specified in AHRI 810-2016, and in the current DOE test procedures, are appropriately representative of those temperatures during an average use cycle or whether different temperature specifications should be considered. In particular, DOE requests data and information describing the ambient air temperature and supply water temperature of different applications at which ACIM equipment are operated.

Ambient Temperature Gradient

DOE is also specifically reviewing the requirements for ambient temperature gradient, which may have an impact on tested energy use. The current ACIM test procedure incorporates by reference section 5.1.1 of ASHRAE 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 ft above the floor, or to a height of 1 ft above the top of the ice maker cabinet, whichever is greater, shall not exceed 0.5 ºF/ft. This requirement is identical in section 5.1.1 of ASHRAE 29-2015, which is incorporated by reference in AHRI 810-2016. DOE notes that this language is based on 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 notes further that 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 ft height requirement and

only require the gradient be maintained to a height 1 ft higher than the top of the unit. 79 FR 22320. DOE is interested in understanding the applicability of the air temperature gradient requirements to ice makers, and whether a similar modification, or any other modifications, would improve the accuracy of the test procedure or reduce testing burden.

Issue 12: DOE requests comment on how manufacturers are demonstrating compliance with the temperature gradient requirements of section 5.1.1 of ASHRAE 29-2015. DOE seeks feedback on whether updates consistent with the temperature gradient requirements for consumer refrigeration products would be appropriate for the ACIM test procedure, and whether such updates would reduce test variability and testing burden.

Weighting of Ambient Temperature Measuring Instruments

ASHRAE 29 states that the average ambient temperature shall not vary by more than 2 °F from the specified temperature during the first five minutes of each freeze cycle, and not vary by more than 1 °F thereafter. However, the current ACIM test procedure, which is based on AHRI 810 and ASHRAE 29, does not indicate whether ambient temperature measuring instruments should be weighted with a thermal mass. The use of a weighted temperature measurement instrument reduces the fluctuations in temperature measurement, making it easier to meet the stability criteria relative to an unweighted temperature measurement instrument.

Issue 13: DOE requests comment on whether manufacturers typically use weighted or unweighted temperature measurement instruments to measure ambient temperatures during ice maker testing. In addition, DOE requests comment on reduction in fluctuation

when using weighted temperature measurement instruments compared to unweighted temperature measurement instruments. DOE also seeks comment and data on benefit and burdens of using unweighted temperature measurement instruments compared to weighted temperature measurement instruments.

c. Test Accuracy and Repeatability

As discussed in section I.A, EPCA requires that test procedures be reasonably designed to produce test results that reflect the energy efficiency, energy use, and estimated operating costs (as applicable) of a type of industrial equipment during a typical cycle of use and not be unduly burdensome to conduct. (42 U.S.C. 6314(a)(2)) The accuracy and repeatability of the ACIM test procedure are important to consider to ensure that test results are representative of typical energy consumption in the field. DOE notes that the current ACIM test procedure incorporates by reference AHRI 810-2007 and ASHRAE 29-2009 to specify the aforementioned measurement methods, tolerances, and accuracies. These specifications have not changed in the most recent versions of these standards, namely AHRI 810-2016 and ASHRAE 29-2015. DOE is interested in whether it should consider modifications to existing test condition tolerances, instrumentation accuracies, and temperature measurement methods that would improve accuracy and precision in test results.

For example, specifying tighter tolerances and/or more accurate measurement equipment can lead to increased accuracy in measuring energy use. However, doing so may also increase the burden associated with testing due to the added cost of higher-precision instruments or increased testing time to achieve tighter tolerances. DOE is

therefore interested in getting feedback from interested parties on the technical feasibility or burden associated with reducing the uncertainty in those variables.

Issue 14: DOE requests comment on the potential improvement in testing accuracy and increase in testing burden and costs associated with tightening the tolerances and increasing the instrumentation accuracies specified by the current ACIM test procedure.

C. *Industry Test Method Harmonization*

The industry test methods incorporated by reference by the DOE ACIM test procedure, ASHRAE 29 and AHRI 810, added measurement and reporting requirements for potable water use. This measurement is not required by the current DOE test procedure, but is required by other programs, such as ENERGY STAR[8] and the AHRI certification program.[9] Since DOE establishes test procedures for the ENERGY STAR program, DOE is interested in seeking feedback from interested parties about whether any updates to the test method for potable water use are needed at this time, including any that may reduce the burden of the current method.

In the January 2012 ACIM TP final rule, DOE declined to establish a test procedure or metric for non-condenser potable water use and noted that no statutory authority to do so exists under EPCA. 77 FR 1591, 1604–1605 (Jan. 11, 2012). Specifically, EPCA prescribes standards for condenser water use in cube type ice makers

[8] The ENERGY STAR specification for automatic commercial ice makers is currently under revision. A draft specification is available at *https://www.energystar.gov/products/spec/commercial_ice_makers_specification_version_3_0_pd.*
[9] *http://www.ahrinet.org/Certification.aspx*

at 42 U.S.C. 6313(d)(1) and explicitly states that prescribed standard levels for condenser water use "does not include potable water used to make ice." EPCA allows, but does not require, the Secretary to issue analogous standards for other types of automatic commercial ice makers under 42 U.S.C. 6313(d)(2). 77 FR 1591, 1605 (Jan. 11, 2012). In general, DOE assumes ice makers that use less potable water would be expected to use less energy, because they have to cool less water. In the January 2012 ACIM TP final rule, DOE stated that, while there is generally a correlation between energy use and potable water use, at a certain point of reduced potable water use, the relationship between potable water use and energy consumption reverses due to scaling. *Id*.

DOE reviewed the relationship between potable water use and both harvest rate and daily energy consumption by analyzing reported ACIM data from the AHRI directory and the ENERGY STAR product database.[10,11] DOE observed that all manufacturers of continuous ice-makers report a consistent amount of potable water use per 100 pounds of ice—between 11.9 and 12.0 gallons—because all of the water is converted to produce ice. 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. 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. Thus, DOE is interested in seeking feedback on any potential relationship between potable water use

[10] Available at: *https://www.ahridirectory.org/ahridirectory/pages/acim/defaultSearch.aspx.*
[11] Available at: *https://www.energystar.gov/productfinder/product/certified-commercial-ice-machines/results.*

and daily energy consumption and whether, and how, this relationship impacts consumer utility of ACIMs, for example, by affecting the quality of ice produced.

Issue 15: DOE requests comment and information on the relationship between potable water use and energy use, including data quantifying the relationship. Additionally, DOE requests comment and information on any potential impact that this relationship has on possible consumer utility.

D. *Standby Energy Use*

The existing ACIM test procedure considers only active mode energy use when an ice maker is actively producing ice and reflects 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. However, when not actively making ice, an ice maker continues to consume energy to power sensors and controls. In this way, standby energy use from control devices impact the daily energy consumption of ACIM equipment.

Issue 16: DOE requests data and information on the magnitude of energy use associated with standby energy use, as well as the relationship of such values to daily energy consumption of ACIM equipment.

E. *Other Test Procedure Topics*

In addition to the issues identified earlier in this document, DOE welcomes comment on any other aspect of the existing test procedures for ACIM that could be

improved to more accurately reflect energy use during a representative average use cycle or reduce testing burden. DOE particularly seeks information that would improve the repeatability, reproducibility, and consumer representativeness of the test procedures. DOE also requests information that would help DOE create a procedure that would limit manufacturer test burden through streamlining or simplifying testing requirements. Comments regarding the repeatability and reproducibility are also welcome.

DOE also requests feedback on any potential amendments to the existing test procedure(s) that could be considered to address impacts on manufacturers, including small businesses. Regarding the Federal test method, DOE seeks comment on the degree to which the DOE test procedure should consider and be harmonized with the most recent relevant industry standards for ACIM and whether there are any changes to the Federal test method that would provide additional benefits to the public. DOE also requests comment on the benefits and burdens of adopting any industry/voluntary consensus-based or other appropriate test procedure, without modification. DOE notes that AHRI 810, which references ASHRAE 29, does not include test specifications that may impact energy use (*e.g.*, relative humidity) and includes specifications that may not be representative of field use (*e.g.*, ambient and inlet water temperature).

Additionally, DOE requests comment on whether the existing test procedure limits a manufacturer's ability to provide additional features to consumers on ACIM. DOE particularly seeks information on how the test procedure could be amended to reduce the cost of new or additional features and make it more likely that such features are included on ACIM.

III. Submission of Comments

DOE invites all interested parties to submit in writing by [**INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***], comments and information on matters addressed in this document and on other matters relevant to DOE's consideration of amended test procedures for ACIM. These comments and information will aid in the development of a test procedure NOPR for ACIM if DOE determines that amended test procedures may be appropriate for this equipment.

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

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

last names, organization names, correspondence containing comments, and any documents submitted with the comments.

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

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

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

Include contact information each time you submit comments, data, documents, and other information to DOE. If you submit via mail or hand delivery, please provide all items on a CD, if feasible. It is not necessary to submit printed copies. No facsimiles (faxes) will be accepted.

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

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

Confidential Business Information. According to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email, postal mail, or hand delivery two well-marked copies: one copy of the document marked confidential including all the information believed to be confidential, and one copy of the document marked "non-confidential" with the information believed to be confidential deleted. Submit these documents via email or on a CD, if feasible. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Factors of interest to DOE when evaluating requests to treat submitted information as confidential include (1) a description of the items, (2) whether and why such items are customarily treated as confidential within the industry, (3) whether the information is generally known by or available from other sources, (4) whether the information has previously been made available to others without obligation concerning its confidentiality, (5) an explanation of the competitive injury to the submitting person which would result from public disclosure, (6) when such information might lose its confidential character due to the passage of time, and (7) why disclosure of the information would be contrary to the public interest.

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

DOE considers public participation to be a very important part of the process for developing test procedures and energy conservation standards. DOE actively encourages the participation and interaction of the public during the comment period in each stage of this process. Interactions with and between members of the public provide a balanced discussion of the issues and assist DOE in the process. Anyone who wishes to be added to the DOE mailing list to receive future notices and information about this process should contact

Appliance and Equipment Standards Program staff at (202) 287-1445 or by e-mail: *ApplianceStandardsQuestions@ee.doe.gov*.

Signed in Washington, D.C., on March 7, 2019.

Steven Chalk
Acting Deputy Assistant Secretary for
Energy Efficiency
Energy Efficiency and Renewable Energy