DEPARTMENT OF ENERGY

10 CFR Parts 429 and 430

[Docket No. EERE–2013–BT–TP–0029]

RIN 1904–AD44

Energy Conservation Program: Test Procedures for Miscellaneous Consumer Refrigeration Products

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

ACTION: Notice of proposed rulemaking.

SUMMARY: The U.S. Department of Energy (DOE) is proposing new test procedures that would measure the energy efficiency of wine chillers and other related miscellaneous refrigeration products that maintain warmer compartment temperatures than refrigerators. These procedures would apply both to those products that use a vapor-compression refrigeration system and those that do not. DOE is also proposing new definitions and test procedures for cooled cabinets, refrigerators that do not use a vapor-compression refrigeration system, hybrid refrigeration products, which incorporate warm compartments such as wine storage compartments in products that otherwise provide the functions of refrigerators, refrigerator-freezers, or freezers, and ice makers. The proposal also seeks to clarify the definitions for refrigerators, refrigerator-freezers, and freezers.

DATES: DOE will hold a public meeting on Thursday, January 8, 2015 from 10 a.m. to 5 p.m., in Washington, DC. The meeting will also be broadcast as a webinar. See section V, ''Public Participation,'' for webinar registration information, participant instructions, and information about the capabilities available to webinar participants.

DOE will accept comments, data, and information regarding this notice of proposed rulemaking (NOPR) before and after the public meeting, but no later than March 2, 2015. See section V, ''Public Participation,'' for details.

ADDRESSES: The public meeting will be held at the U.S. Department of Energy, Forrestal Building, Room 8E–089, 1000 Independence Avenue SW., Washington, DC 20585. To attend, please notify Ms. Brenda Edwards at (202) 586–2945. See Section V, ''Public Participation,'' for details.

Any comments submitted must identify the NOPR for Test Procedures for Miscellaneous Consumer Refrigeration Products, and provide docket number EE–2013–BT–TP–0029 and/or regulatory information number (RIN) number 1904–AD44. Comments may be submitted using any of the following methods:

1. *Federal eRulemaking Portal: www.regulations.gov.* Follow the instructions for submitting comments.
2. *Email: MiscResRefrigProd2013TP0029@ee.doe.gov.* Include the docket number and/or RIN in the subject line of the message.
3. *Mail:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE–5B, 1000 Independence Avenue SW., Washington, DC 20585–0121. If possible, please submit all items on a CD. It is not necessary to include printed copies.
4. *Hand Delivery/Courier:* Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 950 L'Enfant Plaza SW., Suite 600, Washington, DC 20024. Telephone: (202) 586–2945. If possible, please submit all items on a CD. It is not necessary to include printed copies.

For detailed instructions on submitting comments and additional information on the rulemaking process, see section V, ''Public Participation.''

Docket: The docket, which includes **Federal Register** notices, public meeting attendee lists and transcripts, comments, and other supporting documents/materials, is available for review at regulations.gov. All documents in the docket are listed in the 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.

A link to the docket Web page can be found at: *http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx?ruleid=105.* This Web page will contain a link to the docket for this notice on the regulations.gov site. The regulations.gov Web page will contain simple instructions on how to access all documents, including public comments, in the docket.

For further information on how to submit a comment, review other public comments and the docket, or participate in the public meeting, contact Ms. Brenda Edwards at (202) 586–2945 or by email: *Brenda.Edwards@ee.doe.gov.*

FOR FURTHER INFORMATION CONTACT: Ms. Ashley Armstrong, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE–5B, 1000 Independence Avenue SW., Washington, DC 20585–0121. Telephone: (202) 586–6590. Email: *Ashley.Armstrong@ee.doe.gov* or Mr. Michael Kido, U.S. Department of Energy, Office of the General Counsel, GC–33, 1000 Independence Avenue SW., Washington, DC 20585–0121. Telephone: (202) 586–8145. Email: *Michael.Kido@hq.doe.gov.*

SUPPLEMENTARY INFORMATION:

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I. Authority and Background

Title III of the Energy Policy and Conservation Act of 1975 (42 U.S.C. 6291, *et seq.*; ''EPCA'' or, in context, ''the Act'') sets forth a variety of provisions designed to improve energy efficiency. (All references to EPCA refer to the statute as amended through the American Energy Manufacturing Technical Corrections Act (AEMTCA), Public Law 112–210 (Dec. 18, 2012).) Part B of title III, which for editorial reasons was re-designated as Part A upon incorporation into the U.S. Code (42 U.S.C. 6291–6309, as codified), establishes the ''Energy Conservation Program for Consumer Products Other Than Automobiles.'' These include conventional consumer refrigerators, refrigerator-freezers, and freezers, which are among the subjects of today's notice. (42 U.S.C. 6292(a)(1)) The other products addressed by this notice, all of which are consumer products, are hybrid (or combination) refrigerators, refrigerator-freezers, and freezers (*i.e.*, products that include warm compartments such as wine storage compartments in products that otherwise perform the functions of refrigerators, refrigerator-freezers, or freezers), cooled cabinets (including wine chillers), refrigeration products that do not use vapor-compression refrigeration systems (*i.e.*, products that do not include a compressor and condenser unit as an integral part of the cabinet assembly), and standalone ice makers (*i.e.*, ice makers not contained within a refrigerator, refrigerator-freezer, or freezer), which this notice refers to generally as ''ice makers.'' DOE raised the possibility in an October 31, 2013, coverage determination proposal of adding all of these other products as covered products under EPCA. 78 FR 65223 (referred to in this notice as the October 2013 Coverage Proposal).[1]

Under EPCA, the energy conservation program consists essentially of four parts: (1) Testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. The testing requirements consist of test procedures that manufacturers of covered products must use as the basis for (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted under EPCA, and (2) making representations about the efficiency of those products. Similarly, DOE must use these test procedures to determine whether the products comply with any relevant standards promulgated under EPCA.

A. General Test Procedure Rulemaking Process

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE must follow when prescribing or amending test procedures for covered products. Any test procedures prescribed or amended under this section shall be reasonably designed to produce test results that measure the energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use and shall not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

In addition, if DOE determines that adoption or amendment of a test procedure 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. 6293(b)(2)) Finally, when amending a test procedure, DOE would determine to what extent, if any, the proposed test procedure would alter the measured energy efficiency of any covered product as determined under the existing test procedure. (42 U.S.C. 6293(e)(1))

EPCA further requires that any new or amended DOE test procedure for a covered product integrate measures of standby mode and off mode energy consumption into the overall energy efficiency, energy consumption, or other energy descriptor, unless the current test procedure already incorporates the standby mode and off mode energy consumption or such integration is technically infeasible. If an integrated test procedure is technically infeasible, DOE must prescribe a separate standby mode and off mode energy use test procedure for the covered product, if a separate test is technically feasible. (42 U.S.C. 6295(gg)(2)(A)) The current DOE test procedures for refrigerators, refrigerator-freezers, and freezers measure the energy use of these products during extended time periods that include periods when the compressor and other key components are cycled off. All of the energy these products use during the ''off cycles'' is already included in the measurements. The amended and new test procedures proposed in this notice would address standby and off mode energy use in a similar fashion. To address this EPCA requirement for ice makers, the notice proposes to integrate into the energy use measurement the energy consumed in an ice storage test in which the ice maker would be maintaining a full bin of ice rather than producing ice to fill the bin.

B. DOE Test Procedures for the Products in This Rulemaking

EPCA covers various specific consumer products identified in the Act, as well as any other product as to which DOE has determined that (1) coverage is necessary and appropriate for carrying out the purposes of EPCA and (2) the average annual energy use of the product is likely to exceed 100 kilowatt-hours per-household in households that use the product. (*See* 42 U.S.C. 6292) The statute precludes the coverage of any product ''designed solely for use in recreational vehicles and other mobile equipment.'' (42 U.S.C. 6292(a))

Refrigerators, refrigerator-freezers, and freezers are among the consumer products listed as covered products in EPCA. See 42 U.S.C. 6292(a)(1). The Act, however, does not define these terms, although it specifies that statutory coverage applies to a product of one of these types if it (1) can operate

[1] Although DOE has previously indicated its belief that wine chillers, and, by extension, cooled cabinets that use compressor and condenser systems are covered under EPCA, it nevertheless has recently proposed to add them as separately enumerated covered products. This is discussed below in Section I.A.

using alternating current electricity, (2) includes a compressor and condenser unit as an integral part of the cabinet assembly, and (3) is designed to be used with doors. *Id.* (These compressor/condenser-based products use what are commonly referred to as vapor-compression-based systems to provide cool air to the interior of the cabinet assembly.) DOE has adopted definitions for these products, which are located in 10 CFR 430.2.

The current DOE test procedures apply only to those refrigeration products that are identified as covered products in the text of EPCA at 42 U.S.C. 6292(a)(1). The test procedures that apply to basic models of these products manufactured prior to September 15, 2014, are located at 10 CFR part 430, subpart B, Appendix A1, Uniform Test Method for Measuring the Energy Consumption of Electric Refrigerators and Electric Refrigerator-Freezers, and Appendix B1, Uniform Test Method for Measuring the Energy Consumption of Freezers. The DOE test procedures for models manufactured starting on September 15, 2014, are located in Appendices A and B to subpart B of part 430. DOE's current regulatory definitions for ''electric refrigerator'' and ''electric refrigerator-freezer,'' found at 10 CFR 430.2, exclude refrigeration products that are not designed to be capable of achieving storage temperatures below 39 degrees Fahrenheit (°F). This temperature threshold is not listed in EPCA. Although DOE has set a regulatory definition that includes limitations not found in EPCA, DOE is not precluded from expanding that regulatory definition. DOE has indicated that the term ''refrigerator'' as used in EPCA does not exclude products that are not designed to be capable of achieving storage temperatures below 39 °F, and that EPCA authorizes DOE to adopt test procedures and standards for those products. 75 FR 59470, 59486 (Sept. 27, 2010). DOE's purpose in adding the 39 °F criterion to its ''electric refrigerator'' definition was to draw a distinction between refrigerators and wine chillers. DOE drew this distinction on the grounds that these wine chillers were different from standard refrigerators because they are not suitable for fresh food storage. 66 FR 57845, 57846 (Nov. 19, 2001); 64 FR 37706 (July 13, 1999). DOE did not assert that EPCA excludes wine chillers from being considered as a class of refrigerator. *Id.*

Similarly, in a notice of proposed determination published in November, 2011, (the November 2011 Proposed Determination) and in its recent rulemaking to promulgate standards for refrigerators, refrigerator-freezers, and freezers, DOE again clearly indicated that it interprets EPCA as authorizing it to develop standards and test procedures for wine chillers, and many stakeholders agreed. See 76 FR 69147, 69149–50 (Nov. 8, 2011). See also 75 FR at 59486 (Sept. 27, 2010). Furthermore, construing a ''refrigerator'' as including wine chillers and other cooled cabinets using integrated compressor/condenser systems would be consistent with EPCA's statutory framework. Namely, they are designed to be used with doors, use a compressor and condenser unit as an integral part of the cabinet assembly, and operate on alternating current electricity. (42 U.S.C. 6292(a)(1))

Despite this history, DOE has also stated that the exclusion of wine chillers from its definition of ''electric refrigerator'' means that they are ''not a covered product.'' 64 FR 37706, 66 FR 37846; *see* 76 FR 57516, 57534 (Sept. 15, 2011). DOE notes that it has the authority to adopt test procedures and standards for consumer products if they are ''covered products.'' (*See* 42 U.S.C. 6293(b) and 6295(a)). In light of its past positions and its statutory authority to affirmatively establish coverage, DOE has decided to evaluate all of the varied consumer refrigeration products addressed in today's notice (including wine chillers) under the provisions of 42 U.S.C. 6292(a)(20) and (b), rather than proposing to expand the regulatory definition of refrigerator to include some of these products. See 78 FR 65223 (Oct. 31, 2013). Applying this approach requires that DOE issue a determination regarding the appropriateness of covering and then—if merited—set standards for these products using the applicable statutory criteria. See 42 U.S.C. 6292(b) and 6295(l).

DOE began examining whether to adopt energy conservation standards for the products addressed in this NOPR by issuing a framework document explaining the issues, analyses, and process the agency considered in developing standards. 77 FR 7547 (Feb. 13, 2012).[2] Among the issues discussed in the framework document were test procedures for cooled cabinets, to which the document referred generally as ''wine chillers.'' (Docket No. EERE–2011–BT–STD–0043, Energy Conservation Standards for Wine Chillers and Miscellaneous Refrigeration Products, No. 3 at pp. 21–22) As part of that discussion, DOE identified what it believed to be the key issues in developing test procedures for these products and specifically requested comment as to the existence and nature of any other key issues on this subject. *Id.* DOE also solicited written comments on these and the other matters addressed in the framework document and held a public meeting on February 20, 2012, at which it presented and solicited discussion on these issues. 77 FR at 7547 (Feb. 13, 2012).

This NOPR addresses products DOE categorizes as ''cooled cabinets,'' which include units commonly referred to as wine chillers, beverage centers, and beverage coolers. These cooled cabinets are not designed to maintain compartment temperatures below 39 °F. Thus, they do not meet the current regulatory definition of ''electric refrigerator'' in 10 CFR 430.2 and are not currently subject to DOE's energy efficiency regulations for refrigerators. As discussed above, DOE believes that those cooled cabinets that contain a compressor and condenser unit as an integral part of the cabinet assembly could be included within the definition of ''refrigerator'' as that term is used in EPCA. Nevertheless, DOE is evaluating vapor-compression-based cooled cabinets as miscellaneous refrigeration products under the provisions of 42 U.S.C. 6292(a)(20) and (b). See 78 FR 65223 (Oct. 31, 2013). Other cooled cabinets use thermoelectric or absorption technology rather than vapor-compression technology to provide refrigeration. These products are not currently covered under EPCA because the Act specifically excludes refrigerators that do not include a compressor and condenser unit as an integral part of the cabinet assembly. See 42 U.S.C. 6292(a)(1). In November 2011, DOE proposed to classify as ''covered products'' under EPCA these and other non-compressor consumer refrigeration products because they meet the criteria for coverage in 42 U.S.C. 6292(b), set forth above. 76 FR 69147 (Nov. 8, 2011) (the ''November 2011 Coverage Proposal''). DOE reiterated this view in its October 2013 Coverage Proposal. 78 FR at 65224–28 (Oct. 31, 2013).

This NOPR also addresses consumer products that combine a refrigerator (fresh food) compartment, a freezer compartment, or both fresh food and freezer compartments with a refrigerated but higher-temperature compartment for storing wine, other beverages, or other non-perishable items. DOE issued guidance on the treatment of such products in February 2011 (''Guidance

[2] The framework document is available at *http://www.regulations.gov/#!documentDetail;D=EERE-2011-BT-STD-0043-0003.*

on Scope of Coverage for Hybrid Refrigeration Products Issued Feb. 10, 2011,'' No. 5, (''February 2011 Guidance'')).[3] However, the October 2013 Coverage Proposal and this notice propose an alternative treatment of such products. Some of them would meet one of the revised definitions proposed in this notice for ''refrigerator,'' ''refrigerator-freezer,'' or ''freezer,'' and would therefore fall into the class of products identified as covered by EPCA at 42 U.S.C. 6292(a)(1). Depending on the specific characteristics of the model, others would meet the proposed definition of a ''hybrid refrigeration product.'' These products are evaluated in today's notice as miscellaneous refrigeration products under the provisions of 42 U.S.C. 6292(a)(20) and (b). *See* 78 FR 65223 (Oct. 31, 2013). DOE has determined that the former group would continue to be tested using the current test procedures in Appendices A and B. The latter group would be tested using test procedures proposed in this notice. Additionally, this notice proposes to clarify the distinctions between the different product types and how to test them.

II. Summary of the Notice of Proposed Rulemaking

DOE is proposing to establish definitions and test procedures for several consumer refrigeration products whose energy efficiency DOE does not currently regulate. These products include wine chillers and similar products with compartment temperatures too warm to be suitable for food storage (collectively called ''cooled cabinets''); refrigeration products that are cooled with refrigeration system technologies such as thermoelectric and absorption-based systems that do not rely on compressor and condenser units; hybrid (combination) refrigerators, refrigerator-freezers, and freezers (*i.e.*, those that include a refrigerated but higher-temperature compartment for storing wine, other beverages, or other non-perishable items; DOE proposes the term ''cellar compartment'' to describe these warmer compartments); and ice makers. DOE is also proposing to make clarifying amendments to the definitions of refrigerator, refrigerator-freezers, and freezer. For all definitions that include a compartment temperature specification, DOE proposes to clarify that the compartments must be capable of maintaining the required temperatures during operation at an ambient temperature of 72 °F.

Today's notice proposes test procedures for cooled cabinets that would address testing set-up, temperature control adjustment, volume calculation, and energy use measurement and calculation. These test procedures would be nearly identical to the current test procedures used by the State of California to measure wine chiller efficiency. The California procedures are based on the DOE test procedure for refrigerators, but apply a different compartment standardized temperature and usage adjustment factor (0.85 instead of the 1.0 factor used in the DOE refrigerator test procedure). See California Code of Regulations, Title 20, Sections 1601 through 1608 (September 2012).[4] The proposed DOE test procedure for cooled cabinets would use a different adjustment factor than the California test (0.55 v. 0.85), which DOE believes better reflects household usage. In addition, this notice proposes that cooled cabinets using refrigeration technology other than vapor-compression would be tested in 72 °F ambient temperature conditions, rather than the 90 °F ambient temperature currently required in both Appendix A and Appendix B, and would use a different usage factor to account for this difference in test ambient temperature. This proposal is based on DOE's tentative conclusion that testing these products in an elevated ambient temperature would not appropriately simulate added loads, such as the load associated with door openings, because many of these products cannot maintain standardized compartment temperatures in the 90 °F ambient temperature test conditions.

This notice also proposes new test procedures for refrigerators that do not use vapor-compression refrigeration technology. These proposed test procedures would require the same 90 °F ambient temperature condition that is used for testing conventional refrigerators. DOE proposes this approach because refrigerators, which are intended to store fresh food, would be expected to maintain their compartment temperatures when subjected to the same door-opening and other loads that are simulated with closed-door testing in 90 °F temperature conditions. Failing to maintain compartment temperatures when subjected to such loads would constitute a food safety risk, which DOE does not consider to be appropriate for refrigerators. This approach differs from that proposed for cooled cabinets, which would be tested with a 72 °F ambient temperature as described in the previous paragraph.

Today's notice proposes test procedures for ''hybrid refrigeration products.'' DOE proposes that this term would include products that have freezer and/or fresh food compartments, but for which at least 50 percent of the refrigerated volume is comprised of cellar compartments that are not suitable for food storage. The proposal would establish procedures for setting temperature controls, calculating volume and adjusted volume, and measuring and calculating energy use for these products. Today's notice also proposes clarifying amendments to the test procedures for refrigerators, refrigerator-freezers, and freezers to address products that include cellar compartments such as wine storage compartments that occupy less than 50 percent of their total storage volume. Such products would not be included under the proposed definition for hybrid refrigeration products; these products would be classified as refrigerators, refrigerator-freezers, and freezers, and would be required to meet the applicable energy conservation standards for these product types. The proposal also includes clarifying amendments to the definitions for refrigerator, refrigerator-freezer, and freezer to better distinguish them from the new product types.

This notice also proposes new test procedures for ice makers. The proposed amendments include definitions for these products and test procedures indicating how to measure their ice production capacity (*i.e.*, harvest rate) and their annual energy use. The proposed annual energy use calculation would be based on a daily average ice production rate of 4 pounds per day. The annual energy use calculation would account for the energy use during active ice production as well as idle operation. The energy use during idle operation, called ice storage energy use, would account for energy use during times when the ice maker is maintaining a full bin of ice but not replacing ice used by a consumer. Including the ice storage energy use would address the statutory requirement to integrate measures of standby mode and off mode energy consumption into the overall energy consumption descriptor. (42 U.S.C. 6295(gg)(2)(A))

DOE's proposal for ice maker test procedures considers different ice maker design configurations. Specifically, the proposal provides a

[3] This and other DOE guidance documents are available for viewing at *http://www1.eere.energy.gov/guidance/default.aspx?pid=2&spid=1*.

[4] Available at *http://www.energy.ca.gov/2012publications/CEC-400-2012-019/CEC-400-2012-019-CMF.pdf*.

different approach for measuring the energy use associated with ice storage for products that maintain ice storage temperature below freezing temperature than for products without cooled ice storage. Further, it provides different test procedures for batch-type and continuous-type ice makers.

All of the amended and new test procedures for these products would be added to the Code of Federal Regulations (CFR) at 10 CFR 430.23, and also at 10 CFR part 430, subpart B, appendices A (amendments for uniform test method for non-hybrid refrigerators and refrigerator-freezers with cellar compartments,[5] as well as all products newly covered by this proposal except ice makers), B (amendments to uniform test method for non-hybrid freezers with cellar compartments); and BB (new appendix with uniform test method for ice makers).

As explained above, this notice covers two groups of refrigeration products. The first group contains products included in 42 U.S.C. 6292(a)(1)—refrigerators, refrigerators-freezers, and freezers. Amended test procedures for refrigerators and refrigerator-freezers would be addressed in 10 CFR 430.23(a), and amended test procedures for freezers would be addressed in 10 CFR 430.23(b). DOE is proposing to make clarifying amendments to the definitions of refrigerator, refrigerator-freezer, and freezer found at 10 CFR 430.2. DOE is also proposing amendments to the test methods for these products found at Appendices A and B to subpart B of 10 CFR part 430 to clarify how non-hybrid refrigerators, refrigerator-freezers, and freezers with cellar compartments should be tested.

The second group falls under 42 U.S.C. 6292(a)(20) and (b)—cooled cabinets, non-compressor refrigerators, hybrid refrigeration products, and ice makers. Test procedures for all of these products except ice makers would be addressed in a new section 10 CFR 430.23(cc). Test procedures for ice makers would be addressed in a new section 10 CFR 430.23(dd). Definitions associated with these products would also be added to 10 CFR 430.2. Despite the fact that these products are treated separately, there are many similarities among certain of them that warrant applying similar test methods to those DOE currently applies to refrigerators and refrigerator-freezers. Therefore, DOE is proposing to amend 10 CFR part 430, subpart B, appendix A to address cooled cabinets, non-compressor refrigerators, and hybrid refrigeration products in addition to refrigerators and refrigerator-freezers. Test methods for freezers would continue to be found at 10 CFR part 430, subpart B, appendix B. Ice makers do not share these similarities. Therefore, DOE is proposing separate test methods for ice makers at 10 CFR part 430, subpart B, appendix BB.

When amending a test procedure, DOE typically determines the extent to which its proposal would alter the measured energy efficiency of any covered product as determined under the existing test procedure. (42 U.S.C. 6293(e)(1)) DOE notes that most of the products addressed in this notice (*e.g.*, cooled cabinets, products not using vapor-compression refrigeration technology, and ice makers) are not currently covered by energy conservation standards or test procedures. Hence, there would be no change in measured energy efficiency by an amendment to a test procedure. While DOE's February 2011 Guidance previously laid out an approach regarding certain hybrid refrigeration products, this proposal, assuming a coverage determination is finalized, would alter that approach but not result in a change in measured energy use for purposes of 42 U.S.C. 6293(e).

III. Discussion

The discussion below details the various products addressed in today's proposal and the specific changes to the current regulations that would be made to accommodate the testing of these products. These products include all of those consumer refrigeration products that, for a variety of reasons, do not lend themselves to being readily tested under the current test procedures laid out in DOE's regulations. The proposal seeks to remedy this situation by providing manufacturers with the framework to test these refrigeration products. Table III–1 below lists the affected subsections and indicates where the proposed amendments would appear in each appendix or section.

TABLE III–1—DISCUSSION SUBSECTIONS

Section	Title	Affected Appendices or sections
III.A	Products Covered by the Proposed Rule 1. Refrigerators, Refrigerator-freezers, and Freezers. 2. Cooled Cabinets. 3. Non-Compressor Cooled Cabinets/Refrigerators. 4. Hybrid Refrigerators/Refrigerator-Freezers/Freezers. 5. Ice makers. 6. General Terms for the Groups of Products Addressed in this Notice. 7. Test Procedure Sections and Appendices Addressing the New Products.	10 CFR 430.2 and 10 CFR 430.23.
III.B	Elimination of Definition Numbering in the Appendices	Appendices A and B.
III.C	Removal of Provisions for Externally Vented Products	Appendix A.
III.D	Sampling Plans and Certification Reporting	10 CFR 429.61, 10 CFR 429.72, 10 CFR 429.134.
III.E	Compartment and Product Classification	10 CFR 429.14, 10 CFR 429.61, 10 CFR 430.2, Appendices A and B.
III.F	Cellar Compartments 1. Cellar Compartment Definition. 2. Cellar Compartment Standardized Temperature. 3. Cellar Compartment Temperature Measurement. 4. Cellar Compartments as Special Compartments. 5. Temperature Settings and Energy Use Calculations. 6. Volume Calculations. 7. Convertible Compartments.	Appendices A and B.
III.G	Test Procedures for Cooled Cabinets 1. Ambient Temperature and Usage Factor.	Appendix A.

[5] The notice proposes the term ''cellar compartment'' to refer to compartments with a temperature range warmer than that of fresh food compartments, for example, compartments that may be suitable for storage of wine.

TABLE III–1—DISCUSSION SUBSECTIONS—Continued

Section	Title	Affected Appendices or sections
	2. Light Bulb Energy.	
III.H	Non-Compressor Refrigeration Products	Appendix A.
	1. Ambient Temperature for Non-Compressor Refrigerators.	
	2. Refrigeration System Cycles.	
III.I	Extrapolation for Refrigeration Products other than Non-Compressor Products	Appendices A and B.
III.J	Hybrid Refrigeration Product Test Procedure Amendments	Appendix A.
	1. Ambient Temperature and Usage Factor.	
	2. Standardized Temperature, Temperature Control Settings, and Energy Use Calculations for Hybrid Refrigeration Products.	
III.K	Ice maker Test Procedure Amendments	10 CFR 430.2 and Appendix BB.
	1. Establishment of New Section 10 CFR 430.23(dd) and New Appendix BB for Ice makers.	
	2. Definitions for Ice makers.	
	3. Energy Use Metric for Ice makers	10 CFR 430.23(dd) and Appendix BB.
	4. Daily Ice Consumption Rate	Appendix BB.
	5. Test Conditions and Set-up.	
	6. Icemaking Test.	
	7. Ice Storage Test.	
	8. Ice Hardness for Continuous-Type Ice Makers.	
	9. Energy Use Calculations.	
III.L	Incidental Changes to Test Procedure Language to Improve Clarity	Appendices A and B.
III.M	Incidental Changes to Volume Calculation Instructions	Appendices A and B.
III.N	Removal of Appendices A1 and B1 from the CFR	Appendices A1 and B1.
III.O	Compliance With Other EPCA Requirements	No test procedure amendments are proposed in these sections.
	1. Test Burden.	
	2. Changes in Measured Energy Use.	
	3. Standby and Off Mode Energy Use.	

A. Products Covered by the Proposed Rule

Today's notice proposes new test procedures for several consumer refrigeration products DOE does not currently regulate. They include (a) cooled cabinets (*e.g.,* wine chillers) that do not meet the definition for ''refrigerator'' because their compartment temperatures are warmer than the 39 °F threshold established for refrigerators (*see* 10 CFR 430.2), (b) refrigeration products regardless of compartment temperature that do not use vapor-compression refrigeration technology (*i.e.,* no compressor and condenser unit used as an integral part of the cabinet assembly), (c) hybrid products, for which cellar compartments (*e.g.,* wine storage compartments) comprise at least half of the total refrigerated volume within a product that would otherwise meet the definitions for ''refrigerator,'' ''refrigerator-freezer,'' or ''freezer,'' and (d) ice makers. Collectively, these products (*i.e.,* products not currently covered by EPCA as a refrigerator, refrigerator-freezer, or freezer) are referred to by DOE as miscellaneous refrigeration products, and DOE has proposed a definition to distinguish them from the other consumer refrigeration products that DOE's regulations currently cover. The following sections discuss the products affected by this proposed rule and the manner in which DOE proposes to address them for the purposes of regulatory coverage, including (1) distinguishing between those items covered as consumer products from those covered as industrial equipment under EPCA and (2) the status of products currently covered as refrigerators, refrigerator-freezers, and freezers.

1. Refrigerators, Refrigerator-Freezers, and Freezers

Today's notice proposes amendments to the definitions for refrigerators, refrigerator-freezers, and freezers. These amendments would not change the meaning of the definitions, but in light of the proposed addition of numerous related refrigeration product types, these proposed changes would provide a consistent definition structure and improve clarity. These proposed amendments are described below.

DOE is proposing to clarify the compartment temperature ranges used for these products. The current definitions for ''electric refrigerator'' and ''electric refrigerator-freezer'' in 10 CFR 430.2 include cabinets that are ''designed to be capable of achieving storage temperatures above 32 °F (0 °C) and below 39 °F (3.9 °C).'' DOE last modified these definitions in the December 2010 final rule. 75 FR at 78815–17 (Dec. 16, 2010). Prior to the 2010 rule, the definition for electric refrigerator included cabinets that are ''designed for the refrigerated storage of food at temperatures above 32 °F and below 39 °F.'' (66 FR 57845, at 57848 (Nov. 19, 2001). In 2010, DOE proposed to add the new language to the definition of electric refrigerator-freezer in order to clarify that that combination wine storage-freezer units without fresh food compartments are not refrigerator-freezers. 75 FR 29824, at 29829 (May 27, 2010) Responding to stakeholder concerns that most refrigerator-freezers can maintain fresh food temperatures above 39 °F (and the fact that most refrigerators can do the same), DOE modified both definitions to clarify that the ability to maintain temperatures above 39 °F does not preclude a product from being classified as a refrigerator or refrigerator-freezer. DOE also noted that this change was intended to clarify that a poorly constructed product that happens to be incapable of actually achieving 39 °F is not excluded from coverage. 75 FR at 78817.

DOE has observed that the current definition has created ambiguity. Specifically, as DOE noted in its 2010 rule, the phrase ''designed to be capable of achieving'' leaves room for products to be classified as refrigerators even though they cannot actually maintain temperatures that are safe for storing fresh food—provided they are ''designed to be capable'' of doing so. DOE's concern in 2010 was to ensure that these products are not excluded from being ''covered products.''

To address these difficulties, DOE proposes to replace the phrase, ''designed to be capable of achieving [the specified temperature],'' with ''capable of maintaining compartment temperatures at [the specified temperature].'' With this modification, product classification could be definitively determined through testing and would rely on the product's actual capability to serve its intended purpose rather than relying on the design intent of the manufacturer. DOE believes that a clear delineation based upon actual product performance would ensure accurate product classification by manufacturers and enable more effective enforcement of the energy conservation standards. In addition to refrigerators, refrigerator-freezers, and freezers, DOE would apply this approach to the definitions for all refrigeration products whose performance is based on maintaining internal compartment temperatures.

As discussed in Section III.A.3, DOE understands that certain products marketed as refrigerators cannot maintain temperatures below 39 °F at ambient temperatures of 90 °F. The current definitions do not specify the ambient temperature at which a product must be capable of maintaining the specified temperature ranges within the cabinet. To clarify this issue, DOE proposes that the product must be capable of maintaining compartment temperatures as specified during operation at a typical room ambient condition of 72 °F. These proposed changes would appear in the product definitions in 10 CFR 430.2 and would reference product classification sections in the certification requirements in 10 CFR 429.14 and 429.61. DOE proposes this approach for all refrigeration products whose performance is based on maintaining internal compartment temperatures. DOE requests comments on these additional proposed modifications.

DOE's current definitions in 10 CFR 430.2 for refrigerator, refrigerator-freezer, and freezer require that the product be ''designed for the refrigerated storage of food.'' The use of the word ''designed'' and the fact that ''food'' is not defined has led to questions from manufacturers similar to those encountered with the temperature range language. As mentioned above, DOE believes a clear delineation based on product performance would ensure accurate product classification and enable more effective enforcement of the energy conservation standards.

Furthermore, DOE sees no reason to exclude products that are not marketed or configured for food storage, provided that they are capable of maintaining the specified temperatures. Therefore, DOE proposes removing references to storage of food.

Section III.A.4 discusses DOE's proposal to define hybrid products as those for which warm compartments not capable of maintaining compartment temperatures below 39 °F comprise at least half of the refrigerated volume. Section III.F discusses DOE's proposal to call such warm compartments ''cellar compartments''. Although the definitions for refrigerators, refrigerator-freezers, and freezers found in 10 CFR 430.2 do not preclude the possibility that such warm compartments could be included as part of these products, they do not clarify whether such compartments could be included. DOE is proposing edits to these definitions to ensure a clear distinction between these products and the hybrid refrigeration products to be addressed in this proposed rule. Specifically, DOE proposes to clarify the definitions for refrigerator, refrigerator-freezer, and freezer by specifying that the product may include cellar compartments—so long as they comprise less than half of the product's refrigerated volume. DOE notes that specific test procedures associated with the cellar compartments in these products are discussed in sections III.F.3 and III.F.4.

DOE also proposes to amend the definitions in 10 CFR 430.2 for refrigerator, refrigerator-freezer, and freezer to provide a clear mechanism for determining whether a given basic model is a consumer refrigeration product or commercial refrigeration equipment. The current definitions do not make this distinction explicit, which has also created ambiguity. DOE's proposal is intended to reduce or eliminate situations in which DOE, manufacturers, and consumers must rely primarily upon inference or assumptions in order to make such determinations.

DOE's proposed definitions categorically exclude three types of products that would otherwise meet the definitions of refrigerator, refrigerator-freezer, and freezer. These three criteria, which are characteristics of commercial refrigeration equipment, are derived from a combination of sources, including statutory provisions, DOE analysis of the market for refrigeration products, and comments received from manufacturers. Specifically, DOE proposes to exclude from the definition any products: (1) With one or more permanently open compartments; (2) that do not include a compressor and condenser unit as an integral part of the cabinet assembly; or (3) that are certified under ANSI/NSF 7–2009 International Standard for Food Equipment—Commercial Refrigerators and Freezers, or ANSI/UL 471–2006 UL Standard for Commercial Refrigerators and Freezers.

Under this proposal, the criteria proposed in today's notice would be the primary means for determining which refrigeration products are covered consumer products. All refrigeration products that are excluded from coverage as consumer products by the three criteria in the definitions, but which meet the definition of a commercial refrigerator, refrigerator-freezer, or freezer under EPCA, would be considered covered as commercial refrigeration equipment and could be subject to the energy conservation standards in section 431.66 of 10 CFR part 431.

DOE proposes to revise the order of the requirements in the definitions of refrigerator, refrigerator-freezer, and freezer to create a parallel structure. Amending the definitions to follow the same structure would enhance readability and simplify product classification.

DOE is also proposing to remove the word ''electric'' from the definitions of ''electric refrigerator'' and ''electric refrigerator-freezer.'' The current definition for ''refrigerator'' in 10 CFR 430.2 indicates only that the product is an ''electric refrigerator.'' The actual characteristics of the product are detailed in the definition for ''electric refrigerator.'' Similarly, the definition for ''refrigerator-freezer'' in 10 CFR 430.2 references the definition for ''electric refrigerator-freezer.'' An early version of 10 CFR 430.2 defined ''refrigerator'' as ''an electric refrigerator or a gas refrigerator.'' See 42 FR 46140, 46143 (Sept. 14, 1977). This reference to ''gas refrigerator'' has since been deleted; therefore, DOE tentatively concludes there is little reason to retain definitions for both ''refrigerator'' and ''electric refrigerator.'' Hence, DOE proposes to eliminate the definitions for ''electric refrigerator'' and ''electric refrigerator-freezer,'' and to move the detailed descriptions to the definitions for ''refrigerator'' and ''refrigerator-freezer.'' DOE also notes that Appendix B uses the term ''electric freezer'', which is not currently defined, in sections 2.3 and 6.2.2. DOE proposes to change this term to ''freezer'' in these sections of the appendix. These changes would enhance clarity by eliminating duplicate terms. DOE requests comment on this proposal.

The definition for ''all-refrigerator'' currently appears in Appendices A and A1. Whether a product satisfies this definition can determine its product class as well as how to test it. For this reason, DOE proposes to move the definition for all-refrigerator from Appendix A to 10 CFR 430.2. Because Appendix A1 has not been valid for testing since September 15, 2014, and because DOE is proposing to remove Appendix A1 from the CFR as discussed in section III.N, DOE is not proposing to make an accompanying change in that appendix.

DOE notes that the current definition in 10 CFR 430.2 for electric refrigerator-freezer indicates that at least one compartment has attributes consistent with a fresh food compartment and that at least one compartment has attributes consistent with a freezer compartment. DOE proposes to clarify that the same compartment could not satisfy both of these requirements in a refrigerator-freezer—*i.e.,* at least one of the compartments is capable of maintaining compartment temperatures between 32 °F and 39 °F and at least one of the *remaining* compartments is capable of maintaining compartment temperatures below 8 °F.

Finally, DOE is proposing to add language to the freezer definition in 10 CFR 430.2 to clarify the distinction between freezers and ice makers, discussed below in Section III.A.5. Specifically, DOE is proposing to exclude from the freezer definition ''any refrigerated cabinet that consists solely of an automatic icemaker and an ice storage bin arranged so that operation of the automatic icemaker fills the bin to its capacity.'' Tests conducted by DOE indicate that some ice makers have refrigerated space that the product can cool to temperatures of 0 °F or below. (Cooled-Storage Ice Maker Test Summary, No. 3) Because many freezers contain automatic icemakers, DOE considered the potential difficulty of distinguishing ice makers from freezers. Typically, the ice storage bin of an ice maker becomes filled with ice during operation. In most cases, this would preclude use of the product to store items other than ice. However, one could consider a product very similar to an ice maker that has, in addition to the automatic icemaker and the ice storage bin, a compartment maintained at temperatures of 0 °F or below. Such a product would have space for storage of items other than ice and be considered a freezer. Consequently, the key distinctions between ice makers and freezers would include (a) many ice makers do not maintain internal temperatures at or below 0 °F, and (b) ice makers do not have space for storage of items other than ice.

DOE requests comment on all of these proposed changes to the definitions for refrigerator, refrigerator-freezer, and freezer.

2. Cooled Cabinets

DOE proposes adopting in 10 CFR 430.2 the term ''cooled cabinet'' to denote consumer refrigeration products such as wine chillers that do not meet the definition for ''refrigerator'' because their compartment temperatures are warmer than the 39 °F threshold established for refrigerators.

EPCA does not specify the temperature conditions that a product must meet to be considered a refrigerator. (42 U.S.C. 6292(a)(1)) DOE initially defined refrigerators using the term ''electric refrigerator'' to include products ''designed for the refrigerated storage of food at temperatures above 32 °F.'' 42 FR 46140, 46143 (Sept. 14, 1977). However, DOE modified this definition to exclude wine chillers by adding an upper limit of 39 °F to the temperature range cited in the refrigerator definition. 66 FR 57845, 57848 (Nov. 19, 2001) (explaining DOE's reasoning for altering the final definition it adopted for the term ''electric refrigerator'').

DOE further amended the definition for ''refrigerator'' as part of a final rule published on December 16, 2010. See 75 FR 78810, 78817. This revision clarified that a product is not necessarily disqualified from coverage as a refrigerator if its compartments can maintain average temperatures above 39 °F for some temperature control settings. *Id.* This modification to the refrigerator definition did not affect the coverage of products that are not designed to store fresh food at temperatures under 39 °F. DOE explained that it would consider initiating a future rulemaking to establish coverage and energy standards for wine chillers and related products. *Id.*

On February 13, 2012, DOE announced the availability of a framework document that discussed the process it would follow when considering potential energy conservation standards for wine chillers and other related products. 77 FR 7547. In that document, the agency noted that it was considering how to refer to products such as wine chillers that would not, through the use of ''wine'' in the name, suggest a limitation to products designed for wine storage. (Docket No. EERE–2011–BT–STD–0043, Energy Conservation Standards for Wine Chillers and Miscellaneous Refrigeration Products, No. 3 at p. 13) DOE received no comment on this issue and is proposing to use the term ''cooled cabinet'' to denote all products such as wine chillers that do not meet the definition for refrigerator because they are not capable of maintaining compartment temperatures below 39 °F (3.9 °C). DOE is proposing to state this explicitly in the definition so that the conditions under which the category of coverage is established will be clearly understood.

DOE is aware that the Australian/New Zealand Standard 4474.1–2007 [6] (AS/NZS 4474.1–2007) defines a ''cooled appliance'' as a refrigerating appliance that cannot be classified as a refrigerator, refrigerator/freezer, or freezer. AS/NZS 4474.1–2007 further defines a ''refrigerating appliance'' as a self-contained, factory-produced, insulated cabinet of a design and volume which is suitable for general household use, cooled by energy consuming means and intended for the preservation of foodstuffs, frozen or unfrozen. DOE believes that the term ''cooled cabinet'' is more precise than ''cooled appliance,'' since the word ''cabinet'' clarifies that the product is, or includes, a cabinet for storage purposes. Accordingly, DOE is proposing to define such a product as a cabinet having a source of refrigeration requiring electric energy input only and capable of maintaining compartment temperatures not below 39 °F (3.9 °C).

DOE is also aware that some products marketed for the storage of wine or beverages in a temperature range suitable for storage of such products, *i.e.,* in a range from 50 °F to 60 °F, may have the capability to maintain compartment temperatures close to 39 °F and in some cases cross over this threshold by one or two degrees. Rather than require such products to be regulated as refrigerators, and/or their compartments be tested as fresh food compartments, DOE is proposing to allow a small temperature crossover in the definition for cooled cabinet, provided that the product's temperature range extends through the range considered appropriate for wine. Specifically, DOE proposes that the definition specify that a cooled cabinet is capable of maintaining compartment temperatures either (a) no lower than 39 °F (3.9 °C) or (b) in a range that

[6] ''Australian/New Zealand Standard, Performance of Household Electrical Appliances—Refrigerating Appliances, Part 1: Energy Consumption and Performance,'' AS/NZS 4474.1:2007, available for purchase at *http://infostore.saiglobal.com/store/results2.aspx?searchType=simple&publisher=all&keyword=AS/NZS%204474.*

extends no lower than 37 °F (2.8 °C) but at least as high as 60 °F (15.6 °C). As discussed for the other products covered by this notice in the sections below, DOE is proposing also to use this description of temperature range to denote warm compartments, discussed as ''cellar compartments'' in section III.F.1, in its proposals for other products. Also, as discussed in section III.A.1, DOE clarifies that the term ''capable of maintaining'' when used in the product definitions in reference to the compartment temperatures used to delineate coverage (*e.g.,* 39 °F) applies to operation in a typical room ambient condition of 72 °F as specified in 10 CFR 429.14 and 429.61. DOE notes that products that are capable of maintaining compartment temperatures below 39 °F, but not less than 37 °F, and are not capable of maintaining compartment temperatures above 60 °F would be considered refrigerators or refrigerator-freezers, as appropriate.

DOE notes that the proposed definition would cover any product that is capable of maintaining a cooler internal storage temperature than the temperature outside the cabinet. Hence, it would apply to products that provide compartment temperatures warmer than the range that is typical for wine chillers.[7] DOE also notes that the proposed cooled cabinet definition would not be limited to products with alternating current power input. This aspect of the definition addresses the possibility that these products may be cooled using thermoelectric refrigeration systems, which can be powered by direct current as well as alternating current electric power. (Docket No. EERE–2011–BT–STD–0043, Energy Conservation Standards for Wine Chillers and Miscellaneous Refrigeration Products, True Manufacturing, No. 3 at pp. 21, 22)

DOE requests comment on the use of the term ''cooled cabinet'' to denote products such as wine chillers that maintain compartment temperatures that are warmer than 39 °F or between 37 °F and at least 60 °F, and on the proposed definition for these products.

[7] Wine chillers operate with compartment temperatures above 40 °F and generally near 55 °F (see 75 FR 59469, 59486 (September 27, 2010))

3. Non-Compressor Cooled Cabinets/Refrigerators

For refrigerators, refrigerator-freezers, and freezers, EPCA specifies that coverage applies to those products that include a compressor and condenser unit as an integral part of the cabinet assembly. (42 U.S.C. 6292(a)(1)(B)) These are products that use vapor-compression refrigeration technology. However, DOE is aware of consumer refrigeration products that cool their interiors using other refrigeration technologies, notably those products that use thermoelectric and absorption refrigeration. These refrigeration technologies are described in the framework document noted above. (Docket No. EERE–2011–BT–STD–0043, Energy Conservation Standards for Wine Chillers and Miscellaneous Refrigeration Products, No. 3 at p. 5) While DOE is aware of products sold as wine chillers and refrigerators that use thermoelectric and/or absorption technology, it is unaware of any such products sold as refrigerator-freezers or freezers.

DOE proposes to use the term ''non-compressor'' to describe refrigeration products that do not use vapor-compression refrigeration technology and to define non-compressor variants of refrigerators and cooled cabinets. DOE is proposing to define a non-compressor cooled cabinet as ''a cooled cabinet that has a source of refrigeration that does not include a compressor and condenser unit.'' A non-compressor refrigerator would be defined as ''a cabinet that has a source of refrigeration that does not include a compressor and condenser unit, requires electric energy input only, and is capable of maintaining compartment temperatures above 32 °F (0 °C) and below 39 °F (3.9 °C).'' The definition would also indicate that such a product could have a compartment capable of maintaining compartment temperatures below 32 °F (0 °C). The proposed definition would also specify that these products may have one or more cellar compartments, as described in section III.F. DOE's proposed definitions would account for hybrid and non-hybrid versions of these products (*i.e.,* having cellar compartments comprising at least half or less than half of their refrigerated volume, respectively). The definition for non-compressor refrigerator would clarify that these cellar compartments would comprise less than half of the product's refrigerated volume, and the definition for hybrid non-compressor refrigerators would denote the case in which these cellar compartments would comprise at least half of the product's refrigerated volume.

DOE notes that the proposed amendments to the term ''refrigerator'' used without a modifier explicitly exclude those products that do not use vapor-compression technology. (A ''refrigerator'' would be the type of product already covered by the statute.) Thus, a ''non-compressor cooled cabinet'' would be treated as a type of ''cooled cabinet,'' but a ''non-compressor refrigerator'' would not be a type of ''refrigerator.''

DOE considered whether the non-compressor refrigerator definition should state explicitly that the ability to maintain a 39 °F or lower compartment temperature applies when a product operates in a 90 °F ambient temperature condition. The current definition for refrigerator does not explicitly specify the ambient temperature associated with the 39 °F requirement. As discussed in section III.A.1, DOE interprets the temperature range capability for the purposes of determining product status to apply to typical room temperature ambient temperature conditions, *i.e.,* 72 °F. DOE has observed that many products marketed as refrigerators that do not use vapor-compression refrigeration technology cannot maintain the 39 °F standardized temperature that is used for fresh food compartments when tested using the required 90 °F ambient temperature condition. As described in section III.G.1, refrigerators are tested with closed doors in a 90 °F ambient temperature condition to simulate the added thermal loads associated with door openings and the insertion of warm food items. DOE test results for five non-compressor refrigeration products in 90 °F test conditions are summarized in Table III–2. Each of these products was marketed as a ''refrigerator'', but none could attain a 39 °F compartment temperature at the 90 °F test conditions—none were even within 9 °F of the target.

TABLE III–2—TEST RESULTS FOR THERMOELECTRIC AND ABSORPTION PRODUCTS MARKETED AS REFRIGERATORS

Product	Refrigeration technology	Lowest compartment temperature achieved in 90 °F ambient temperature
Model 1	Thermoelectric	57.5 °F
Model 2	Thermoelectric	48.2 °F
Model 3	Thermoelectric	48.6 °F
Model 4	Thermoelectric	58.2 °F
Model 5	Thermoelectric	61.1 °F
Model 6	Absorption	52.6 °F

In DOE's view, the ability of a product to maintain temperatures that are safe for food storage, *i.e.,* 39 °F or lower, is a key attribute of refrigerators. While most vapor-compression refrigerators generally have no trouble meeting this target, even in 90 °F ambient temperature conditions, DOE's investigation shows that most products, if not all, that are marketed as refrigerators and do not use vapor-compression technology fail to reach this target in 90 °F ambient temperature conditions. In spite of the inability of these products to reach safe food temperatures under these conditions, it may be inappropriate to classify them as cooled cabinets rather than refrigerators, because they are marketed as refrigerators, and DOE expects that they are used as such by consumers. Hence, the definition for non-compressor refrigerator does not indicate that the ability to maintain temperatures below 39 °F applies to operation in a 90 °F ambient temperature condition. This approach has consequences for testing, which is generally conducted in a 90 °F ambient temperature condition. Specifically, the compartment temperature for a non-compressor refrigerator is generally warmer than 39 °F when operating with the temperature control set in the coldest position. DOE's proposals for addressing this issue are discussed in Section III.H.1.

DOE notes that it is not at this time defining ''non-compressor refrigerator-freezers'' and ''non-compressor freezers'' because it is not aware of the existence of such products. However, this does not imply that such products would not be covered under any final coverage determination established for miscellaneous refrigeration products, as proposed by the October 2013 Coverage Proposal.

DOE requests comment on the use of the terms ''non-compressor cooled cabinet'' and ''non-compressor refrigerator'' to denote products that use refrigeration systems that do not use vapor-compression refrigeration technology. DOE also requests comment on the definitions proposed for these products, and on DOE's initial market research indicating that non-compressor refrigerator-freezers and non-compressor freezers are not available for sale.

4. Hybrid Refrigerators/Refrigerator-Freezers/Freezers

In 2007, Liebherr sought a waiver from the refrigerator test procedure for its combination freezer-wine chillers. It argued that it would be inappropriate to test these products with the wine storage compartment set at the 45 °F standardized temperature used at that time (prior to September 15, 2014) for the fresh food compartments of refrigerator-freezers. Liebherr petitioned to use a standardized temperature of 55 °F for the wine storage compartment to represent energy use because, in its view, the higher temperature would more accurately reflect the energy consumption at the intended temperatures of the wine storage compartments. DOE granted Liebherr's waiver request and permitted the manufacturer to use this alternative test procedure with the condition that the wine storage volume must constitute at least 50 percent of the total volume of the tested product. 72 FR 20333 (April 24, 2007).

On December 16, 2010, DOE issued a final rule that modified the definitions of ''electric refrigerator'' and ''electric refrigerator-freezer.'' The final rule's preamble discussion explained that combination products such as combination wine storage-refrigerators would be treated as covered products (*see* 75 FR 78810, 78817). DOE reinforced this statement with the February 2011 Guidance, which clarified that a wine storage compartment added to a product that would otherwise be a refrigerator or a refrigerator-freezer does not change the product's coverage status as a refrigerator or refrigerator-freezer. The February 2011 Guidance also indicated, however, that products combining freezer compartments and wine storage compartments are not covered. DOE indicated in its December 2010 final rule that it would address wine storage-refrigeration combination products in a separate rulemaking. 75 FR at 78817.

In its October 2013 coverage proposal, DOE proposed that some products that combine fresh food compartments with warmer compartments such as wine storage compartments (or that combine fresh food and freezer compartments with warmer compartments) would be considered to be hybrid products that are not subject to regulation as refrigerators and/or refrigerator-freezers. 78 FR at 65224 (Oct. 31, 2013). However, DOE did not, in that notice, define the term ''hybrid'' or elaborate on those characteristics that would distinguish hybrid products from refrigerators and refrigerator-freezers. In today's notice, DOE proposes that hybrid refrigeration products would be required to have wine storage or similar types of warm compartments that comprise half or more, but not all, of the refrigerated volume of the product. As described in section III.F.1, DOE proposes to use the term ''cellar compartments'' for such warm compartments.

DOE's proposal for the 50-percent minimum threshold is based on the expectation that a hybrid product must be designed, built, and marketed with an emphasis on the storage of beverages or other non-perishable items rather than food storage. DOE adopted this same threshold when granting Liebherr a waiver for a product incorporating freezer and wine storage compartments. 72 FR at 20334 (April 24, 2007). DOE is basing its proposal that the cellar compartment volume of a hybrid product be less than 100 percent of the refrigerated volume on the observation that a product comprised entirely of one or more cellar compartments would be a cooled cabinet rather than a hybrid product.

DOE proposes to define a hybrid refrigerator as a product that has ''at least half but not all of its refrigerated volume comprised of one or more cellar compartments.'' Otherwise the proposed definition is similar to the definition for a non-hybrid ''refrigerator.'' DOE is proposing similar definitions for hybrid refrigerator-freezers and freezers. All of these definitions would appear in CFR 430.2. DOE's proposals also specify that these products have refrigeration systems that include a compressor and condenser unit and require electric energy input only.

DOE recognizes that refrigerators, refrigerator-freezers, and freezers may also have cellar compartments whose combined refrigerated volume is less than half the total refrigerated volume of the product. Section III.A.1 discusses DOE's proposal to address such compartments in the definitions for these products.

For hybrid non-compressor refrigerators, DOE proposes to define these items as referring to ''a non-compressor refrigerator with at least half of its refrigerated volume composed of one or more cellar compartments.''

DOE also proposes to include a general term for hybrid refrigeration products, which would specify that they include hybrid refrigerators, hybrid refrigerator-freezers, hybrid freezers, and hybrid non-compressor refrigerators.

DOE notes that the proposed definitions for hybrid products are based on the concept of compartments; *i.e.,* they would be products in which half or more of the volume comprises one or more cellar compartments. While compartments are generally considered to be enclosed spaces within a cabinet, the DOE test procedures do not define ''compartment.'' Section III.E.1 discusses the need for this term and DOE's proposal for a definition.

DOE requests comment on the definitions for hybrid products, including on the proposed requirement that hybrid status would require that at least 50 percent of the product's refrigerated volume comprise one or more cellar compartments.

5. Ice Makers

DOE proposes to define in 10 CFR 430.2 the term ''ice maker'' as ''a consumer product other than a refrigerator, refrigerator-freezer, freezer, hybrid refrigeration product, non-compressor refrigerator, or cooled cabinet that is designed to automatically produce and harvest ice, but excluding any basic model that is certified under NSF/ANSI 12–2012 *Automatic Ice Making Equipment.* Such a product may also include a means for storing ice, dispensing ice, or storing and dispensing ice.''

DOE's proposed definition indicates that the functions of an ice maker may include ice storage and/or ice dispensing. This part of the definition is consistent with the characteristics of ice makers designed and sold for consumer markets, as demonstrated by product information for a representative sample of ice makers (Product Information for Representative Ice Makers, No. 9). DOE is not aware of any ice makers that do not incorporate an ice storage bin for ice storage. The proposed definition would cover such products, although the proposed test procedures would not necessarily address them. DOE would consider developing additional test procedures to address such products if and when they are commercialized.

The proposed definition would distinguish ice makers from automatic commercial ice makers (ACIM)—ice makers would be consumer products as defined in 42 U.S.C. 6291(1). The definition would exclude from coverage any ice makers with basic models certified to NSF/ANSI Standard 12–2012, which is used to certify commercial ice makers. Therefore, any ice maker that is not certified to NSF/ANSI 12–2012 would be classified as an ice maker rather than an ACIM even if its harvest rate falls within the range for which there are energy conservation standards for ACIMs (*i.e.,* over 50 pounds of ice produced per day). (42 U.S.C. 6313(d)(1)) Likewise, any ice maker that is certified to NSF/ANSI 12–2012 would not be classified as an ice maker even if it produces 50 or less pounds of ice per day. Such a product may meet the definition for ACIM, even though there are currently no standards for ACIMs that produce less than 50 pounds of ice per day.

This proposed definition would also distinguish ice makers from other types of consumer refrigeration products. As discussed above, DOE considered the difficulty of distinguishing ice makers from other refrigeration products that have automatic ice makers. In order to prevent the ice maker definition from also covering models that would otherwise meet the definition for a freezer or other refrigeration product, DOE is proposing to exclude from the ice maker definition any product that meets the definition for one of the other refrigeration products covered by this notice.

DOE requests comment on its proposed definition for ice makers.

6. General Terms for the Groups of Products Addressed in This Notice

DOE proposes to define ''miscellaneous refrigeration product'' as a consumer refrigeration product other than a refrigerator, refrigerator-freezer, or freezer, which includes hybrid refrigeration products, cooled cabinets, non-compressor refrigerators, and ice makers. DOE also proposes to define ''consumer refrigeration product'' as a refrigerator, refrigerator-freezer, freezer, or miscellaneous refrigeration product. DOE requests comment on these proposed definitions.

7. Test Procedure Sections and Appendices Addressing the New Products

Appendices A and B, along with 10 CFR 430.23(a)–(b), contain the test procedures for refrigerators, refrigerator-freezers, and freezers. To limit the impact of the amendments that may be required to adopt test procedures for all of the additional products mentioned in this notice, DOE proposes to modify only Appendix A to address the new products whose primary function is to provide refrigerated storage within their cabinets: cooled cabinets, non-compressor refrigerators, and hybrid refrigeration products. This would mean that the test procedure requirements for hybrid freezers would be inserted into Appendix A rather than Appendix B. DOE proposes to adopt this approach to limit the duplication of amendments that would be required in both appendices if hybrid freezer test procedures were inserted into Appendix B. While the notice proposes some amendments to Appendix B, these amendments would apply to freezers that have cellar compartments that do not comprise a sufficiently large fraction of the product's refrigerated volume to meet the proposed hybrid refrigeration product definition—that is, a product that would continue to be classified as a freezer. DOE also proposes to adopt a new section 10 CFR 430.23(cc) for cooled cabinets, non-compressor refrigeration products, and hybrid refrigeration products.

Regarding ice makers, DOE is proposing to add a new section 10 CFR 430.23(dd) and a new Appendix BB for ice makers, because the proposed test procedure for these products has many differences compared to the test procedures for the other consumer refrigeration products.

B. Elimination of Definition Numbering in the Appendices

Appendices A, B, A1, and B1 each have an introductory section (''Section 1'') that defines terms that are important for describing the test procedures for these products. These sections are currently numbered such that each definition has a unique sub-section number. DOE believes that this approach is unnecessary because the definitions are all listed in alphabetical order. To improve the readability of these sections and to limit confusion from renumbering when definitions are added or removed, DOE proposes to eliminate the sub-section numbering to simplify the structure of these sections of the appendices.

C. Removal of Provisions for Externally-Vented Products

Externally-vented refrigerators and refrigerator-freezers can reduce energy use by using outside air to help cool the condenser and compressor when the outside air is cooler than the inside air. The condenser and compressor of such a product would be surrounded by a box connected to air ducts that would penetrate the exterior wall of a house, allowing cooler air to be drawn by the condenser fan into the box to cool down these internal components. By using cooler outdoor air to cool these components, an externally-vented product can, in theory, achieve a higher level of efficiency by increasing the efficiency of the product's refrigeration system and reducing the thermal impacts associated with the condenser and compressor heat. DOE established test procedures for these products in Appendix A1 on September 9, 1997. 62 FR 47536. These provisions were retained for the more recent Appendix A. See 75 FR 78853, 78858–59.

Since the inception of this procedure, more than 15 years have elapsed and DOE, after having researched whether any refrigeration product employs this technology, is unaware of any externally-vented refrigeration products that are either currently available or that manufacturers plan to offer. Because these provisions do not appear to apply to any known products—or those that are likely to be produced—DOE proposes to remove the externally-vented products provisions from Appendix A to help simplify and improve its clarity. These changes would entail the removal of a number of provisions, including certain definitions, required testing conditions, testing measurement sections, and calculation methods. DOE also proposes to remove all references to externally vented products from the regulatory text in section 430.23(a) of subpart B. Specifically, DOE proposes to make the following modifications to section 430.23(a): (1) Remove all references to externally vented products from sections 430.23(a)(1) through 430.23(a)(5), (2) remove sections 430.23(a)(7) through 430.23(a)(9), and (3) re-number section 430.23(a)(10) as section 430.23(a)(7). DOE requests comment on this proposal.

D. Sampling Plans, Certification Reporting, and Measurement/Verification of Volume

DOE's sampling plans for both consumer and commercial refrigeration products all use identical statistical evaluation criteria for the samples. (*See,* for example, 10 CFR 429.14, 429.42, and 429.45.) DOE proposes to apply the same sampling plan criteria to all of the miscellaneous refrigeration products addressed in this test procedure notice. DOE proposes to establish a new section 10 CFR 429.61, which would be titled ''Miscellaneous refrigeration products,'' to address sampling plans and certification reporting for these products.

The information DOE typically requires to be included in a certification report generally falls into three broad categories, (1) general information applicable to any product, (2) public product-specific information, and (3) non-public information. DOE proposes to treat certain information that would be required to be submitted for cooled cabinets, hybrid refrigeration products, and non-compressor refrigerators as public—the annual energy use in kilowatt-hours per year, the total refrigerated volume of the product, and the total adjusted volume. The total adjusted volume for the product can be used to determine the allowed annual energy use under the standard. DOE would also require that certification reports for these products indicate whether they have variable defrost control or variable anti-sweat heater control, and whether the locations of temperature sensors were modified from their standard locations during testing, as is currently required for refrigerators, refrigerator-freezers, and freezers. While this information may not apply to most cooled cabinets, hybrid refrigeration products, and non-compressor refrigerators, DOE proposes to require its inclusion in the certification reports for any such product for which the information does apply. DOE would also require manufacturers to report other non-public details regarding variable defrost and variable anti-sweat heater control in a manner similar to what is currently required for refrigerators, refrigerator-freezers, and freezers.

Regarding ice makers, DOE is proposing to require that manufacturers provide the following information which would be treated as public for each certified product: the annual energy use in kilowatt-hours per year and the harvest rate in pounds per day. In case the model is a continuous-type ice maker (see further description of ice maker types in section III.K.2), manufacturers would also need to report whether the standard default value of ice hardness was used in the calculation of energy use, and, if it was not, the measured value of ice hardness.

DOE has not yet added ''miscellaneous refrigeration product'' to the list of covered products. Accordingly, DOE has not yet established product classes or product class definitions for this product type. Further, DOE has not yet proposed energy conservation standards for miscellaneous refrigeration products. DOE may modify these proposed requirements once these elements are finalized in order to harmonize the reporting elements with these other requirements. For example, if DOE were to propose and finalize an energy conservation standard for an ice maker that did not depend on that product's harvest capacity to verify whether its certified energy rating meets that standard, DOE might not require the reporting of this value.

On April 21, 2014, DOE amended its regulations to allow use of computer-aided design (CAD) models when determining volume for refrigerators, refrigerator-freezers, and freezers, adding a new section 429.72(c) within 10 CFR part 429 for this purpose. 79 FR 22319, 22336. DOE proposes to add a section 429.72(d) to establish the same approach for use of CAD for miscellaneous refrigeration products. DOE also amended its regulations to establish procedures for evaluating certified volume data and for determining whether to use certified or measured volume in calculating allowable energy use, adding a new section 429.134 for this purpose. *Id.* DOE proposes to add a section 429.134(c) to establish the same approach for miscellaneous refrigeration products.

DOE requests comment on its proposed sampling plans and certification report requirements for the products covered by this proposed test procedure. DOE also requests comments on its proposal to establish requirements for allowing use of CAD for volume measurements and for regulations associated with verifying certified volumes for miscellaneous refrigeration products.

E. Compartment and Product Classification

Section III.F.1 discusses a proposal to define ''cellar compartment'' as a compartment with a warmer temperature range than fresh food compartments. Although the term ''compartment'' has been used extensively in the DOE test procedures, it has not been defined. DOE considered whether further clarification of the term is required. DOE notes that Sanyo commented on this topic in response to the framework document for the energy conservation standard rulemaking for wine chillers and miscellaneous products. Specifically, Sanyo commented that the term ''compartment'' requires greater clarity, as hybrid products create multiple temperature zones in a variety of ways. (Energy Conservation Standards for Wine Chillers and Miscellaneous Refrigeration Products, Docket No. EERE–2011–BT–STD–0043, Sanyo, No. 12 at p. 2) Sanyo did not, however, offer any suggestions on how to define that term.

DOE is aware of only one specific definition for ''compartment'' in finalized test procedures. The term is found in the Australian/New Zealand test procedures (AS/NZS 4474.1–2007). Those procedures define a compartment as ''an enclosed space within a refrigerating appliance, which is directly accessible through one or more external doors. A compartment may contain one or more sub-compartments and one or more convenience features.'' This use of the term ''compartment'' suggests that there may be multiple compartments in a refrigeration product of a given type. This approach is consistent with its use in parts of the DOE test procedures, such as the definition for ''electric refrigerator-freezer''—defined as a cabinet which consists of two or more compartments (*see* 10 CFR 430.2). AS/NZS 4474.1–2007 further defines a ''sub-compartment'' as ''a permanent enclosed space within a compartment or sub-compartment which is designated as being a different type of food storage space (*i.e.,* has a different compartment temperature range) from the compartment or sub-compartment within which it is located,'' and ''convenience features'', as enclosures or containers with temperature conditions which may or may not be different from the compartment within which they are located. The test standard indicates that ''compartment'' may be taken to mean ''compartment'' or ''sub-compartment'', as appropriate for the context. The ''sub-compartment'' and ''convenience feature'' definitions are similar to the concept of a ''special compartment'' as defined in the DOE test procedures—these are compartments other than butter conditioners, without doors directly accessible from the exterior, and with separate temperature control. (*See* Appendix A, section 1).

However, DOE notes that the AS/NZS 4474.1–2007 approach is not fully consistent with all of the uses of the term ''compartment'' in the DOE test procedures. In some cases, the term denotes all of the space within a refrigeration product that operates within a designated temperature range. For example, Appendix A, section 5.1.3 describes ''*the* fresh food compartment temperature'' and section 5.1.4 describes ''*the* freezer compartment temperature.'' Similarly, Appendix A, section 5.3 refers to *the* fresh food compartment volume and *the* freezer compartment volume for refrigerators and refrigerator-freezers.

After carefully evaluating the uses of the term ''compartment'', DOE was not convinced that any of them fully addresses the issue that Sanyo raised when suggesting that a definition for ''compartment'' should be established. Sanyo's comments responded to DOE's requests for comment on its framework document discussing potential energy conservation standards for wine chillers and miscellaneous refrigeration products. (Energy Conservation Standards for Wine Chillers and Miscellaneous Refrigeration Products, Docket No. EERE–2011–BT–STD–0043, Sanyo, No. 12 at p. 2) Among the issues raised by DOE were questions related to how DOE should regulate hybrid products, how to determine whether a product is a hybrid product, and how to establish test procedures and energy conservation standards for them. (Energy Conservation Standards Rulemaking Framework Document for Wine Chillers and Miscellaneous Refrigeration Products, Docket No. EERE–2011–BT–STD–0043, No. 3 at p. 68) Because Sanyo's comment was primarily concerned with clarifying the concept of ''compartment'' for the purpose of classifying basic models and conducting tests, DOE has focused on these issues in this notice, while questions regarding the establishment of energy conservation standards would be addressed in the ongoing energy conservation standard rulemaking for wine chillers and miscellaneous refrigeration products.

In light of the different uses of the term ''compartment'' that already exist in the test procedures, DOE concluded that developing a single definition for the term would not add greater clarity or uniformity to the test procedures, since it would require establishing a new term to denote some of the existing uses of the term. Instead, DOE is proposing to add a dual definition that mirrors its understanding of the term's two key meanings in the test procedures. DOE also proposes to add instructional language to its test procedures that will clarify how the concept of compartments should be used in classifying products and in conducting tests.

In order to determine which definition applies to a given basic model (*e.g.,* cooled cabinet, refrigerator, or hybrid refrigerator), DOE proposes that the person testing the unit must first determine the volume and temperature range of each compartment within the unit. The proposed language provides instructions for how to determine which spaces within a cabinet must be evaluated as compartments and how to configure those spaces to determine their volume. Once the volume and temperature range of each compartment has been identified, the product would be classified according to the existing definitions for refrigerator, refrigerator-freezer, and freezer, and the new definitions proposed in this notice for cooled cabinets, hybrid refrigeration products and non-compressor products. For example, if at least half, but not all, of the refrigerated volume of a particular refrigerated cabinet is comprised of a compartment or multiple compartments that are capable of maintaining compartment temperatures above 39 °F, but not below 39 °F, or in a range that extends no lower than 37 °F but at least as high as 60 °F, that cabinet would be classified as a hybrid refrigeration product. The compartment types within the remainder of the volume of the cabinet and its refrigeration system technology would dictate whether it is a hybrid refrigerator, hybrid refrigerator-freezer, hybrid freezer, or hybrid non-compressor refrigerator.

DOE proposes that manufacturers and testing facilities use the following principles when selecting spaces within a given basic model to evaluate as compartments: (1) Each compartment to be evaluated would be an enclosed space without subdividing barriers that divide the space—a subdividing barrier would be defined as a solid barrier (including those that contain thermal insulation) that is sealed around all of its edges to prevent air movement from one side to the other, or has edge gaps insufficient to permit thermal convection transfer from one side to the other that would cause the temperatures on both sides of the barrier to equilibrate; (2) each evaluated compartment would not be a zone of a larger compartment unless the zone is separated from the larger compartment by subdividing barriers; and (3) if a subdividing barrier can be placed in multiple locations, it would be placed in the median position, or, if it can be placed in an even number of locations, it would be placed in the near-median position that results in less cellar compartment volume.

The first instruction would prevent multiple compartments from being evaluated in aggregate when classifying a basic model. This step would prevent, for example, considering a freezer compartment and fresh food compartment of a refrigerator-freezer to be all one single compartment. The second instruction would require that there be a substantial physical barrier between zones that are treated as separate compartments, which would prevent, for example, a single compartment with warm temperatures at the top and cool temperatures at the bottom from being considered two separate compartments. Although some products could maintain different temperature zones in such a fashion, DOE is concerned that allowing such zones to be considered separate compartments would significantly complicate classifying models because the separation between the zones would not be very well defined, and it could change depending on operating conditions and temperature control settings. The third instruction seeks to ensure consistency in how to prepare a subdivided compartment for testing set-up in case the consumer can adjust the position of a compartment-subdividing barrier.

DOE proposes that these instructions be followed when classifying a given basic model based on the volume of its compartment(s)—they would be inserted as a new paragraph within section 5.3 of Appendix A and Appendix B. DOE proposes to establish a definition for ''compartment'' allowing two meanings—one consistent with the proposed instructions for classifying products, and the second to denote all of the space within a product that is associated with a given temperature range. This definition would appear in Section 1 of both Appendices A and B. Finally, DOE proposes to include the set-up requirement for moveable subdividing barriers in section 2.7 of Appendix A and in section 2.5 of Appendix B. DOE requests comment on these proposals and their placement in the regulations.

DOE proposes to include in 10 CFR 429.14 and 429.61 descriptions of how manufacturers would determine the appropriate compartment classifications. DOE proposes that the product category would be based on measured compartment volumes and temperatures. The proposed provisions in 10 CFR 429.14 and 429.61 would require manufacturers to determine compartment volumes according to the provisions in the applicable test procedure, including the proposed clarifications to section 5.3 of Appendix A and Appendix B discussed in the paragraph above, and to base the product classification on these measured volumes. Compartment temperatures would be determined according to the applicable test procedure for the certified product, but at an ambient temperature of 72.0 °F±1.0 °F (22.2±0.6 °C). These measurements would determine the temperature a compartment is capable of maintaining. The measured compartment volumes and temperatures would determine the appropriate product category for certification based on the proposed product definitions in 10 CFR 430.2. These proposed provisions would help to clarify the distinction between different refrigeration products—*e.g.,* whether a given product is a miscellaneous refrigeration product or a refrigerator-freezer.

F. Cellar Compartments

While the term ''cellar compartment'' has a connotation associated with the storage of wine, DOE is tentatively proposing an approach that would determine the appropriate test method for a compartment based on that compartment's physical and performance characteristics. DOE is taking this approach in order to apply an objective set of criteria that would enable a manufacturer or testing facility to readily determine whether a given compartment should be treated as a cellar compartment for testing purposes. This additional level of clarity should provide manufacturers and testing facilities sufficient instruction to ensure that all parties test compartments in a consistent manner. DOE is also interested in whether other, more usage-neutral terms might be better suited in designating this type of compartment other than the term ''cellar.''

1. Cellar Compartment Definition

With coverage and definitions proposed for cooled cabinets, DOE also proposes to define the volume within a cabinet that is not designed to maintain compartment temperatures below 39 °F. DOE previously referred to these volumes as wine storage compartments. (*See, e.g.,* 77 FR 3559, 3569 (Jan. 25, 2012).) However, using ''wine storage compartment'' could potentially conflict with DOE's goal of using terms that do not suggest a specific cooling application. AS/NZS 4474.1–2007 includes a definition for ''cellar compartment'' to describe a compartment designed to reach temperatures warmer than those of fresh food compartments. DOE proposes adopting this term and defining it as ''a refrigerated compartment within a consumer refrigeration product that is capable of maintaining compartment temperatures either (a) no lower than 39 °F (3.9 °C), or (b) in a range that extends no lower than 37 °F (2.8 °C) but at least as high as 60 °F (15.6 °C).''

However, DOE is not proposing to use the same definition as AS/NZS 4474.1–2007, which applies a complicated set of requirements for classifying cellar compartments.[8] DOE believes that its proposed definition sufficiently distinguishes cellar compartments from fresh food and freezer compartments without the need for the more complex requirements set out in the AS/NZ protocol.

As with the use of the term ''compartment'' for freezer compartments and fresh food compartments, DOE proposes that the term ''cellar compartment'' would be used in different ways, as described in section III.E. For example, one would be able to consider a single cellar compartment within a wine chiller that has multiple cellar compartments. However, one would also be able to consider ''*the* cellar compartment temperature'' or ''*the* cellar compartment refrigerated volume,'' concepts that would refer to the entire cellar compartment space within the product in the same way that this concept is applied in sections 5.1.3 and 5.3 of Appendix A for fresh food compartments.

DOE invites comment on its definition for cellar compartment.

2. Cellar Compartment Standardized Temperature

In order to ensure that energy test results are both repeatable and representative of consumer use, the DOE test procedures require the use of compartment temperatures that target standardized temperatures representative of those that are typical of consumer usage. For example, the standardized freezer compartment temperature for the DOE test of a freezer is 0 °F (*see* Appendix B, section 3.2). For cellar compartments, DOE proposes to specify a standardized temperature of 55 °F. This temperature has already

[8] For example, the average temperature in such a compartment must, for at least one setting of the controls, be within the range 8 °C to 14 °C (46 °F to 57 °F) when tested in a 32 °C (90 °F) ambient temperature condition—however, for some product types, if the product has no fresh food compartment, a temperature within this range must also be attainable when tested in 10 °C and 43 °C ambient temperature conditions. *See* AS/NZS 4474.1–2007, sections 3.6 and 3.6.3 and Table 3.2.

been adopted as a standardized test temperature for wine storage compartments in the test procedures for wine chillers adopted by California (2012 Appliance Efficiency Regulations, CEC–400–2012–019–CMF, Table A–1, p. 70), Canada (Energy Performance and Capacity of Household Refrigerators, Refrigerator-Freezers, Freezers, and Wine Chillers, Canadian Standards Association, Standard C300–08 (''CSA C300–08''), section 5.3.6.2), and the Association of Home Appliance Manufacturers (AHAM) (AHAM HRF–1–2008, section 5.6.2), as well as in DOE test procedure waivers for products combining wine storage and other compartments (*see,* for example, the decision and order notices granting waivers to Liebherr (72 FR 20333 (Apr. 24, 2007)) and Sanyo (77 FR 49443 (Aug. 16, 2012))). It is also very close to the 12 °C (54 °F) temperature already adopted in AS/NZS 4474.1–2007, Table 3.5, for cellar compartments. Because a standardized temperature of 55 °F has already been widely adopted, this requirement is familiar to industry and is based on an engineering approach that has been vetted and reviewed. In addition, DOE market research of products with cellar compartments revealed common temperature ranges of 45 °F to 65 °F, with 55 °F often representing the most common target temperature used. Accordingly, DOE is proposing to modify section 3.2 of Appendix A to require a 55 °F standardized temperature be used for cellar compartments.

DOE requests comment on its selection of 55 °F as the cellar compartment standardized temperature.

3. Cellar Compartment Temperature Measurement

The DOE test procedures provide instructions for measuring compartment temperatures during tests. For example, section 5.1 of Appendix A requires that temperatures be measured at the locations prescribed in Figures 5.1 and 5.2 of AHAM HRF–1–2008. Section 5.1.1 of Appendix A indicates that the compartment temperature at any given time be equal to the average at that time of the temperatures measured by all sensors placed in that compartment. Similarly, section 5.1.2 of Appendix A indicates that the measured compartment temperature for the test is based on a time average of the compartment temperatures recorded during the test period. Finally, section 5.1.3 of Appendix A requires that the fresh food compartment temperature be calculated as the volume average of the temperatures of the fresh food compartments within the product, and section 5.1.4 provides a similar requirement for freezer compartments.

With respect to temperature sensor placement within a compartment, section 5.5.5.4 of AHAM HRF–1–2008, which is referenced in the DOE test procedure, requires that the temperature measurement of wine storage compartments in wine chillers follow the same sensor placement requirements as fresh food compartments. DOE proposes to adopt the same approach for the measurement of cellar compartment temperatures in cooled cabinets and in hybrid refrigeration products. To implement this step, DOE is proposing to add a reference to cellar compartments in section 5.1 of Appendix A, indicating that temperature sensor placement within these compartments would be performed as indicated in Figure 5.1 of AHAM HRF–1–2008. DOE also proposes to require volume-weighted averaging of cellar compartment temperatures in cases where there are multiple cellar compartments, similar to the current requirements for volume-weighted averaging of fresh food and freezer compartments in sections 5.1.3 and 5.1.4 of Appendix A.

For cellar compartments contained in products such as refrigerators or refrigerator-freezers that are not hybrid refrigeration products, DOE is not proposing to require a cellar compartment temperature measurement. The temperature of the fresh food and/or freezer compartments of such products would be the basis of energy use calculations, without consideration of the temperatures maintained in the cellar compartments. This proposal is consistent with the current testing requirements for special compartments, and for ice freezing compartments of all-refrigerators, which are also compartments representing a small portion of the refrigerated space that do not dominate their products' energy use. The cellar compartments of these products would represent less than half of the refrigerated volume, and the energy use of the product would be dominated by the colder fresh food and/or freezer compartments, making measurement of the cellar compartments' temperatures unnecessary. Also, as proposed in section III.F.4, any temperature controls of these compartments would be set in their coldest position for the test, as required for special compartments by the current test procedure (see section 2.7 of Appendix A).

The requirements for measurement of temperatures in cellar compartments would be placed in a new section 5.1.5.

DOE requests comments on these proposals for the measurement of cellar compartment temperatures.

4. Cellar Compartments as Special Compartments

Section III.F.3 discusses DOE's proposal to not require that cellar compartment temperatures be measured for products that are not cooled cabinets or hybrid refrigeration products. In DOE's view, the fresh food and/or freezer compartments would dominate product energy consumption when compared to cellar compartments both because of the cellar compartments' much warmer standardized temperature and the relative volume size differences between the cellar compartment (which is small) and the remaining colder compartments (*i.e.,* fresh food and freezer compartments). However, cellar compartments that have their own separate temperature control may have a significant influence on product energy use. Hence, in these cases, DOE proposes to treat these types of compartments as special compartments, which would require a manufacturer to apply the existing test procedure requirements for special compartments. These procedures require that special compartments be tested at their coldest temperature setting except for those special compartments for which any portion of the temperature range is achieved through the addition of heat to the compartment. In those cases involving the addition of heat, the measurement would be the average of two sets of tests, with the temperature settings for the special compartments in the coldest setting for one set of tests and in the warmest setting for the other. (*See* Appendix A, section 2.7 or Appendix B, section 2.5.) DOE requests comment on this proposal to require that cellar compartments with their own temperature control within products that are not cooled cabinets or hybrid refrigeration products be treated as special compartments.

5. Temperature Settings and Energy Use Calculations

The refrigerator and refrigerator-freezer test procedure (Appendix A) uses the compartment temperatures measured in fresh food and freezer compartments to determine the temperature settings for additional tests and to calculate the energy use associated with the product at the standardized compartment temperatures. DOE proposes using a similar approach for cellar compartments.

DOE's proposed approach to incorporate cellar compartments into the temperature control setting and test selection requirements, which are used to calculate energy use, would apply to hybrid refrigeration products and cooled cabinets. The amendments DOE is considering adding to section 3 of Appendix A would consist of the following steps:

(1) The temperature controls for cellar compartments would be placed in the median position for a first test.

(2) The temperature control setting for the second test would depend on all of the measured compartment temperatures, including that of the cellar compartment. The setting would be warm for all compartments, including the cellar compartment, if the compartment temperatures measured for the first test are all below their standardized temperatures; otherwise, the temperature controls would all be set to their coldest settings.

(3) If all of the measured compartment temperatures are lower than their standardized temperatures for both tests, the energy use calculation would be based only on the second test.

(4) If the measured compartment temperature of any compartment is warmer than its standardized temperatures for a test with the controls in the cold setting, the energy use calculation would be based on cold- and warm-setting tests, subject to specific restrictions based on compartment temperatures, measured energy use, except that for non-compressor refrigeration products, the energy use calculation would be based only on the cold-setting test.

(5) If neither (3) nor (4) occur, the energy use calculation would be based on both tests.

(6) The test procedure would also allow an energy use rating to be based simply on the results of a single first test, if that test is conducted with the compartment temperature controls in their warmest setting, provided that the measured compartment temperatures are all cooler than their standardized temperatures.

For cellar compartments that are not part of cooled cabinets or hybrid refrigeration products, these requirements would not apply; as discussed in section III.F.3, the temperatures of such compartments would not be measured.

DOE proposes that the energy use calculations for cooled cabinets and hybrid refrigeration products be based on the measured cellar compartment temperatures (as well as the fresh food and/or freezer compartment temperatures for hybrid refrigeration products), using the measured cellar compartment temperature to calculate a weighted average energy use, as is done in the existing test procedures for refrigerators and refrigerator-freezers (see Appendix A, section 6.2). For hybrid refrigeration products, the highest of the energy use calculations would be used as the product's energy use rating. In some cases, this would be the highest of three calculations, one each based on the measured freezer, fresh food, and cellar compartment temperatures.

DOE requests comment on these proposals for incorporating cellar compartment temperature measurements into the test procedure requirements for temperature control settings and the test selections to be used to calculate energy use for cooled cabinets and hybrid refrigeration products.

6. Volume Calculations

Existing test procedures for wine chillers prescribe capacity ratings that are based on volume (see for example, AHAM HRF–1–2008, section 4). The test procedures generally explain how to calculate the volume of a wine chiller. These instructions are the same as those used when calculating the volume of a refrigerator. *See, e.g.,* AHAM HRF–1–2008, section 4.1, and CSA C300–2008, section 4.1. In addition, the existing test procedures provide that the adjusted volume for wine chillers is equal to the total refrigerated volume. Similarly, these procedures indicate that the volume adjustment factor for wine chillers is equal to 1.0. *See, e.g.,* AHAM HRF–1–2008, section 6.3.5 and CSA C300–2008, sections 7.3.1 and 7.3.2. Consistent with this approach, DOE proposes to require that calculating the refrigerated volume of a cellar compartment be conducted the same way as for the refrigerated volume of a fresh food compartment. In calculating the adjusted volume of cooled cabinets, the volume adjustment factor for cellar compartments would be set equal to 1.0.

However, DOE proposes to apply a volume adjustment factor for those cellar compartments in refrigeration products that combine cellar compartments with other types of compartments to account for the warmer temperature and reduced thermal load of the cellar compartments. Similar to the determination of the volume adjustment factor for freezer compartments, DOE proposes to set a volume adjustment factor for cellar compartments based on the difference between the 55 °F standardized compartment temperature and the 90 °F ambient temperature required for testing. The adjustment factor is equal to the ratio between this difference for a compartment type and the temperature difference for a fresh food compartment. Hence, the volume adjustment factor for cellar compartments of hybrid products would be determined as follows.

$$CC = \frac{(90-55)}{(90-39)} = 0.69$$

The adjustment factor would reduce the weighting of a cellar compartment in calculating the adjusted volume to account for its reduced thermal load, similar to the way the adjustment factors for freezer compartments increase the weighting of their volume in the calculation. DOE requests comments on the proposals for calculating cellar compartment volume and for using a volume adjustment factor of 1.0 for these compartments for cooled cabinets and a volume adjustment factor of 0.69 for other refrigeration products.

7. Convertible Compartments

The DOE test procedures have special requirements for compartments that are convertible between fresh food and freezer compartment temperature ranges. With the proposed amendments to account for cellar compartments, some compartments may also be convertible between fresh food and cellar compartment temperature ranges, or they may be convertible over all three temperature ranges (*i.e.,* cellar, fresh food, and freezer compartment temperatures). To address these possibilities, DOE proposes to modify the requirements for convertible compartments. The proposed changes would include establishing target temperature ranges in Appendix A, section 3.2.3 for convertible compartments that are appropriate for compartments that can achieve cellar compartment temperature ranges. The existing requirement that the convertible compartment be tested in its highest energy use position would not change, nor would the requirement that separate auxiliary convertible compartments be tested with the convertible compartment set as the compartment type (freezer, fresh food, or cellar) that represents the highest energy use position. DOE requests comments on these proposed test procedure changes to address compartments that are convertible between the cellar compartment temperature range and fresh food and/ or freezer temperature range.

G. Test Procedures for Cooled Cabinets

1. Ambient Temperature and Usage Factor

The DOE test procedures require testing of refrigerators and refrigerator-freezers in an environmentally controlled room at 90 °F temperature conditions, with the cabinet doors kept closed to simulate operation in more typical room temperature conditions (72 °F (22.2 °C)) with door openings (see 10 CFR 430.23(a)(10)). The test procedures for freezers also require testing with closed doors in a 90 °F room, but the test procedures apply adjustment factors to the measurements of energy use during the test to adjust for average household usage (*see* Appendix B, section 5.2.1.1). The adjustment factors account for the overestimation of the impacts from door-openings and related thermal loads associated with the 90 °F test condition. Appendix B corrects for this overestimation by applying correction factors equal to 0.7 for chest freezers and 0.85 for upright freezers (see Appendix B, section 5.2.1.1). These correction factors acknowledge that the added load associated with door openings and other field use thermal loads are significantly less for freezers than for refrigerators and refrigerator-freezers, because the doors of products such as upright freezers and chest freezers are expected to be opened less frequently than the doors of a typical household refrigerator or refrigerator-freezer.

California initially established test procedures unique for wine chillers in its 2002 Appliance Efficiency Regulations. (Appliance Efficiency Regulations, California Energy Commission, P400–02–021F, Nov. 2002) These test procedures used a 55 °F standardized compartment temperature and a 0.85 adjustment factor. In material presented in the October 19, 2000 California workshop discussing the potential establishment of energy standards for wine chillers, Sub-Zero suggested using the 0.85 adjustment factor. Sub-Zero indicated that because the door opening frequency for wine chillers is much more similar to that of freezers than refrigerators, the 0.85 adjustment for upright freezers would be appropriate for wine chillers. (Comments Presented at the California Energy Commission October 19, 2000, Workshop, No. 1 at p. 10) California adopted this usage factor for wine chillers, and it was also adopted in wine chiller test procedures contained in AHAM HRF–1–2008 and CSA C300–08.

DOE considered adopting a test procedure for cooled cabinets using a 90 °F ambient temperature condition and a 0.85 usage factor. To investigate whether these would be appropriate parameters for the test procedure, DOE evaluated a limited amount of field energy use data for wine chillers and tested a number of wine chillers, including products using vapor-compression refrigeration systems and thermoelectric refrigeration systems.[9]

DOE conducted field testing for two vapor-compression wine chillers. The test results for these products are summarized in Table III–3 below. DOE calculated the average annual field energy use by adjusting the energy use measured for the test period, which was several months in duration, multiplying by hours in a year and dividing by the number of hours in the test period. DOE used these field data to calculate the adjustment factor to apply to the laboratory test measurement to correctly predict the observed field test energy use. The field data suggest that the 0.85 adjustment factor is too high for wine chiller-type products, such as the cooled cabinets DOE is considering regulating.

TABLE III–3—WINE CHILLER FIELD TEST DATA

Unit No.	Rated energy use (kWh/year)*	Laboratory energy consumption (kWh/year, without 0.85 adjustment factor)**	Average field energy use (kWh/year)	Field/Laboratory energy consumption ratio
1	368	433	181	0.42
2	320	376	144	0.38

* Ratings obtained from the California Energy Commission's Appliance Efficiency Database, available at *http://www.appliances.energy.ca.gov/AdvancedSearch.aspx*.

** The laboratory energy consumption measurement without the 0.85 factor is calculated by dividing the rated energy use by 0.85.

DOE tested eight vapor-compression wine chillers, using a standardized temperature of 55 °F, with the products' light switches turned off. Each unit was tested at two ambient temperatures: 90 °F, the temperature that DOE is currently proposing, and 72 °F, a temperature selected to represent typical field usage conditions. This temperature had been selected as an appropriate one to represent room temperature in the waiver test procedure initially proposed by GE for refrigerator-freezers with variable anti-sweat heater controls. (73 FR 10425, 10427 (Feb. 27, 2008)). DOE's laboratory test data is presented in Table III–4. This data is presented without any adjustment for usage or other correctional factors.

TABLE III–4—VAPOR-COMPRESSION WINE CHILLER LABORATORY TEST DATA

DOE sample number	Total refrigerated volume (ft^3)	72 °F ambient energy use (kWh/year)	90 °F ambient energy use (kWh/year)	Ratio of 72 °F & 90 °F energy tests
1	1.7	120	238	0.50
2	5.9	165	375	0.43
3	5.7	225	564	0.40

[9] Vapor-compression refrigeration systems use a compressor and condenser unit integrated into the product's cabinet assembly. This type of system is used for the vast majority of refrigerators, refrigerator-freezers, and freezers.

TABLE III–4—VAPOR-COMPRESSION WINE CHILLER LABORATORY TEST DATA—Continued

DOE sample number	Total refrigerated volume (ft^3)	72 °F ambient energy use (kWh/year)	90 °F ambient energy use (kWh/year)	Ratio of 72 °F & 90 °F energy tests
4	5.4	106	268	0.40
5	5.9	134	315	0.42
6	5.9	85	189	0.45
7	15.4	238	423	0.56
8	17.3	224	430	0.53
Average				0.46

Note: Energy use is as measured, without multiplying by usage adjustment factors.

The table also presents the ratios between the energy use measured in 72 °F temperature conditions and the energy use measured in 90 °F conditions. These energy use ratios can be considered to represent the correction factors that would be appropriate to apply to measurements made in 90 °F temperature, in order to estimate energy use at 72 °F with no door openings. These ratios were determined to vary from 0.40 to 0.56, with a 0.46 average. If door openings for wine chillers are limited, and represent a modest load, a usage factor that accounts for not only the difference in ambient temperature between test and field conditions, but also for these door openings, would therefore likely be slightly higher than 0.46.

The usage factor of 0.85 currently adopted in existing wine chiller test procedures is based on the test procedure for upright freezers, and was initially suggested for use with wine chillers based on a claim that upright freezers and wine chillers had similar usage frequencies—specifically with respect to door openings. However, the elevated ambient temperature most likely does not have as significant of an effect on freezer energy consumption as it does on cooled cabinet energy consumption due to the higher standardized compartment temperature of the latter. Specifically, for a freezer compartment at 0 °F, the difference between the compartment and the ambient temperatures increases by 25 percent between 72 °F and 90 °F; whereas, for a wine chiller, this same elevation in ambient temperature represents a 106-percent increase in the temperature difference between the ambient and a compartment temperature of 55 °F. From this information, DOE tentatively concludes that the current test procedures for wine chillers overcompensate for added loads, and that the appropriate adjustment factor for a test conducted in a 90 °F condition should be significantly lower than 0.85.

Because of the precedent set by the California Energy Commission (CEC) and AHAM procedures for testing vapor-compression wine chillers in a 90 °F ambient condition, DOE proposes to use this same condition for its procedure for testing vapor-compression cooled cabinets. Unlike non-compressor refrigerators, discussed later in this section, vapor-compression wine chillers generally are able to maintain the 55 °F target temperature in a 90 °F ambient temperature test condition, so testing at this ambient temperature would be representative of their energy use. However, DOE proposes to use an adjustment factor of 0.55 for vapor-compression cooled cabinets. This factor is more consistent with the expected actual energy use of these products, based upon the laboratory and field data that DOE has obtained, than the 0.85 factor used in the current CEC, Natural Resources Canada (NRCan), and AHAM tests. Specifically, this 0.55 factor is based on the 0.46 ratio of measured energy use values observed between the closed-door energy test results in typical room conditions (72 °F) and the 90 °F ambient test condition, multiplied by the 1.2 usage factor representing additional loads (0.46 times 1.2 equals 0.55). This approach would be consistent with current testing for vapor-compression wine chillers, but would provide a more appropriate estimate of field energy use.

In the case of thermoelectric-based wine chillers, the available data present a less clear picture. DOE's laboratory test data for thermoelectric wine chillers is presented in Table III–5. DOE tested three thermoelectric products in both 72 °F and 90 °F ambient temperature conditions, using a 55 °F standardized temperature. The energy use results for both 72 °F and 90 °F ambient temperature conditions are presented without any adjustment factor. The results are for tests with the products' light switches turned off. The table presents the ratios between the energy use measured in 72 °F temperature conditions and the energy use measured in 90 °F conditions.

TABLE III–5—THERMOELECTRIC WINE CHILLER LABORATORY TEST DATA

DOE sample number	Total refrigerated volume (ft^3)	72 °F Ambient energy use (kWh/year)	90 °F Ambient energy use (kWh/year)	Ratio of 72 °F & 90 °F energy tests
1	0.6	118	485	0.24
2	1.1	366	647	0.57
3	2.3	553	552	1.00
Average				0.60

Notes: Energy use is as measured, without multiplying by usage adjustment factors.

The energy use of the thermoelectric wine chillers measured in 72 °F conditions increased in a fashion that is roughly consistent with the product volume. However, the same was not true for the tests conducted in 90 °F conditions. Test samples 1 and 3 were not able to maintain a 55 °F compartment temperature in 90 °F ambient tests. For sample 1, the compartment temperature was 57 °F at both the cold and the median temperature control settings, and 66 °F for the warm setting, while for sample 3, the compartment temperature was 71 °F for any selected setting. The energy use of these products did not increase consistently with elevated ambient temperature because the thermoelectric refrigeration systems did not have sufficient refrigeration capacity to maintain a 55 °F compartment temperature. In contrast, Sample 2, which was able to maintain a compartment temperature of 55 °F in the 90 °F ambient condition while operating in the median temperature control setting, used the most energy. This unit has sufficient refrigeration system capacity to maintain the target temperature, which correspondingly caused its energy use to be higher.

The results show that testing these products in a 90 °F ambient temperature condition does not provide a representative indication of their energy use in typical field use conditions. This observation is also consistent with the varying field/laboratory energy use ratios exhibited for these products. Test sample 3 used no more energy in 90 °F testing than it did in 72 °F testing, which suggests that it was already operating at its maximum refrigeration capacity at the 72 °F ambient condition. The energy use of this product would be significantly underestimated by testing it in 90 °F temperature conditions and applying an appropriate adjustment factor. While a different usage adjustment factor could be chosen to provide a proper prediction of the unit's energy use in 72 °F field conditions, some products may have sufficient refrigeration system capacity for operation in 90 °F conditions, and such products would require a lower usage adjustment factors to accurately predict energy use in 72 °F conditions. In other words, based on these data, a single adjustment factor may not necessarily apply to all thermoelectric-based wine chiller units.

To address the problems noted above, DOE proposes that non-compressor cooled cabinets be tested with closed doors in a 72 °F ambient temperature, with an upward adjustment in the measured energy use to account for the added load associated with door openings. DOE does not have data that would provide direct evidence of the energy use impact associated with added field loads typical for wine chillers (or upright freezers, which are claimed to have usage similar to wine chillers) as compared to operation with doors closed in the same ambient conditions. However, DOE considered the 0.7 and 0.85 adjustment factors used for chest and upright freezers, respectively, and noted that the adjustment factor for upright freezers is 1.2 times the adjustment factor for chest freezers. DOE believes that chest freezers experience less frequent door openings than upright freezers, which is likely to yield a negligible impact on their energy use in the field. While DOE does not have data to support this view, DOE believes it is a reasonable assumption, one which leads to the conclusion that the ratio of 1.2 mentioned above would be an appropriate usage factor to represent the energy use impact associated with door-opening and related loads at the usage frequency typical of upright freezers, and, by extension, wine chillers. Hence, multiplying by 1.2 the energy use measured in a closed-door test in normal room temperature conditions, *i.e.,* 72 °F, would provide a projection of typical field energy use for upright freezers or wine chillers. In the absence of additional data demonstrating the impact, DOE proposes to apply a 1.2 adjustment factor for testing thermoelectric and other non-compressor cooled cabinets tested with closed doors in a 72 °F ambient condition.

DOE requests comment on its proposals for ambient temperatures and usage adjustment factors for both vapor-compression and non-compressor cooled cabinets. DOE requests information regarding field energy use of wine chillers and other cooled cabinets which it could use to confirm or adjust the proposed adjustment factors.

2. Light Bulb Energy

Cooled cabinets such as wine chillers often have glass doors that permit consumers to display stored items and manually-operated lighting to illuminate these items for better viewing. The procedures under Appendices A and B provide that electrically-powered features not required for normal operation and that are manually-initiated and manually-terminated, must be set in their lowest energy use position during the energy test. *See, e.g.,* HRF–1–2008, section 5.5.2(e) (incorporated by reference in Appendix A). However, for wine chillers with manual light switches, CSA C300–08 requires two tests, one with the lights turned on and one with the lights turned off, and averaging the results. See CSA C300–08, section 5.3.7.1. In contrast, the CEC and AHAM tests do not provide instructions for light switches for testing wine chillers. Instead, these test procedures include or refer to language similar to that cited above, which indicates that such features should be set in their lowest energy use position for testing.

Field survey data collected by LBNL suggests that testing with the lights off would be more representative of field use than testing with the lights on or using the average of the results of tests conducted with the lights on and off. Specifically, the survey found that roughly 63 percent of respondents indicated that their wine chillers or beverage coolers had internal lights, and of these, 10 percent indicated that the lights are usually on compared with 90 percent who indicated that the lights are usually off. (U.S. Residential Miscellaneous Refrigeration Products: Results from Amazon Mechanical Turk Surveys, LBNL–6194E, No. 10 at pp. 43–44)

Because the survey data point to the limited use of interior lighting in these products, and the added test burden of conducting tests both with the lights switched on and off, DOE proposes to require that cooled cabinets be tested only with the light switches in their lowest energy use position, consistent with the test procedures for other refrigeration products and the wine chiller test procedures of the CEC and AHAM. DOE requests comment on this proposal.

H. Non-Compressor Refrigeration Products

1. Ambient Temperature for Non-Compressor Refrigerators

As discussed in section III.G.1, DOE is proposing to require that non-compressor cooled cabinets be tested in 72 °F ambient temperature conditions because testing in 90 °F conditions would not be representative of field energy use. However, DOE has concerns about adopting a similar approach for non-compressor refrigerators. Refrigerators are designed for storing perishable food items and must maintain their standardized compartment temperatures in 90 °F closed door testing conditions to ensure food safety. The 90 °F ambient test conditions are an accepted method for simulating the thermal loads on household refrigerators that would occur in more typical room temperature conditions with the expected door openings and insertion of warm food. This situation is in contrast to cooled cabinets, which are not expected to have a door opening frequency and usage pattern consistent with refrigerators. Consequently, DOE proposes that non-compressor refrigerators be tested in 90

°F ambient conditions, similar to conventional vapor-compression refrigerators. The usage factor for non-compressor refrigerators would also be consistent with vapor-compression refrigerators, equal to 1.0.

However, DOE notes that in its testing of products marketed as non-compressor refrigerators, none was able to maintain its internal compartment temperature within 9 °F of 39 °F, which is the standardized temperature for fresh food compartments in the DOE test procedure and the temperature cited in the definition for refrigerator in 10 CFR 430.2 as the storage temperature that these products must be able to achieve. However, unlike non-compressor cooled cabinets, non-compressor refrigerators would be expected to have a usage intensity (*i.e.,* added load associated with door openings and other factors) in the field that would push their refrigeration systems to work at full capacity. Similarly, such a product would be operating at full capacity in a test if its temperature controls are set in the coldest position and the compartment temperature is above 39 °F. Hence, DOE expects that testing thermoelectric or absorption-based ''refrigerators'' in a 90 °F ambient temperature condition would be representative of their energy use, and that the energy measured for the cold-setting test would be the appropriate measurement if the compartment temperature rises above the standardized temperature in this setting.

When measured compartment temperatures are warmer than the applicable standardized temperatures, Appendices A and B specify that product energy use cannot be rated. The previous test procedures in Appendices A1 and B1, which DOE proposes to remove from subpart B to 10 CFR part 430 in this notice, used an ''extrapolation'' approach to calculate energy use when compartment temperatures are warmer than their standardized temperatures in the cold setting (see, for example, Appendix A1, section 3.2.3). Extrapolation in this case means that the energy use is calculated for a compartment temperature that is not between the two compartment temperatures measured during the two tests. DOE has concerns about adopting the extrapolation approach for non-compressor refrigerators for two reasons. First, the compartment temperatures for these products, as shown in Table III–2, are much higher than the standardized temperature. Hence, the energy use calculated for the standardized temperature would be much higher than the highest level of energy use actually measured for the product. As discussed above, the product would be running at maximum capacity for the cold-setting test, and would not be expected to operate with higher energy use. Second, DOE testing of non-compressor refrigerators shows that these products often yield compartment temperatures during the cold- and warm-setting tests used in the extrapolation approach that are very close to each other, which can result in energy use calculated at the standardized temperature (see, for example, Appendix A1, section 6.2.1.2) that is unrealistically high or low, and sometimes negative. For these products, DOE believes that a more consistent result that is more representative of field energy use would be obtained by simply using the cold-setting test energy use measurement, rather than both sets of measurements.

Hence, to comply with EPCA requirements that test procedures be consistent with a representative average use cycle (see 42 U.S.C. 6293(b)(3)), DOE proposes that non-compressor refrigerators be tested in a 90 °F ambient temperature, similar to refrigerators and refrigerator-freezers, and that the test result be the energy use measured in the cold setting test if one or more compartment temperatures are warmer than their standardized temperature for this setting.

On the other hand, DOE recognizes that test measurements for non-compressor refrigerators for which the coldest compartment temperatures are far above the standardized temperatures would effectively be rated at a condition that theoretically should require less energy use than for operation at the standardized temperature. DOE may consider implementing an adjustment in the allowable maximum energy use for such products as part of the ongoing energy conservation standard rulemaking in order to compensate for this potential difference in measured energy use. In order to prepare for such a possibility, DOE proposes to require that certification reports for non-compressor refrigerators indicate the coldest fresh food compartment temperature achieved by the product in the cold setting during the test, if this is warmer than 39 °F. The reported value would be the average of the coldest compartment temperatures observed for the tests used as the basis for the certification. DOE proposes that this information would be part of the public product-specific information required to be reported for non-compressor refrigerators.

DOE seeks comment on its proposal to require testing of non-compressor refrigerators in 90 °F ambient temperature conditions, and to require that their energy use be calculated with a usage factor equal to 1.0. Further, DOE requests comment on its proposal to require reporting of the coldest fresh food compartment temperature achieved in the test if such a product cannot maintain an internal temperature of 39 °F or cooler during a test in 90 °F conditions. Finally, DOE requests comment on its potential consideration of adjustments to the energy conservation standards to be developed for non-compressor cooled cabinets that would address the reduced stringency of a test in which the compartment temperature is warmer than the standardized temperature.

2. Refrigeration System Cycles

The DOE test procedures for refrigerators and refrigerator-freezers use test periods based on the operation of the component within the product that consumes the most energy—typically, the compressor. *See, e.g.,* Appendix A, section 4.1. The test procedures specifically require that the test periods comprise a whole number of complete ''compressor cycles.'' Applying a similar approach to non-compressor products, even though they do not have compressors and would instead have alternative refrigeration systems that may cycle to maintain compartment temperatures, would be based on similar reasoning—*i.e.,* to help capture the energy usage of the tested product by focusing on the most energy consumptive component. To ensure that non-compressor products have clear test procedure requirements, DOE proposes to indicate, in 10 CFR 430.23(cc)(8), that, in the context of non-compressor products, the term ''compressor cycle'' means a ''refrigeration cycle'' and that the term ''compressor'' refers to a ''refrigeration system.'' DOE views this as a simpler approach than establishing parallel identical test procedures for non-compressor products or inserting the term ''or refrigeration system cycles for non-compressors products'' in the existing test procedures where compressor cycles are discussed. DOE seeks comment on this proposal.

DOE notes that it recently modified its test procedures for refrigerators, refrigerator-freezers, and freezers to more accurately measure the energy consumption of multiple-compressor products. See 79 FR 22320, 22325–22330 (April 21, 2014). DOE is also aware of non-compressor products that use multiple refrigeration systems. The recently promulgated test procedures for multiple-compressor products would also be suitable for application to products with multiple refrigeration systems. Hence, DOE is proposing to apply these same procedures to non-compressor products if DOE establishes coverage over them. This step would require no further amendments in the test procedures, other than the proposed change discussed above (*i.e.,* modifying 10 CFR 430.23) that the term ''compressor'' would refer more generally to a ''refrigeration system'' when used in the context of testing non-compressor products.

I. Extrapolation for Refrigeration Products Other Than Non-Compressor Refrigerators

Section III.H.1 above discusses proposed test procedure requirements for non-compressor refrigerators, which generally do not maintain temperatures near fresh food compartment standardized temperatures when operating in 90 °F ambient temperature conditions. DOE proposes that their calculated energy use be calculated as the energy used during the test for the cold temperature setting. In contrast with this approach, the test procedures of Appendices A and B indicate that a product that fails to meet its standardized temperature in any compartment during a test cannot be rated, even if it otherwise would meet the definition of a refrigerator, refrigerator-freezer, or freezer in 10 CFR 430.2 based on operation at ambient conditions of typical consumer use. This approach was established by DOE an interim final rule published December 16, 2010. See 75 FR 78810, 78840–78842.

DOE considered whether to propose adopting the extrapolation approach that was previously used in Appendices A1 and B1 as a means for testing and rating such products. This approach involved calculating energy use for the product at the standardized temperature using the measured energy use and compartment temperatures for two tests, one conducted using the cold temperature control settings and the other using the warm temperature control settings. For this calculation, the compartment temperatures measured for both tests are warmer than the standardized temperature. The equations used for the calculations are found in section 6.2.1.2 of Appendix A for all-refrigerators and section 6.2.2.2 for refrigerators with freezer compartments or refrigerator-freezers—these equations are mathematically identical to those used when the standardized temperature falls between the compartment temperatures. As discussed in section III.H.1, DOE is concerned that in some cases the extrapolation approach can result in energy use measurements that are unrealistically high or low. In order to safeguard against this possibility, DOE proposes to restrict use of the extrapolation approach to tests in which the compartment temperature for the warm temperature setting is higher than the compartment temperature for the cold temperature setting, and the energy use measured for the warm setting is lower than the energy use measured for the cold setting.

DOE expects the proposed restriction to resolve potential issues for most refrigeration products that use vapor-compression refrigeration technology. For these products, DOE expects that the cold-setting compartment temperatures are unlikely to be significantly warmer than their standardized temperatures in cases that require use of the extrapolation approach—perhaps up to 5 °F higher, rather than the overshoot of 9 °F or more observed for non-compressor products, as discussed in section III.H.1. Further, DOE expects that the warm temperature control settings for these products will generally allow operation at compartment temperature more than 5 °F higher than the standardized temperature. Hence, the potential crossover of observed compartment temperatures (*i.e.,* measuring compartment temperature in the warm setting that is not higher than the temperature measured in the cold setting) would not likely occur for such products. There may be some vapor-compression refrigeration products for which such crossover does occur. However, DOE expects that few if any products with such characteristics are likely to exist. In such cases, a test procedure waiver would be required.

As discussed in section III.H.1, DOE notes that for non-compressor refrigerators, where the cold-setting compartment temperature is 9 °F or more higher than the standardized compartment temperature, the chance that the compartment temperatures are nearly the same for both cold and warm temperature control settings is much higher. DOE also notes that the very large deviation from typical operating compartment temperature for non-compressor refrigerators means that the measured energy use associated with extrapolation would not be representative of field energy use. Hence, while DOE is proposing to add the extrapolation approach to Appendices A and B for use with vapor-compression products, DOE is not proposing this approach for non-compressor refrigerators for the reasons noted above.

DOE requests comments on its proposal to adopt the extrapolation approach for measurement of energy use in Appendices A and B for refrigeration products other than non-compressor refrigerators, subject to the requirement that the measured warm-setting compartment temperature(s) must be warmer than the cold-setting compartment temperatures and that the measured energy use must be lower in the warm setting.

J. Hybrid Refrigeration Product Test Procedure Amendments

To adequately address the testing issues involved with assessing the energy usage of hybrid refrigeration products, DOE examined a number of factors. These factors included appropriate ambient temperatures, usage adjustment factors, standardized temperatures, temperature control settings, and energy use calculations. These different elements, along with DOE's proposals in addressing them, are discussed in detail below.

1. Ambient Temperature and Usage Factor

DOE proposes to require that hybrid refrigeration products be tested in 90 °F ambient temperature conditions. These products do not have the combination of characteristics that led DOE to consider an alternative ambient temperature for testing non-compressor cooled cabinets. Most hybrid refrigeration products have vapor-compression refrigeration systems that should have sufficient capacity to maintain the product's intended compartment temperatures in 90 °F ambient temperature conditions. Although DOE is not aware of any hybrid non-compressor products that can safely store food, such products (if developed) should reasonably be expected to maintain compartment temperatures at or below the 39 °F standardized temperature for fresh food compartments, even with elevated use that would be simulated with closed door operation in 90 °F ambient temperature conditions, as would be expected for the types of refrigerators and refrigerator-freezers that are currently covered. Consequently, DOE sees no reason to deviate from this specified test condition, which is currently used for all regulated consumer refrigeration products.

DOE also proposes a usage adjustment factor of 0.85 for hybrid refrigeration products. Because at least half of the refrigerated volume of these products is occupied by the cellar compartment, which is often for wine storage, DOE believes that the door opening frequency of these products would be closer to that of wine chillers than refrigerators. As discussed in section III.G.1, a number of test procedures prescribe a usage adjustment factor of 0.85 for wine chillers. Although that section suggests that a lower adjustment factor than 0.85 may be more appropriate for cooled cabinets because of the differing impact of testing in 90 °F ambient temperature compared to testing of refrigerators, refrigerator-freezers, and freezers, the same argument would not necessarily apply to hybrid products because a substantial portion of the refrigerated space of hybrid products would be dedicated to fresh food and/or freezer compartments. Because hybrid products include fresh food and or freezer compartments, using an elevated ambient temperature would not produce as dramatic an impact on energy use of a hybrid product compared to a cooled cabinet. Also, the refrigeration system of a hybrid product would generally be working to cool the coldest compartment in the product, while the warmer compartments would be cooled by transferring air from the cooler compartments, which means the refrigeration system operating efficiency (coefficient of performance, ''COP'') of a hybrid product would be more typical of the refrigeration systems of refrigerators, refrigerator-freezers, or freezers than that of cooled cabinets. Hence, the COP trend while operating in an elevated ambient temperature environment for a hybrid refrigeration product should be more consistent with the COP behavior for refrigerators, refrigerator-freezers, and freezers, than for cooled cabinets. These arguments suggest that the greater sensitivity to elevated ambient temperature for cooled cabinets would not necessarily apply to hybrid products. DOE does not have data indicating that a 0.85 usage adjustment factor would be inappropriate for hybrid refrigeration products. In the absence of such data, DOE proposes to use this factor for calculating energy use for hybrid products.

DOE seeks comments on its proposal to specify that hybrid refrigeration products be tested in 90 °F ambient temperature conditions, and that their energy use be calculated using a 0.85 usage adjustment factor.

2. Standardized Temperature, Temperature Control Settings, and Energy Use Calculations for Hybrid Refrigeration Products

Hybrid refrigeration products have cellar compartments, in addition to fresh food and/or freezer compartments. As discussed in section III.F.2, DOE proposes that 55 °F be used as the standardized temperature for cellar compartments. Consistent with this approach, this proposal would require testing of the cellar compartments found in hybrid refrigeration products using the same standardized temperature.

When testing hybrid refrigeration products, there may be two or three compartment temperatures to compare with standardized temperatures, including the cellar, fresh food, and freezer compartment temperatures. DOE proposes to require that the procedures for setting temperature controls and test selection be consistent with the current test procedures for refrigerators, refrigerator-freezers, and freezers (*see, e.g.,* Appendix A, sections 3.2.1 and 3.2.2), as described below:

(1) A first test would be conducted with all temperature controls set in their median position.

(2) If the measured compartment temperatures during the first test are all lower than the compartments' standardized temperatures, a second test would be conducted with all temperature controls set in their warmest positions. If the measured compartment temperatures for the second test are still lower than the compartments' standardized temperatures, the energy use would be calculated based on the results of the second test only. Otherwise, the energy use would be calculated based on the results of both tests.

(3) Conversely, if one or more of the measured compartment temperatures during the first test are warmer than the standardized temperature(s), the second test would be conducted with all temperature controls set in their coldest positions. If, for this second test, the measured compartment temperatures are all lower than the compartments' standardized temperatures, the results of both tests would be used to calculate the energy consumption. If one or more of the compartment temperatures are still warmer than the standardized temperatures, the energy use would be calculated based on cold- and warm-setting tests, subject to restrictions on measured compartment temperatures, measured energy use, and product status as a non-compressor refrigerator.

(4) Alternatively, the energy use could be calculated based on a single test conducted with all temperature controls set in their warmest position, if the measured compartment temperatures are all lower than their compartments' standardized temperatures.

DOE also proposes to calculate energy use in a manner consistent with the procedures currently specified in the test procedures for refrigerators and refrigerator-freezers (*see, e.g.,* Appendix A, section 6.2). Specifically, if the compartment temperatures measured for a test conducted with all temperature controls set in their warmest positions are all lower than their compartments' standardized temperatures, the results of this test alone would be used to determine energy use. Also, if two tests were used to determine energy use as described above, a weighted average of the test results would first be determined based on each of the compartment temperatures individually. See 10 CFR part 430, subpart B, Appendix A, section 6.2.2.2. For hybrid refrigeration products, this calculation would be performed for the cellar compartment temperature as well as the fresh food and/or freezer compartment temperature. The rated energy use for the product would be based on the highest of the three calculations performed in this fashion, or the higher of the two calculations performed. DOE proposes to add a third table describing the temperature setting logic in section 3 of Appendix A. The table would describe the test sequence and the tests to be used for the energy use calculation, similar to the existing tables in this section, but for a generalized case in which the product may have one, two, or three compartments of different standardized temperatures. Also, DOE proposes to restructure section 3.2.1 for better clarity.

DOE requests comment on these proposed procedures for setting temperature controls, conducting tests, and calculating product energy consumption.

K. Ice Maker Test Procedure Amendments

In developing a means to reliably test the energy usage of ice makers, DOE is considering adding new provisions to its testing regulations. These provisions, which would be located in 10 CFR 430.23 and a new Appendix BB, would detail the testing, measuring, and calculation of energy usage of these products. DOE would also add a definition to describe the scope of those products that would be treated as ice makers. Additional detail regarding these provisions follows.

1. Establishment of New Paragraph 10 CFR 430.23(dd) and New Appendix BB for Ice Makers

DOE believes that testing ice makers would require a substantially different procedure from the approach proposed for refrigerator-freezers and freezers, products that DOE already regulates. In light of these differences, DOE proposes to add a new paragraph (dd) to 10 CFR 430.23 and a new Appendix BB to contain the test procedures for ice makers. The new paragraph (dd) would explain how to calculate the annual energy consumption for ice makers, which would involve multiplying the daily average energy consumption by the number of days in a year (365). The new Appendix BB would describe how to measure ice maker energy use.

2. Definitions for Ice Makers

DOE proposes to add several new definitions to clarify components or characteristics of ice makers, as described below. Some of the definitions would be added to 10 CFR 430.2 while others would be added to a new section 1 within the new Appendix BB.

The definitions being proposed for 10 CFR 430.2 would distinguish among the different types of ice makers that DOE is considering addressing in a separate effort to evaluate potential energy conservation standards for these products. First, DOE proposes to distinguish between ''batch-type'' and ''continuous-type'' ice makers. The proposed definitions for these two ice maker categories are identical to those used in DOE's ACIM test procedure and are commonly understood in the industry: In the context of consumer ice makers, ''batch-type ice maker'' would mean an ice maker having alternate freezing and harvest periods, and ''continuous-type ice maker'' would mean an ice maker that continually freezes and harvests ice at the same time. Although most ice makers are batch-type, DOE is aware of at least one continuous-type product. (Continuous-Type Ice maker, No. 2) The operating characteristics of these products are sufficiently different to require different testing methods. Hence, distinguishing between the types is necessary in establishing the procedures that apply to a given model of ice maker.

Furthermore, the energy use characteristics of these two types of ice makers may be different, which may justify establishing different product classes. DOE may establish different product classes of a given category of product if they have performance-related features that justify a higher or lower standard. (42 U.S.C. 6295(q)(1)(B)) If DOE decides to propose separate product classes for batch-type and continuous-type ice makers, further discussion and an opportunity for comment would be provided in the appropriate rulemaking proceeding.

Second, DOE proposes to establish definitions to distinguish ''cooled-storage'' and ''uncooled-storage'' ice makers. DOE proposes to define a ''cooled-storage ice maker'' as an ice maker that maintains ice storage bin temperatures below 32 °F. A cooled-storage ice maker would be distinct from an ''uncooled-storage ice maker,'' which DOE proposes to define as an ice maker that does not maintain ice storage bin temperatures below 32 °F between periods of ice production. Such units often, but not always, have a drain connection to remove the melt water that collects in the bin.

Although the terms ''cooled-storage ice maker'' and ''uncooled-storage ice maker'' are not widely used in industry, DOE proposes to use them to distinguish between these two types of ice makers because they have different operating characteristics requiring unique test procedures. For example, cooled-storage ice makers consume energy after filling their ice storage bins with ice by operating their refrigeration systems to cool their ice storage bins and prevent the melting of ice. Consequently, cooled-storage ice makers only need to replace the ice removed by the user.

In contrast, uncooled-storage ice makers do not operate their refrigeration systems after filling their ice storage bins and may consume very little energy when they are not actively producing ice. However, because the ice in the bin melts, uncooled-storage ice makers need to replace the ice that melts in the uncooled ice storage bin in addition to replacing the ice that is removed by the user. Although the proposed test procedure has very similar provisions for measuring icemaking energy use for both of these types of ice makers, the proposal has different provisions for measuring the energy associated with ice storage. For cooled-storage ice makers, ice storage energy use comprises the energy required to maintain the ice storage bin at its below-freezing temperature, whereas for uncooled-storage ice makers, it comprises the energy required to replace melted ice. The differences between these products may extend to specific features, such as the production of different types of ice, and others that may affect energy usage, which may help justify the creation of separate product classes. Consequently, in DOE's view, the proposed definitions should help address these different operating characteristics and the potential that these products may constitute different product classes.

Finally, DOE proposes to define the term ''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. This style of ice maker is also generally small (Portable Ice Maker, No. 8); hence, both the lack of a fixed water connection and the small size of these units contribute to their portability. Not using a water supply represents a difference in operation of portable ice makers that requires differences in the test procedure as compared with procedures with water inlet connections. In addition, as described in section III.K.9, DOE proposes to apply an adjustment factor of 0.5 for portable ice makers to account for the likelihood that they would not be energized throughout the year, due to their portability.

DOE requests comments on the proposed definitions delineating different types of ice makers. DOE also seeks comment on whether there exists common industry terminology that would be more suitable for distinguishing cooled-storage and uncooled-storage ice makers.

DOE is also proposing to include a number of definitions as part of a new Appendix BB that would relate to icemaking and be used to describe the icemaking operation and the test procedures necessary to measure icemaking energy use. In particular, DOE is proposing to define the terms ''harvest,'' ''harvest rate,'' ''ice hardness factor,'' ''ice storage bin,'' ''icemaking cycle,'' and ''replacement cycle.'' Some of these definitions exist in similar forms in the test procedures for refrigerators and refrigerator-freezers, or in the test procedures for ACIM. With the exception of the proposed definition for ''replacement cycle,'' which DOE included to clarify the duration of the ice storage test period for uncooled-storage ice makers, these proposed definitions are all commonly understood in the industry. The proposed definitions for ''harvest rate'' and ''ice hardness factor'' are identical to those used in DOE's ACIM test procedure.

DOE requests comment on these proposed definitions.

3. Energy Use Metric for Ice Makers

DOE's regulations do not currently incorporate a test procedure for consumer ice makers. While DOE is aware that manufacturers are using the current ACIM test procedure (see 10 CFR part 431, subpart H) to represent the energy use of consumer ice makers, DOE is unaware of any procedure that has been specifically developed for these ice makers. DOE's research indicates that there is very little reporting of energy use information for consumer ice makers.

In developing the test procedures for ice makers, DOE considered its approach for ACIM (see 10 CFR

431.134) and the proposed approach for consumer refrigeration products with ice makers. 78 FR 41609 (July 10, 2013). The DOE test procedure for ACIM incorporates by reference the test procedures of AHRI Standard 810–2007 with Addendum 1, Performance Rating of Automatic Commercial Ice-Makers, March 2011 (''AHRI 810''), as well as 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 (''ANSI/ ASHRAE 29–2009''). The energy use of an ACIM is reported in kilowatt-hours per 100 pounds of ice. This metric represents the efficiency of ice production when operating in a 90 °F ambient temperature room with 70 °F inlet water temperature. The metric does not account for standby energy use between icemaking periods or the energy use associated with replenishing the ice that melts in the storage bin.

Similarly, DOE's previously proposed approach for measuring icemaking energy use in refrigerators, refrigerator-freezers, and freezers, which DOE is continuing to consider (see 78 FR 41610 (July 10, 2013)) is based on a procedure developed by AHAM. (Test Procedures for Refrigerators, Refrigerator-Freezers, and Freezers, Docket No. EERE–2012–BT–TP–0016, No. 5). The energy conservation standards for these products are based on an energy use metric in units of kilowatt-hours per year (kWh/year). *See, e.g.,* 10 CFR 430.32(a). The proposed procedures would, if eventually adopted, measure the energy use associated with icemaking in these products by determining the energy required by the product to produce each pound of ice and multiplying that energy consumption by an average daily ice production rate. See 78 FR at 41628 (discussing in detail DOE's 2013 proposal for calculating the energy use attributable to the icemaking process in consumer refrigerator-freezers). This daily energy consumption, which would include icemaking energy use, would then be multiplied by 365 to yield the energy use in kilowatt-hours per year, which is consistent with the manner in which the annual energy usage must be calculated for refrigeration products. *See, e.g.,* 10 CFR 430.23(a)(5). The ice produced in these products is stored in an ice storage bin located in the freezer compartment or in an icemaking compartment within the fresh food compartment that is maintained at sub-freezing temperatures. The energy required by the product's refrigeration system to maintain these sub-freezing temperatures in the ice storage bin is already accounted for in the existing test procedure, which measures the energy use of these products while maintaining their compartment temperatures at the appropriate standardized temperatures (*e.g.,* temperatures that are less than 32 °F in the freezer compartment).

While ice makers, unlike the refrigeration products noted immediately above, do not necessarily maintain cold compartment temperatures, they do store ice. In these cases, the ice is not stored in a separate compartment; rather, the ice is stored in the open interior of the product, *i.e.,* within the ice bin itself, as opposed to having a separate storage compartment. ACIMs operate in a similar manner—while an ACIM ''may include [a] means for storing ice'' (see 10 CFR 431.132), many ACIM models do not include separate ice storage bins. The energy use metric for ACIMs, kilowatt-hours per 100 pounds of ice, does not include the energy use required to store ice or to replenish ice that melts.

Today's proposal considers whether the energy use metric for ice makers should include the energy use associated with ice storage and/or replenishment of melted ice. As part of this effort, DOE conducted testing to observe the energy use characteristics of ice makers and to measure energy use, both for ice production and for ice storage. The tests and energy consumption calculations were based on today's proposed test procedure, which calls for testing in 72 °F ambient temperature conditions (see section III.K.5). Table III–6 presents the test results for four ice makers. The table displays the annual energy consumption attributable to both ice production and ice storage for both a low and a high daily ice consumption rate estimate. The low production estimate is equal to the average daily ice production proposed for the icemaking test for refrigerators, refrigerator-freezers, and freezers, while the high production rate estimate would represent an extreme daily average production rate scenario, because it exceeds the harvest capacity of some of the tested ice makers. The test data show that the energy use associated with ice storage is a significant portion of the energy use of these products. Hence, DOE's proposed test procedure would measure this portion of the energy consumption and include it in the proposed energy use metric.

TABLE III–6—ICE MAKER TEST RESULTS

Ice maker No.	Storage type	Icemaking energy consumption (kWh/lb)	Annual energy consumption (kWh/year)					
			1.8 lb/day Ice consumption rate			20 lb/day Ice consumption rate		
			Ice production	Ice storage	% storage	Ice production	Ice storage	% storage
1	Uncooled	0.15	101	495	83	1,121	102	8
2	Uncooled	0.14	90	925	91	1,003	508	34
3*	Uncooled	0.073	24	38	61	268	16	5
4*	Uncooled	0.17	56	144	72	624	40	6
5**	Cooled	0.21	141	120	46	1,562	N/A	N/A
6**	Cooled	0.29	188	182	49	2,084	N/A	N/A

* Portable ice maker.
** Measured harvest rate is less than 20 lb/day.

DOE requests comment on this proposed energy use metric and whether it would sufficiently capture the total energy consumption of both cooled-storage and uncooled-storage ice makers.

4. Daily Ice Consumption Rate

DOE proposes to use a value of 4 pounds per day as the daily ice consumption rate for calculating the annual energy consumption of ice makers. In a separate rulemaking, DOE had previously proposed to apply an ice consumption rate of 1.8 pounds per day for measuring the energy use associated with icemaking in consumer refrigerators, refrigerator-freezers, and freezers. 78 FR at 41628. In response to the proposed test procedure for refrigerators, refrigerator-freezers, and freezers, AHAM commented that based on a Northwest Energy Efficiency Alliance (NEAA) field study and member data on ice production rates for products in the NEAA field study, the average ice consumption rate would be 0.76 pounds per day. (Test Procedures for Refrigerators, Refrigerator-freezers, and Freezers; Docket No. EERE–2012–BT–TP–0016; AHAM, No. 41 at p. 2) DOE notes that ice makers within consumer refrigerator-freezers or freezers are a feature of that particular product type, while ice makers are a product specifically designed to produce ice. Accordingly, the daily ice consumption likely varies between these ice makers. DOE lacks data on the difference in daily ice consumption between ice makers and ice makers within refrigerator-freezers and freezers; however, DOE assumes that consumers who choose to purchase a dedicated ice maker will consume, on average, more ice than consumers who rely on their refrigerator-freezers or freezers to supply ice. Given the lack of usage data for ice makers, DOE selected 4 pounds per day as a reasonable daily ice consumption rate that is substantially higher than both the 1.8 pounds per day and 0.76 pounds per day referenced for ice makers in refrigerator-freezers and freezers.

Moreover, dedicated ice makers are typically capable of producing much more ice per day than the automatic icemakers used in refrigerator-freezers and freezers, with some ice makers having claimed harvest rates ranging from 10 to 70 pounds per day. DOE recognizes that these rates may have been measured under different testing conditions than those being proposed in today's notice.[10] In the absence of comprehensive and reliable field data that would suggest a particular national-average daily ice consumption rate, DOE is assuming that these products will, for the reasons noted immediately above, have an ice production rate roughly double that which DOE previously considered for the automatic icemakers of refrigerator-freezers and freezers.

DOE requests comment on this proposed daily ice consumption rate.

[10] Daily Harvest Rates for Representative Residential Ice Makers, No. 4.

DOE also seeks access to field or survey data that indicate whether this value is representative of actual ice consumption for ice makers. Because the harvest rates of ice makers vary widely, DOE recognizes the limitations of using a 4 pound per day estimate for all ice makers. Therefore, DOE requests comment on whether the daily ice consumption rate used in the test procedure should vary based on harvest rate, and if so, how the rate should vary.

5. Test Conditions and Set-Up

Because of the similarities between ice makers and other consumer refrigeration products, DOE proposes to require that ice makers be tested using many of the same test conditions as are required for refrigeration products such as refrigerators, refrigerator-freezers, and freezers. Specifically, DOE proposes to require that ice makers meet the same set-up requirements and operating conditions (excluding those requirements that are not applicable to ice makers), clearance distances, steady-state conditions as applicable, and icemaking cycle indication provisions. DOE expects that using the same set-up and test conditions will help ensure testing consistency for ice makers while minimizing manufacturer burden.

DOE initially considered proposing that ice makers be tested in an ambient temperature condition of 90 ± 1 °F, which is considerably warmer than the average ambient temperature that these products would likely face in consumers' homes. The 90 °F ambient temperature is used for many refrigeration products because the test procedure requires testing with the doors closed and the elevated temperature simulates thermal loads associated with door openings and other loads, such as cooling down warm food. However, ice makers would likely experience much less frequent door openings than refrigerators or refrigerator-freezers since an ice maker's door would be expected to be opened primarily when retrieving ice for use in cool drinks, while refrigerator and refrigerator-freezer doors would be accessed when retrieving or preparing any food that requires refrigeration or is cooled before consumption. In addition, the load associated with the freezing and cool down of ice would be measured directly in the ice maker test procedure, while the load associated with cool-down of foods inserted into a refrigerator or refrigerator-freezer is not directly measured in the test procedure for these products, suggesting that using an elevated temperature to simulate these loads is inappropriate when testing ice makers. Consequently, DOE's proposal would require that ice makers be tested in a 72 °F ambient temperature condition. See also section III.G.1.

DOE requests comment on its proposal to require testing of ice makers in a 72 °F ambient temperature condition and its proposal to apply all of the set-up requirements that are currently required for refrigerators, refrigerator-freezers, and freezers to ice makers. DOE also seeks comment on its assumption that ice makers are not opened as frequently as other refrigeration products along with its estimated ice production rate for ice makers.

For ice makers that are not portable (*i.e.,* units that use water provided by a water supply line), DOE proposes to require that the inlet water temperature be the same as the 72 °F ambient temperature condition required for the test, but with a modified tolerance requirement of ± 2 °F. DOE has proposed a similar approach for measuring the energy use associated with icemaking in refrigerator-freezers and freezers. *See* 78 FR at 41621 (proposing that testing be conducted with water inlet temperature of 90 ± 2 °F). DOE offered this approach as a means to minimize the potential complications associated with maintaining water temperature at a level other than the ambient temperature in the supply water lines when water is not flowing. DOE also proposes to require the same inlet water pressure as proposed for testing of automatic icemakers in refrigerators, refrigerator-freezers, and freezers, 60 ± 15 psig. *Id.* DOE also proposes to clarify that the pressure range would apply while the water is flowing.

DOE considered whether to propose the same 72 ± 2 °F water supply temperature requirement for portable ice makers. However, during testing of a portable ice maker, DOE determined that the water in the reservoir reached a steady-state temperature of approximately 45 °F after several hours. Therefore, to reduce the time required during testing to reach a steady-state, DOE proposes that the water used to fill the reservoir of portable ice makers be 55 ± 2 °F.

DOE requests comment on whether its proposed water temperature and pressure conditions for portable and non-portable ice makers are appropriate.

The DOE proposal for ice makers would use many of the same requirements as those used for other consumer refrigeration products. Many of these requirements are from HRF–1–2008 and are incorporated by reference into DOE's regulations. See Appendix A, section 2.2. This group of requirements addresses the test room, the placement of the unit under test within the test room, the electric power supply, measurement instrumentation, sensor placement for measuring ambient air temperatures, and product set-up conditions. Many of these requirements would also apply when testing ice makers. Hence, DOE's proposed test procedures for Appendix BB would incorporate by reference many of the same provisions as Appendix A.

To ensure that consumer refrigeration products are set up for testing in a manner consistent with their normal use set-up, DOE's Appendix A requires that set-up be in accordance with the printed consumer instructions supplied with the cabinet. However, the test procedure permits certain exceptions designed to ensure test consistency for set-up parameters that could affect test results, but allow for set-up flexibility for those parameters that do not affect energy test results. See Appendix A, section 2.6. DOE proposes to use the same set-up approach for ice makers, with some adjustments to the exceptions. Specifically, the proposed ice maker test procedure would not include the exceptions that (a) waive the need for the installation of water lines and water filters, (b) highlight specific requirements for setting the temperatures of convertible or special compartments, and (c) require ice bins to be emptied of ice.

DOE's proposal includes instructions for setting temperature controls for ice makers. These requirements would apply primarily to cooled-storage ice makers. While DOE found from its research that not all cooled-storage ice makers have user-operable temperature controls, the proposal addresses how to test products equipped with such controls. The proposal would require these types of controls to be set at the median setting during testing, for both the ice production and ice storage parts of the test. This proposed requirement would differ from the current requirements for refrigerators, refrigerator-freezers, and freezers. These provisions require multiple tests and the results are used to calculate energy use based on standardized compartment temperatures. Such an approach is unnecessary for ice makers because they are not designed to maintain storage space within compartments at specific temperatures.

Furthermore, the detailed requirements that DOE proposed earlier for measuring icemaking energy use in refrigerator-freezers are unnecessary when testing ice makers. This is because, for refrigerator-freezers and freezers, any ''drift'' in compartment temperature associated with the initiation of icemaking can change the energy use associated with maintaining the compartment temperatures. To control this drift, temperature readjustment is necessary to help minimize the change in compartment-related energy use. *See* 78 FR at 41623. Ice makers do not consume energy to maintain compartment temperatures because they have no separate internal spaces apart from the ice storage bin that could be considered a ''compartment'' for the purposes of the test. Accordingly, DOE is not proposing similar requirements in the test procedure for ice makers.

On the other hand, some features of ice makers raise set-up concerns that do not arise for refrigerators, refrigerator-freezers, or freezers (*e.g.,* ice piece size control, drain lines, and elevated-drain auxiliary pumps). The proposed procedure would account for these concerns.

DOE is not aware of user-accessible ice piece size control for any automatic icemakers used in refrigerator-freezers or freezers. While DOE is similarly unaware of such controls in ice makers, DOE expects that such a control feature would be more likely to be offered in an ice maker, since the main function of these products is the production of ice. In addition, the impact of varying ice piece size in an ice maker that has such a control feature would be expected to affect the energy use measurement much more for these products, since most of the energy use of refrigerator-freezers and freezers is associated with maintaining cold individual compartment temperatures. DOE proposes that any user-accessible control allowing ice piece size adjustment to be set for the largest ice piece size when testing ice makers. This approach would be consistent with maximizing ice production rate, one of the key sales features of ice makers that distinguish them, for example, from the icemaking capabilities of conventional refrigerator-freezers.

As mentioned above, many uncooled-storage ice makers have drain connections to remove water that remains from the ice production process or that collects at the bottom of the ice storage bin. To ensure that this water freely flows out of the ice maker, DOE proposes to require that any tubing used to convey such water away from the unit under test to a test lab floor drain be as specified in the consumer instructions supplied with the cabinet, and that, unless otherwise specified by the instructions, the drain lines must be installed running downwards from the ice maker's drain outlet. DOE is aware that ice maker manufacturers offer optional pumps that can pump the drain water to a higher location, which is useful in those cases where the drain piping in the house is at a higher elevation than the ice maker's drain outlet. DOE's proposal does not permit the use of such optional pumps in the test.

Further, DOE is aware that some ice makers have on-board pumps integrated within the products' cabinets that can be used for this purpose if necessary. DOE's proposal would also allow these integrated pumps to be shut off or disconnected for the test, if the consumer instructions supplied with the cabinet indicate that such pumps can be switched off or disconnected when they are not needed for lifting the drain water to a higher location. If the integrated pump cannot be turned off by the consumer during typical operation, the pump would be operational during the test and its energy consumption would be included during testing.

DOE is proposing a data collection frequency interval for temperature, power, and energy measurements to be not less than once per minute. The current DOE test procedures in Appendices A and B allow a recording interval of up to four minutes. Because the icemaking test involves multiple recurring events (*i.e.,* icemaker cycles and compressor cycles) that are not synchronized, a shorter recording interval would improve the accuracy of the measurements. Additionally, updating the requirements to reflect the increased accuracy of the equipment routinely employed by test facilities would ensure that the procedure adequately accounts for the improved technology already used in the field. DOE believes that the test burden associated with this requirement, if any, would be insignificant because most, if not all, test facilities already use one-minute recording intervals during testing.

DOE's proposed batch-type ice maker procedure would measure the energy use for test periods that comprise complete icemaking cycles. This concept is consistent with both the established ACIM test procedure and the test procedure DOE proposed for measuring icemaking energy use in refrigerator-freezers and freezers. The concept is also based on a correlation between the energy used to produce ice during each cycle, which is used to accurately calculate the energy use per mass of produced ice.

For most ice makers, identifying icemaking cycles from recorded data (*e.g.,* power input and temperatures) is straightforward, since the compressor power measured for an uncooled-storage ice maker will change suddenly in the transition from the harvest cycle to the freeze cycle, or the mold heater of a cooled-storage ice maker will be energized to free the ice from the icemaking mold. However, identifying the icemaking cycles for some ice makers may be difficult because the power required to energize the mold heater (or other ice release mechanism) may be negligible compared to the overall power draw of the unit, and/or the compressor power may not change significantly during harvest. To address this situation for the icemaking test procedure for refrigerator-freezers and freezers, DOE proposed three alternative methods that would allow one to readily identify the start and end of icemaking cycles. See 78 FR at 41622 (describing in detail the alternative methods proposed by DOE). DOE's proposal for ice makers would follow this same approach to identifying icemaking cycles.

Additionally, DOE's proposal would require manufacturers to measure the energy used for icemaking and ice storage. Measuring the energy use of the ice storage function for cooled-storage ice makers requires measuring how much energy is used to maintain the ice maker's storage bin at a steady state ice storage temperature. A test would be needed to confirm that the unit is operating in a steady state before such a measurement is made. For refrigerators, refrigerator-freezers, and freezers, steady state is determined based on compartment temperatures—*i.e.,* once the rate of temperature change within a compartment is less than 0.042 °F per hour. See Appendix A, section 2.9. DOE proposes to use a similar temperature-based method for ice makers to confirm that uncooled-storage ice makers have reached steady state. However, as mentioned above, ice makers do not have compartments to provide refrigerated storage space. Hence, the evaluation of stability would not be based on an evaluation of compartment temperature, as it is for other refrigeration products, but rather, a less complex measurement of the interior temperature of the ice maker.

DOE also notes that because its proposed approach for ice makers would not be based on the maintenance of particular storage temperatures (*i.e.,* standardized temperatures), in DOE's tentative view, for the purpose of evaluating stability, temperature sensor locations are not as critical for ice makers as they are for the compartments of other consumer refrigeration products (*e.g.,* refrigerator-freezers). As a result, today's proposal would require manufacturers to evaluate steady-state conditions on the basis of a single temperature sensor located one inch above the maximum ice level of the ice storage bin as close to the center of the bin as possible but in a location that would not interfere with the operation of the ice maker, such as when ice falls into the bin during harvest. In addition, because the space available in this location of the ice maker may be limited, DOE's proposal does not require use of weighted temperature sensors, for example, as described in HRF–1–2008 section 5.5.4. However, the proposal would require a measurement accuracy of at least ±0.5 °F for these sensors. DOE also proposes to apply the same steady state criterion already used for refrigerators, refrigerator-freezers, and freezers to the single measured temperature to confirm that a steady state condition has been achieved for the ice storage test for cooled-storage ice makers.

DOE requests comment on all of its proposals for test conditions and for set-up of ice makers for testing. DOE also requests comment on its proposals related to the treatment of ice maker drain lines and drain pumps, along with information regarding the power consumption of such pumps.

6. Icemaking Test

To measure icemaking energy use, DOE proposes to require a test similar to its ACIM test procedure, which involves measuring ice and monitoring energy use once per icemaking cycle for three consecutive icemaking cycles to determine the energy use per 100 pounds of produced ice. However, rather than requiring the collecting and weighing of ice after every icemaking cycle, DOE's proposal for batch-type ice makers would measure icemaking energy use for a whole, but unspecified, number of icemaking cycles over at least 6 hours, unless the bin fills first. For continuous-type ice makers with no icemaking cycles, DOE's proposal would measure energy use over 6 hours, unless the bin fills first. DOE proposes to use the same approach to minimize any thermal losses from door openings in order to mitigate their potential impacts on the measured energy use. The thermal loss associated with ice collection would have a much greater impact on energy use measurement for an ice maker than for a typical ACIM because ice collection for an ice maker requires opening the door and exposing much more of the cooled surfaces of the interior to warm test room air. Many ACIM models drop the produced ice through a hole in the bottom of the ACIM assembly at the end of each icemaking cycle, which reduces the thermal exposure associated with ice collection. In addition, the harvest capacity of most ice makers is much lower than that of ACIMs, so any amount of thermal loss would have a greater impact on the energy use measurement. Reducing this thermal loss by requiring ice collection only once would reduce the test uncertainty that would be associated with a once-per-cycle collection of ice.

DOE notes that for batch-type ACIMs, the ACIM test procedure requires icemaking stabilization to occur prior to taking measurements. This stabilization is achieved when the difference in the weight of harvested ice for two consecutive icemaking cycles does not exceed 2 percent. *See* ANSI/ASHRAE 29–2009, section 7.1.1. DOE proposes to require a stabilization period for the ice maker test procedure as well, but stabilization would be achieved after two hours of icemaking operation rather than confirmed based on batch weight. This method would avoid the potential thermal loading associated with door openings that is likely to occur if DOE were to adopt the ice production-based approach followed by the ACIM-based procedure. DOE observed during ice maker testing that the temperatures and power consumption of these products reach steady-state within these times. (Ice maker Stabilization Data, No. 6)

DOE requests comment on the proposed two-hour stabilization period for both batch-type and continuous-type ice makers.

Also, similar to the procedure for ACIM, DOE proposes to require that a perforated container be placed in the ice storage bin to collect the ice that will be weighed at the end of the test period. DOE proposes to require that the container used to catch the harvested ice shall be perforated such that the ice of the unit under test cannot fall through the container's holes and the water hold-up weight is no more than 1.0 percent of the weight of the smallest batch of ice for which the container is used. DOE expects that some portion of the ice collected during a test of an uncooled-storage ice maker may melt before the container is removed for weighing of the ice. The water that melts off the ice in a consumer's home would drop to the bottom of the ice storage bin and would not be available for use as ice. In order to maintain consistency with field use, DOE proposes that melted ice should not be included in the ice mass measurement at the end of the test period—hence, the proposed use of a perforated container. However, DOE is aware that surface tension may prevent melt water from passing through the holes in the container. To address this possibility, DOE proposes that the perforated container may not ''hold'' water representing more than 1.0 percent of any ice mass measurement made during testing. To help with this measurement, DOE is including a procedure to determine the water hold-up weight of the container that involves immersing the container in water, letting it drain, and measuring the weight of the remaining water that does not drain.

DOE also proposes to require using a perforated container for continuous-type ice makers. This is in contrast to the test procedure for continuous-type ACIMs, which requires using a non-perforated container to capture ice. *See* ANSI–ASHRAE 29–2009, section 7.2.1, which is incorporated by reference in the DOE ACIM test procedure. As with batch-type ice, the water that melts off continuous-type ice and drains to the bottom of the bin prior to the retrieval of ice from the bin is not useful as ice. Hence, DOE proposes use of a perforated container for continuous-type ice makers as well as for batch-types.

During its tests of ice makers, DOE noted one unit whose design severely limited the size of a perforated container that could be placed within its bin to collect harvested ice because the ice bin did not slide or tilt out. Consequently, a perforated container that could be placed in the bin was unable to fit all of the ice that was produced within the specified icemaking test period. For such units, in which it is impossible to place a perforated container large enough to capture all of the ice produced during the icemaking test period, DOE proposes to allow additional door openings during the test period for ice retrieval and measurement. The collected ice would be placed into the ice storage bin of the unit under test, underneath the perforated container. The proposal would also allow (in the case of batch-type ice makers) the perforated container to be sized so that it can capture the ice associated with no less than five icemaking cycles. The ice produced during the test period would be retrieved and weighed multiple times during the test period, but no more frequently than once every five icemaking cycles. For continuous-type ice makers, the proposal would allow the perforated container to be sized so that it can capture the ice associated with no less than an hour of ice production. The ice produced during the test would be retrieved and weighed multiple times during the test period, but no more frequently than once per hour.

DOE proposes to apply weighing requirements identical to those used for ACIMs, *i.e.,* using a scale for weighing ice with an accuracy and precision within 1 percent of the measured ice weight. *See* ANSI–ASHRAE 29–2009, section 5.51.

For measuring the energy use of batch-type ice makers, DOE proposes using a test period that would begin with the start of the first icemaking cycle occurring after the two-hour stabilization period. The perforated container would be placed into the ice bin after the last batch of ice harvested prior to the start of the test period drops into the bin, and the bin would not be emptied of ice before inserting the container. The test period would consist of a whole number of icemaking cycles and be at least six hours in duration, or until the ice storage bin fills and ice production stops automatically. The ice container would be retrieved for weighing of the ice within two minutes of the time that the last batch of ice produced during the test period falls into the bin.

For continuous-type ice makers, the test procedure would also require a two-hour stabilization period, and the test period duration would last either six hours or until icemaking is automatically stopped—whichever comes first. The container for collecting the ice would be retrieved for weighing of the ice either at the end of the six hours or within two minutes of the termination of icemaking.

To limit thermal loss associated with the door opening, the proposal would require that the elapsed time during which the ice maker door is open when placing or retrieving the container must not exceed 15 seconds. DOE anticipates that this is a reasonable amount of time to retrieve or place the container without creating a substantial thermal loss.

DOE proposes to require the rapid retrieval of the ice for weighing after the end of the test period to ensure that the ice weight does not decrease significantly after the test period due to melting that would occur in uncooled-storage ice makers. However, DOE recognizes that the test would require close monitoring to make sure that the two minutes are not exceeded. DOE requests comment on the two-minute requirement and suggestions of alternative ice collection delay limits.

DOE also requests comment on other aspects of the proposed test procedure, including use of a perforated container and the container specifications, requirements for the scale used to measure the ice weight, the requirement to leave the ice produced during the stabilization period in the ice storage bin, the six-hour test period, or any other aspect of the proposed test.

DOE notes that the measurements that would be made under the proposed icemaking test would include the energy consumed during the test period and the mass of ice produced during the test period. This energy use would be divided by the ice mass to determine the energy consumption per pound of ice produced. The estimated daily energy use in kilowatt-hours associated with ice production would then be calculated as the daily average production rate multiplied by the calculated energy use per pound of ice. This is discussed in further detail in section III.K.9.

7. Ice Storage Test

For both cooled-storage and uncooled-storage ice makers, DOE proposes to require that the ice storage test be conducted when the ice maker enters ice storage mode to maintain cool ice storage conditions or when replenishing the ice supply to replace melted ice. In these cases, the ice storage bin would be full of ice during this part of the test. During testing, however, an ice maker may not have completely filled its bin during the test period specified for the icemaking test. If this occurs, icemaking may have to continue after completion of the icemaking test in preparation for the ice storage test. The proposal would allow the ice that would have been collected at the end of the icemaking test period to be placed back into the bin after being weighed. However, the proposal would prohibit the use of ice from a different source to accelerate the filling of the bin. This precautionary step would ensure that the ice storage test results would not be affected by any potential subcooling (*i.e.,* temperature below 32 °F) or different melt characteristics associated with the size or shape of ice from a different source.

The proposal would also use a stabilization period for cooled-storage ice makers after the initial filling of the ice storage bin automatically terminates ice production. DOE proposes that completion of this stabilization period be defined based on the stabilization criteria used for the testing of refrigerators, refrigerator-freezers, or freezers, as described, for example, in Appendix A, section 2.9. This proposal, and the requirements for the temperature sensor used to confirm stabilization, are described in section III.K.5. DOE is not proposing to require a stabilization period for uncooled-storage ice makers because of the lengthiness of the proposed ice storage test period described below.

The proposed ice storage measurement test periods would also be different for cooled-storage and uncooled-storage ice makers because of the different operation of these two ice maker types. For cooled-storage ice makers, DOE proposes to specify a test period as required for refrigerators, refrigerator-freezers, or freezers with manual defrost, *i.e.,* the test period would comprise at least two whole compressor cycles and be of a duration not less than 3 hours. See Appendix A, section 4.1.

For uncooled-storage ice makers, DOE proposes a test period duration of at least 48 hours that would start at the end of ice production and end once the following replacement cycle stops. During testing of uncooled-storage ice makers, DOE observed that the periods of ice production initiated to replace melted ice did not always occur at regular intervals, nor did they consistently last the same amount of time. The change in the average energy use measured for the entire ice storage period, evaluated after each replacement cycle, continued to represent a significant portion of ice maker total energy use for a long period of time. Test data show that a test period as long as 48 hours is generally required to limit this variation to roughly one percent of total ice maker energy use. (''Ice Storage Test Period Stabilization'', No. 7) DOE proposes using a test period of at least 48 hours to reduce the potential variability associated with the ice storage test for uncooled storage ice makers.

DOE requests comment on its proposed methodology for measuring ice storage energy consumption for both cooled-storage and uncooled-storage ice makers. In particular, it requests comment on whether its proposed duration for the uncooled-storage test period is sufficiently long to reduce the variability in test results that might be caused by the inconsistent intervals between ice production and idle periods when the ice maker is operating only to replenish melted ice. DOE is also interested in whether a shorter duration would be viable. In either case, DOE is interested in any supporting data suggesting a different duration than the one proposed or data supporting the proposed duration.

8. Ice Hardness for Continuous-Type Ice Makers

DOE is aware of at least one continuous-type ice maker on the market: a nugget ice maker, which compresses the continuously formed ice to produce uniformly-sized cylindrical pieces. ANSI/ASHRAE 29–2009, ''Method of Testing Automatic Ice Makers,'' Annex A, ''Method of Calorimetry,'' addresses the hardness of ice produced by continuous-type ACIMs. Ice hardness, which represents the fraction of the delivered ice product which is frozen as opposed to liquid water, is defined as the percentage value or ratio obtained by dividing the measured latent heat capacity of the ice, expressed in British thermal units per pound (Btu/lb), by the value 144 Btu/lb, which is the latent heat capacity of water assuming all of the water freezes.

DOE's ACIM test procedure adjusts the energy consumption calculations using the ice hardness. *See* 10 CFR 431.134(2)(i). This adjustment corrects the measured energy use per pound of ice so that it represents the energy use that would have been required to produce ice of 100 percent hardness. The adjustment ensures that a higher efficiency rating cannot be obtained simply by designing a continuous ice maker that produces lower-hardness ice. Similarly, the adjustment partially corrects for the typically greater energy use per pound of batch type ice makers (compared with continuous type) by eliminating the portion of the energy use rating difference associated with the reduced frozen water content found in ice produced by continuous-type ice makers. DOE proposes that an ice hardness factor be used in the same way to adjust the measurement of energy use per pound of ice for continuous-type ice makers to calculate an adjusted energy use per pound of ice produced. As described in section III.K.6, energy use per pound of ice would be multiplied by the daily average ice production to determine the daily average energy use for ice production.

However, DOE recognizes that the ice hardness measurement procedure prescribed in Annex A: Method of Calorimetry in ASHRAE 29–2009 could incur a significant test burden. Therefore, DOE proposes to allow manufacturers the option of either using an ice hardness measurement determined using the ASHRAE 29–2009 procedure or a standard ice hardness factor of 0.85, which is a typical ice hardness value for nugget ice, the style of ice produced in the continuous-type ice maker mentioned above. This approach will reduce the test burden by avoiding the need for measuring ice hardness, while still providing manufacturers the option of using the ice hardness measurement if they desire to do so.

DOE requests comment on its proposal to adjust the icemaking energy use for continuous-type ice makers to account for ice hardness under 100 percent and its proposed approach to allow manufacturers to use either an ice hardness value measured using calorimetry or a standard ice hardness factor when calculating energy usage. DOE also requests comment on whether its proposed ice hardness factor of 0.85 is an appropriate value to represent the nugget ice expected to be produced by consumer continuous-type ice makers.

9. Energy Use Calculations

As discussed in section III.K.3, DOE proposes to use an energy use metric for ice makers that includes energy use associated both with icemaking and with ice storage. Section III.K.4 discusses DOE's proposal to use an average daily ice production rate of 4 pounds to calculate the contribution to daily energy use associated with icemaking. DOE's proposal would involve calculating the energy use per ice mass by dividing the total energy use measured during the icemaking test period by the total mass of ice produced during the test period. Daily icemaking energy use would be calculated by multiplying the energy use per ice mass by the daily ice consumption rate of 4 pounds per day. For continuous-type ice makers, the energy use per ice mass would be adjusted by multiplying this value by the ice hardness adjustment factor, I_{HAF}, which is equal to:

$$I_{HAF} = \frac{144\frac{Btu}{lb} + 40\frac{Btu}{lb}}{\left(144\frac{Btu}{lb} \times I_H\right) + 40\frac{Btu}{lb}}$$

I_H is the ice hardness factor, either a standard value of 0.85 or the measured value obtained using the procedure specified in Annex A of ASHRAE 29–2009. The ice hardness factor corrects the energy use per ice mass to account for the reduced refrigeration load associated with the production of ice such as nugget ice, which is not 100 percent frozen water. The 40 Btu/lb in the above expression represents the cooling load required to reduce the temperature of a pound of the incoming water from its inlet temperature of 72 °F to the ice temperature of 32 °F.

To calculate daily ice storage energy use, DOE is proposing that the average ice storage power consumption be multiplied by the amount of time per day that the ice maker is not producing the 4-pound average daily ice consumption. This approach avoids attributing ice storage energy use to ice makers during the time when they would be operating in active mode to produce the projected daily amount of 4-pounds of ice. This amount of time would be calculated based on the 4-

pound consumption and the measurements of ice mass and duration of the icemaking test period. The ice storage time would be equal to the number of minutes in a day, 1,440, minus the number of minutes required to produce 4 pounds of ice. This ice storage time would then be multiplied by the energy consumption measured during the ice storage test period and divided by the duration of that test period to provide the daily energy use associated with ice storage.

The ice production and ice storage energy use contributions would be added to provide the daily average energy use. For portable ice makers, this sum would be further multiplied by a usage adjustment factor to account for the fact that portable ice makers are not energized and producing or storing ice at all times. DOE proposes applying a usage adjustment factor equal to 0.5 for portable ice makers. DOE has no data to indicate, on average, what portion of the year portable ice makers are energized—DOE has proposed use of 0.5 for this factor and requests comments and any information that might refine this estimate.

DOE requests comment on its proposed method for calculating the daily energy consumption of ice makers. In addition, DOE requests comment on whether 0.5 is an appropriate annual usage adjustment factor for portable ice makers and seeks access to field or survey data that could help it develop a more representative assumption.

L. Incidental Changes To Test Procedure Language To Improve Clarity

DOE proposes to change the description for calculating the energy use for products in the majority of cases where two tests are conducted using two different temperature control settings that bracket the compartments' standardized temperatures. Specifically, section 6.2.1.2 of Appendix A currently refers to these two tests as two ''test periods.'' DOE proposes to change the language to refer to ''tests.'' DOE proposes similar changes in sections 6.2.1.1, 6.2.2.1, 6.2.3.1, and 6.2.4.1 of Appendix A and in sections 6.2.1.1 and 6.2.1.2 of Appendix B. DOE requests comment on this proposal.

DOE also proposes to amend the regulatory language associated with separate auxiliary compartments. Rather than discussing ''first'' fresh food or freezer compartments, DOE is proposing to use the term ''primary'' fresh food or freezer compartments. DOE requests comment on this proposal.

DOE proposes to modify its definition for variable defrost. Rather than indicating that ''the times between defrost *should* vary with different usage patterns and include a continuum of lengths of time between defrosts as inputs vary.'' DOE proposes to modify the language by replacing ''should'' with ''must''. DOE requests comment on this proposal.

DOE proposes to extend certain set-up provisions to some of the new product classes addressed by this notice. For example, section 2.4 of Appendix A describes requirements for automatic defrost refrigerator-freezers. DOE proposes to indicate in the title of this section that it applies to all automatic defrost refrigeration products covered by Appendix A with freezer compartments that have a temperature range equivalent to the freezer compartments of refrigerator-freezers. These products include hybrid refrigerator-freezers and hybrid freezers. Also, section 2.5 describes requirements for all-refrigerators with small compartments for the freezing and storage of ice. DOE proposes that the title of this section would be modified to also cite hybrid all-refrigerators, non-compressor all-refrigerators, and hybrid non-compressor all-refrigerators. Finally, section 2.11 addresses refrigerators and refrigerator freezers with demand-response capability. DOE proposes that this requirement would generally apply to refrigeration products covered by the test procedure. DOE requests comment on these proposed extensions of the set-up requirements.

M. Changes to Volume Measurement and Calculation Instructions

Section 5.3 of Appendices A and B, which references AHAM HRF–1–2008 section 3.30 and sections 4.2 through 4.3, provides instructions for measuring a unit's refrigerated volume. Since establishing the test procedures in Appendices A and B, DOE has received questions regarding how to account for certain component volumes when determining the total refrigerated volume according to AHAM HRF–1–2008. DOE issued guidance on the proper treatment of such components in August 2012 (''Guidance on Component Consideration in Volume Measurements,'' No. 11, (''August 2012 Guidance'')).[11] DOE is proposing to amend Appendices A and B to clarify the appropriate volume measurements consistent with the instructions provided in the August 2012 Guidance.

Specifically DOE proposes that the following component volumes would not be included in the compartment volume measurements: Icemaker compartment insulation (*e.g.,* insulation isolating the icemaker compartment from the fresh food compartment of a product with a bottom-mounted freezer with through-the-door ice service), fountain recess, dispenser insulation, and ice chute (if there is a plug, cover, or cap over the chute per Figure 4–2 of AHAM HRF–2–2008). DOE proposes that the following component volumes would be included in the compartment volume measurements: Icemaker auger motor (if housed inside the insulated space of the cabinet), icemaker kit, ice storage bin, and ice chute (up to the dispenser flap, if there is no plug, cover, or cap over the ice chute per Figure 4–3 of HRF–1–2008). DOE requests comment on the proposed volume measurement clarifications.

Adjusted total volume is designated VA in Appendices A and B, whereas it is designated AV in 10 CFR 430.32. DOE proposes to change the designation to AV in the test procedure appendices for consistency.

Rounding for volume calculations, as specified in HRF–1–2008, is to the nearest 0.01 cubic foot or 0.1 liter for freezer and fresh food compartments. DOE proposes to require that volumes of freezer, fresh food, and cellar compartments be rounded off to the nearest 0.01 cubic foot, and that, if the volumes of these compartments are recorded in liters, that they be converted to cubic feet and rounded off to the nearest 0.01 cubic foot before use in calculations of total refrigerated volume or adjusted total volume. DOE proposes also that total refrigerated volume and adjusted volume be recorded to the nearest 0.1 cubic foot.

DOE requests comments on these proposals and is particularly interested in the proposed conversion when calculating refrigerated and adjusted total volumes.

N. Removal of Appendices A1 and B1

On September 15, 2011, DOE published a final rule establishing amended energy conservation standards for refrigerators, refrigerator-freezers, and freezers. (76 FR 57516) Any refrigerator, refrigerator-freezer, or freezer manufactured starting on September 15, 2014, must be compliant with those amended standards to be legally distributed in commerce in the United States. To determine whether products comply with the amended standards, DOE requires that manufacturers use the test procedures set forth in Appendix A for refrigerators and refrigerator-freezers and Appendix B for freezers. Products manufactured

[11] This and other DOE guidance documents are available for viewing at *http://www1.eere.energy.gov/guidance/default.aspx?pid=2&spid=1.*

prior to September 15, 2014, were required to be tested for compliance with the existing standards using Appendices A1 or B1 unless the manufacturer was certifying the product for early compliance with the amended standards, in which case the manufacturer would use Appendix A or B. However, beginning on September 15, 2014, the Appendix A1 and B1 test procedures will be displaced by Appendices A and B. To prevent confusion after the compliance date of the amended standards and to eliminate unnecessary regulatory text, DOE proposes to remove Appendix A1 and Appendix B1 from subpart B to 10 CFR part 430 and to remove reference to these appendices in other parts of the regulations.

In addition, DOE proposes to remove from the list of materials incorporated by reference ANSI/AHAM HRF–1–1979, (Revision of ANSI B38.1–1970), (''HRF–1–1979''), *American National Standard, Household Refrigerators, Combination Refrigerator-Freezers and Household Freezers.* This commercial standard is incorporated by reference only into the test procedures of Appendices A1 and B1, which DOE proposes to eliminate.

O. Compliance With Other EPCA Requirements

1. Test Burden

EPCA requires that the test procedures DOE prescribes or amends be reasonably designed to produce test results that measure the energy efficiency, energy use, or estimated annual operating cost of a covered product during a representative average use cycle or period of use. These procedures must also not be unduly burdensome to conduct. *See* 42 U.S.C. 6293(b)(3). DOE has concluded that the amendments proposed in today's notice satisfy this requirement.

The test procedures proposed in this notice apply primarily to products currently unregulated by DOE. Most of these products are very similar to refrigerators, refrigerator-freezers, and freezers, and use insulated cabinets and refrigeration systems to keep the interiors cool. The proposed test procedures are based on, and consistent with, test procedures currently required for testing refrigerators, refrigerator-freezers, and freezers and would not represent any greater test burden than DOE's test procedures for these products.

The proposed test procedures for ice makers differ somewhat from the test procedures for refrigerators, refrigerator-freezers, and freezers. However, the test facilities and instrumentation required for testing ice makers would be nearly identical, and the test duration would be very similar and would represent no greater test burden than what is currently required of manufacturers of those refrigeration products that DOE already regulates.

DOE considered whether the proposed test procedures could be modified to further reduce the burdens of its proposal without negatively affecting test accuracy and concluded that there are no such options for modification that would significantly reduce the burden beyond the steps already taken and described above.

2. Changes in Measured Energy Use

Most of the amendments proposed in today's notice establish test procedures for products for which there currently are no DOE test procedures or energy conservation standards: Cooled cabinets, non-compressor refrigeration products, hybrid freezers, and ice makers. Hence, there are no changes in measured energy use associated with these amendments.

DOE had previously issued guidance that addressed hybrid products as well as refrigerator, refrigerator-freezer, and freezer products that have a wine chiller volume that comprises less than 50 percent of that product's interior volume. While this guidance may not have completely clarified whether existing coverage for refrigerators and refrigerator-freezers extends to any of these products, DOE's proposed coverage determination, published October 31, 2013, has since clarified the extent of this coverage and affirmed that products with a wine storage volume less than 50 percent of the total interior volume are currently subject to the standards applicable to refrigerators and refrigerator-freezers, but that hybrid products are not. 78 FR 65223. Hence, for refrigerator, refrigerator-freezer, and freezer products, including refrigerators and refrigerator-freezers that have a wine chiller comprising less than 50 percent of the product's volume, there also are no changes in measured energy use.

This notice also proposes test procedure amendments for a small minority of product types that are currently covered by DOE's regulations, including non-hybrid refrigerators, refrigerator-freezers, and freezers that have cellar compartments comprising less than half of their total refrigerated volume. The test procedure amendments addressing these products for the most part clarify how to conduct the test, rather than impose any new requirements. Further, to the extent DOE is aware, no actual or planned products in this category (*i.e.,* products with cellar compartments whose volumes are insufficient to meet the proposed hybrid refrigeration product definition) would be affected by the proposed amendments. Hence, DOE does not expect at this time that there would be any change in measured energy consumption for such products.

Today's proposal also would modify the definitions for refrigerator, refrigerator-freezer, and freezer, and would introduce general terms such as consumer refrigeration product to denote groups of covered products. The definitional changes for refrigerator, refrigerator-freezer, and freezer would indicate that these products may contain cellar compartments that comprise less than half of their refrigerated volume, and would otherwise rearrange the order of the requirements to make the structure of all the definitions consistent. DOE is not aware of any existing products whose status would be changed by this amendment, nor does DOE believe that the proposal would change any product's energy use measurement.

DOE requests comment on its findings that there would be no affected products for which there would be changes in measured energy use associated with any of the amendments proposed in this notice.

3. Standby and Off Mode Energy Use

EPCA directs DOE to amend its test procedures to include standby mode and off mode energy consumption. It also requires that this energy consumption be integrated into the overall energy consumption descriptor for the product, unless DOE determines that the current test procedures for the product already fully account for and incorporate the standby and off mode energy consumption of the covered product. (42 U.S.C. 6295(gg)(2)(A)(i)).

DOE's proposal involves measuring the energy use of the affected products during extended time periods that include periods when the compressor and other key components are cycled off. All of the energy these products use during the ''off cycles'' would be included in the measurements. A given refrigeration product being tested could include auxiliary features that draw power in a standby or off mode. In such instances, HRF–1–2008, which is incorporated in relevant part into the proposed test procedures, generally instructs manufacturers to set certain auxiliary features to the lowest power position during testing. In this lowest power position, any standby or off mode energy use of such auxiliary features would be included in the energy measurement. Hence, no separate changes would be needed to account for standby and off mode energy consumption, since the current (and as proposed) procedures address these modes. DOE also notes that it has included an ice storage test for the energy test procedure for ice makers, which effectively addresses standby energy use for these products during times when the ice maker is not actively making ice.

DOE requests comments on its tentative determination that the proposed test procedures would adequately address standby and off mode energy use.

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

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

B. Review Under the Regulatory Flexibility Act

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

For manufacturers of consumer refrigeration products, the Small Business Administration (SBA) has set a size threshold, which defines those entities classified as ''small businesses'' for the purposes of the statute. DOE used the SBA's size standards published on January 31, 1996, as amended, to determine whether any small entities would be required to comply with the rule. 61 FR 3280, 3286, as amended at 67 FR 3041, 3045 (Jan. 23, 2002) and at 69 FR 29192, 29203 (May 21, 2004); see also 65 FR 30836, 30850 (May 15, 2000), as amended at 65 FR 53533, 53545 (Sept. 5, 2000). The size standards are codified at 13 CFR part 121. The standards are listed by North American Industry Classification System (NAICS) code and industry description and are available at *http://www.sba.gov/sites/default/files/files/Size_Standards_Table.pdf.* Miscellaneous refrigeration product manufacturers are classified under NAICS 335222, ''Household Refrigerator and Home Freezer Manufacturing'' and NAICS 333415, ''Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing.'' The SBA sets a threshold of 1,000 employees or less for an entity to be considered as a small business for NAICS 335222 and 750 employees or less for NAICS 333415.

In this NOPR, DOE proposes new test procedures for miscellaneous refrigeration products, comprising cooled cabinets (*e.g.,* wine chillers and beverage centers), hybrid refrigeration products, non-compressor refrigerators, and ice makers. As described in section III.O.2, these products are not currently covered by DOE energy conservation standards. The notice also proposes to amend the test procedure for refrigerators, refrigerator-freezers, and freezers that have cellar compartments that have a volume insufficient to be considered hybrid products under today's proposal. The proposed test procedures, when taken as a whole, may impact manufacturers who would be required to test their products in accordance with these proposed requirements. DOE has analyzed these impacts on small businesses and presents its findings below.

DOE examined the potential impacts of the new testing procedures proposed in this rulemaking under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. In using these procedures, DOE conducted a more focused inquiry into small business manufacturers of products that would be covered by this proposal. During its market survey, DOE used all available public information to identify potential small manufacturers. DOE's research involved the review of product databases (*e.g.,* California Energy Commission (CEC), and Natural Resources Canada (NRCan) databases) and individual company Web sites to create a list of companies that manufacture or sell miscellaneous refrigeration products. DOE reviewed these data to determine whether the entities met the SBA's definition of a small business manufacturer of miscellaneous refrigeration products and screened out companies that do not offer products that would be affected by the proposed amendments, do not meet the definition of a ''small business,'' or are foreign-owned and operated.

DOE identified four small business manufacturers of products that would be affected by today's proposal. From its analysis, DOE determined the expected impacts of the proposed rule on affected small businesses and whether DOE could certify that this rulemaking would not have a significant economic impact on a substantial number of small entities.

If adopted, the proposed test procedure would provide new test procedures for manufacturers to use when evaluating the energy efficiency of all cooled cabinets, ice makers, non-compressor refrigerators, and hybrid refrigeration products as they are all defined in today's proposal. Cooled cabinets are currently regulated by the CEC and NRCan as wine chillers. DOE assumes that such products sold in California and/or Canada are the same products sold in the remaining States. Hence, manufacturers have already tested such products in order to report energy use to CEC and/or NRCan. The proposed test procedure would modify the calculation of energy use for these products, but would not require retesting. The cost to manufacturers associated with testing procedures for the remaining products addressed by today's proposal are estimated to average $2,500 per test. This estimate is based on input from third party testing labs for completing tests as specified by DOE's proposed test procedure.

The primary cost for small businesses under this rulemaking would result from the aforementioned testing requirements. The four identified small businesses manufacture cooled cabinets, hybrid refrigeration products, and ice makers. However, assuming that DOE establishes coverage over the products addressed in this proposal, only products for which manufacturers publicly make energy use claims would be required under Federal law to be tested using a DOE test procedure. (At this time, there are no Federal energy conservation standards in place for these products.) Currently, only wine chillers (treated under this proposal as cooled cabinets) are required to make representations of their energy use by virtue of their coverage by the State of California. Moreover, although some of the four identified small businesses also manufacture ice makers, they do not make any public claims regarding their energy consumption; therefore, these ice makers would not be subject to any testing requirements under this rulemaking. As mentioned above, existing cooled cabinet models that are being sold in the U.S. are assumed to have already been tested, and the proposed test would require only an adjustment of the calculated energy use. Consequently, costs associated with revising the calculations of energy use and revising representations of energy use were applied only to the number of existing basic models of cooled cabinets manufactured by these small businesses, which DOE estimated at 25 cooled cabinet basic models. DOE estimated that revising the energy use representations for these products would require 120 hours of effort for each manufacturer. The average hourly salary for an engineer completing these tasks is estimated at $44.36.[12] Fringe benefits are estimated at 30 percent of total compensation, which brings the hourly costs to employers associated with reviewing and filing of reports to $57.67.[13] Hence, total costs to small businesses to implement the requirements of this rulemaking are estimated at $28,000, or an average of $7,000 per small business.

DOE also considered the additional costs associated with the test procedure requirements of testing and reporting to DOE the energy use of the products other than cooled cabinets that are the subject of this notice. These costs would be incurred if an energy conservation standard were established that imposed efficiency requirements as well as requirements to report energy use for these products. Based on an estimated testing cost of $2,500 per unit, testing of two units per basic model, shipping costs for shipping the units to a test laboratory of $150 per unit, test management and review time of 5 hours per unit, reporting time of 40 hours plus 6 hours per model, and the above hourly rate, the additional costs are estimated at $74,000, or $18,500 per small business.

DOE seeks comment on its estimated additional testing cost from the proposed testing requirements, particularly the impacts of these additional costs on small manufacturers and whether the number of small businesses DOE has identified is accurate.

[12] U.S. Department of Labor, Bureau of Labor Statistics. 2011. National Occupational Employment and Wage Estimates. Washington, DC.

[13] U.S. Department of Labor, Bureau of Labor Statistics. 2010. Employer Costs for Employee Compensation—Management, Professional, and Related Employees. Washington, DC.

DOE also analyzed the testing cost burden relative to the revenues of small manufacturers. Based on this analysis, DOE estimates that the cost burden of the test procedure proposal's requirement for revising representations of cooled cabinets ranges from 0.01 to 0.02 percent of annual revenues, depending on the small entity affected by this test procedure. DOE concludes that these values would be unlikely to represent a significant economic impact for small businesses. The total cost burden, including the cost associated with the additional requirement for testing of the additional products associated with this notice, if energy conservation standards are established, ranges from 0.01 to 0.2 percent of annual revenues. DOE concludes that this also would be unlikely to represent a significant economic impact for small businesses.

Based on the criteria outlined above, DOE has determined that the proposed amendments would not have a ''significant economic impact on a substantial number of small entities,'' and the preparation of a regulatory flexibility analysis is not required. DOE will transmit the 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).

DOE seeks comment on its reasoning that the proposed test procedure changes would not have a significant impact on a substantial number of small entities.

C. Review Under the Paperwork Reduction Act of 1995

DOE has generally established regulations for the certification and recordkeeping requirements for certain covered consumer products and commercial equipment. 76 FR 12422 (March 7, 2011). DOE proposed to add coverage for miscellaneous refrigeration products in a notice published on October 31, 2013. 78 FR 65223. All collections of information from the public by a Federal agency must receive prior approval from OMB. DOE is actively pursuing its renewal and expansion for the information collection for all of its covered products, including miscellaneous refrigeration products. As part of that effort, DOE estimated its public reporting burden for a typical manufacturer that is subject to DOE recordkeeping regulations. DOE estimated that it will take each respondent approximately 30 hours total per company per year to comply with the certification and recordkeeping requirements based on 20 hours of technician/technical work and 10 hours clerical work to actually submit the CCMS templates. DOE has proposed certification requirements for miscellaneous refrigeration products (which would only be required if DOE ultimately issues a coverage determination and sets standards for these products). This rulemaking would include recordkeeping requirements on manufacturers that are associated with executing and maintaining the test data for these products. For the purposes of estimating burden, DOE assumed that each respondent will spend 30 hours total per company per year estimate. DOE recognizes that recordkeeping burden may vary substantially based on company preferences and practices. DOE requests comment on this burden estimate and plans to publish a notice once the information approval is approved by OMB should this rulemaking be finalized as proposed.

D. Review Under the National Environmental Policy Act of 1969

DOE is proposing test procedure amendments that will likely be used to develop and implement future energy conservation standards for miscellaneous refrigeration products. 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, this proposed rule would amend the existing test procedures without affecting the amount, quality or distribution of energy usage, and, therefore, would not result in any environmental impacts. Thus, this rulemaking is covered by Categorical Exclusion A6 under 10 CFR part 1021, subpart D, which applies to any rulemaking that interprets or amends an existing rule without changing the environmental effect of that rule. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

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

F. Review Under Executive Order 12988

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

G. Review Under the Unfunded Mandates Reform Act of 1995

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

I. Review Under Executive Order 12630

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

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

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516, note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). DOE has reviewed today's proposed rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

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

Today's regulatory action proposes to establish test procedures to measure the energy efficiency of miscellaneous refrigeration products, and is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

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

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

The proposed rule would require using testing methods contained in the following commercial standards: AHAM HRF–1–2008, ''Energy and Internal Volume of Refrigerating Appliances'', and ANSI–ASHRAE 29–2009, ''Method of Testing Automatic Ice Makers.'' DOE has evaluated these standards and is unable to conclude whether they fully comply with the requirements of section 32(b) of the FEAA, (*i.e.,* that they were developed in a manner that fully provides for public participation, comment, and review). DOE will consult with the Attorney General and the Chairman of the FTC concerning the impact of these test procedures on competition, prior to prescribing a final rule.

V. Public Participation

A. Attendance at Public Meeting

The time, date and location of the public meeting are listed in the **DATES** and **ADDRESSES** sections at the beginning of this document. If you plan to attend the public meeting, please notify Ms. Brenda Edwards at (202) 586–2945 or *Brenda.Edwards@ee.doe.gov.* Please note that foreign nationals visiting DOE Headquarters are subject to advance security screening procedures. Any foreign national wishing to participate in the meeting should advise DOE as soon as possible by contacting Ms. Regina Washington at (202) 586–1214 or by email: *Regina.Washington@ee.doe.gov.* Please also note that those wishing to bring laptops into the Forrestal Building will be required to obtain a property pass. Visitors should avoid bringing laptops, or allow an extra 45 minutes. Persons can attend the public meeting via webinar. For more information, refer to the Public Participation section near the end of this notice.

DOE requires visitors with laptop computers and other devices, such as tablets, to be checked upon entry into the building. Any person wishing to bring these devices into the Forrestal Building will be required to obtain a property pass. Visitors should avoid bringing these devices, or allow an extra 45 minutes to check in. Please report to the visitor's desk to have devices checked before proceeding through security.

Due to the REAL ID Act implemented by the Department of Homeland Security (DHS), there have been recent changes regarding ID requirements for individuals wishing to enter Federal buildings from specific states and U.S. territories. Driver's licenses from the following states or territory will not be accepted for building entry and one of the alternate forms of ID listed below will be required. DHS has determined that regular driver's licenses (and ID cards) from the following jurisdictions are not acceptable for entry into DOE facilities: Alaska, American Samoa, Arizona, Louisiana, Maine, Massachusetts, Minnesota, New York, Oklahoma, and Washington. Acceptable alternate forms of Photo-ID include: U.S. Passport or Passport Card; an Enhanced Driver's License or Enhanced ID-Card issued by the states of Minnesota, New York or Washington (Enhanced licenses issued by these states are clearly marked Enhanced or Enhanced Driver's License); a military ID or other Federal government issued Photo-ID card.

In addition, you can attend the public meeting via webinar. Webinar registration information, participant instructions, and information about the capabilities available to webinar participants will be published on DOE's Web site, *http://www1.eere.energy.gov/buildings/appliance_standards/rulemaking.aspx?ruleid=105.* Participants are responsible for ensuring their systems are compatible with the webinar software.

B. Procedure for Submitting Prepared General Statements for Distribution

Any person who has plans to present a prepared general statement may request that copies of his or her statement be made available at the public meeting. Such persons may submit requests, along with an advance electronic copy of their statement in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format, to the appropriate address shown in the **ADDRESSES** section at the beginning of this notice. The request and advance copy of statements must be received at least one week before the public meeting and may be emailed, hand-delivered, or sent by mail. DOE prefers to receive requests and advance copies via email. Please include a telephone number to enable DOE staff to make a follow-up contact, if needed.

C. Conduct of Public Meeting

DOE will designate a DOE official to preside at the public meeting and may also use a professional facilitator to aid discussion. The meeting will not be a judicial or evidentiary-type public hearing, but DOE will conduct it in accordance with section 336 of EPCA (42 U.S.C. 6306). A court reporter will be present to record the proceedings and prepare a transcript. DOE reserves the right to schedule the order of presentations and to establish the procedures governing the conduct of the public meeting. After the public meeting and until the end of the comment period, interested parties may submit further comments on the proceedings and any aspect of the rulemaking.

The public meeting will be conducted in an informal, conference style. DOE will present summaries of comments received before the public meeting, allow time for prepared general statements by participants, and encourage all interested parties to share their views on issues affecting this rulemaking. Each participant will be allowed to make a general statement (within time limits determined by DOE), before the discussion of specific topics. DOE will permit, as time permits, other participants to comment briefly on any general statements.

At the end of all prepared statements on a topic, DOE will permit participants to clarify their statements briefly and comment on statements made by others. Participants should be prepared to answer questions by DOE and by other participants concerning these issues. DOE representatives may also ask questions of participants concerning other matters relevant to this rulemaking. The official conducting the public meeting will accept additional comments or questions from those attending, as time permits. The presiding official will announce any further procedural rules or modification of the above procedures that may be needed for the proper conduct of the public meeting.

A transcript of the public meeting will be included in the docket, which can be viewed as described in the *Docket* section at the beginning of this notice. In addition, any person may buy a copy of the transcript from the transcribing reporter.

D. Submission of Comments

DOE will accept comments, data, and information regarding this proposed rule before or after the public meeting, but no later than the date provided in the **DATES** section at the beginning of this proposed rule. Interested parties may submit comments using any of the methods described in the **ADDRESSES** section at the beginning of this notice.

Submitting comments via regulations.gov. The 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 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 regulations.gov cannot be claimed as CBI. Comments received through the Web site 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 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 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 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).

E. Issues on Which DOE Seeks Comment

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

1. DOE requests comment on the use of the term ''cooled cabinet'' to denote products such as wine chillers that maintain compartment temperatures that are warmer than 39 °F and on the proposed definition for these products.

2. DOE requests comment on the use of the terms ''non-compressor cooled cabinet'' and ''non-compressor refrigerator'' to denote products that use alternative refrigeration systems. DOE also requests comment on the definitions proposed for these products, and also on DOE's initial market research indicating that non-compressor refrigerator-freezers and non-compressor freezers are not available for sale.

3. DOE requests comment on the definitions for hybrid products, including on the proposed requirement that hybrid status would require that at least 50 percent of the product's refrigerated volume comprise one or more warm compartments such as wine chiller compartments.

4. DOE requests comment on its proposed definition for ice makers. DOE also requests comment on whether it is necessary to further distinguish ice makers from freezers in the proposed ice maker definition. If so, what specific changes would be needed to the definition to ensure clarity between these two terms?

5. DOE requests comment on its proposed definitions for ''refrigerator, refrigerator-freezer, and freezer'', ''miscellaneous refrigeration product'', and ''consumer refrigeration product.''

6. DOE requests comment on the proposed changes to the definitions for refrigerator, refrigerator-freezer, and freezer that would distinguish these products from commercial refrigeration

equipment. Similarly, DOE also seeks general comments on its proposed clarifying amendments to these definitions.

7. DOE requests comment on its proposal to remove provisions for testing externally vented products from the test procedures.

8. DOE requests comment on its proposed sampling plans and certification report requirements for the products covered by this proposed test procedure. DOE also requests comments on its proposal to establish requirements for allowing use of CAD for volume measurements and for regulations associated with verification of certified volumes for miscellaneous refrigeration products.

9. DOE invites comment on its definition for cellar compartment. DOE also requests comment on whether an alternative term may be more appropriate than ''cellar'' to denote this type of compartment.

10. DOE requests comment on its proposal to use 55 °F as the cellar compartment standardized temperature during testing.

11. DOE requests comments on it proposals for measuring cellar compartment temperatures.

12. DOE requests comment on its proposal to require that cellar compartments with their own temperature control within products that are not cooled cabinets or hybrid refrigeration products be treated as special compartments.

13. DOE requests comment on its proposals for incorporating cellar compartment temperature measurements into the test procedure requirements for temperature control settings and the proposed selection of tests to be used to calculate energy use for cooled cabinets and hybrid refrigeration products.

14. DOE requests comments on the proposals for calculating cellar compartment volume and for using a volume adjustment factor of 1.0 for these compartments for cooled cabinets and a volume adjustment factor of 0.69 for these compartments in other refrigeration products.

15. DOE requests comments on its proposed test procedure changes to address compartments that are convertible between the cellar compartment temperature range and fresh food and/or freezer temperature range.

16. DOE requests comment on its proposals for ambient temperatures and usage adjustment factors for both vapor-compression and non-compressor cooled cabinets. DOE requests information regarding field energy use of wine chillers and other cooled cabinets which it could use to confirm or adjust the proposed adjustment factors.

17. DOE requests comment on its proposal, for cooled cabinets equipped with manual light switches, that only one test would be required, with the lighting control set to its lowest energy use position.

18. DOE seeks comment on its proposal to require testing of non-compressor refrigerators in 90 °F ambient temperature conditions, to require that their energy use be calculated with a usage factor equal to 1.0, and to require that certification reports include the fresh food compartment temperature attained in testing (if warmer than 39 °F). DOE also requests comment on its potential consideration of adjustments to the energy conservation standards to be developed for non-compressor refrigerators that would address the reduced stringency of a test in which the compartment temperature is warmer than the standardized temperature.

19. DOE requests comment on its proposal that non-compressor refrigeration system cycling be addressed in the test procedure by indicating that the term ''compressor cycles'' means ''refrigeration system cycles'' for such products.

20. DOE requests comment on its proposal to incorporate into Appendices A and B the extrapolation approach when testing refrigeration products other than non-compressor refrigerators, subject to the requirement that the measured warm-setting compartment temperature(s) must be warmer than the cold-setting compartment temperatures and that the measured energy use must be lower in the warm setting.

21. DOE seeks comments on its proposal to specify that hybrid refrigeration products be tested in 90 °F ambient temperature conditions, and that their energy use be calculated using a 0.85 usage adjustment factor.

22. DOE requests comment on its proposals to incorporate cellar compartment temperatures into the test procedure requirements for setting temperature controls, conducting tests, and calculating product energy consumption.

23. DOE requests comments on the proposed definitions delineating different types of ice makers. DOE also seeks comment on whether the industry uses terminology that would be more technically accurate (and descriptive) when distinguishing cooled-storage from uncooled-storage ice makers.

24. DOE requests comment on its proposed definitions to support the proposed test procedures for ice makers.

25. DOE requests comment on its proposal to establish an energy use metric for ice makers that includes both ice production and ice storage energy use, and whether the proposed metric would sufficiently capture the total energy consumption of both cooled-storage and uncooled-storage ice makers.

26. DOE requests comment on its proposed daily ice consumption rate of 4 lb per day. DOE also seeks access to field or survey data that would yield, if possible, a more representative value for a daily ice consumption rate. DOE also requests comment on whether the daily ice consumption rate used in its proposal should vary based on ice maker harvest rate, and if so, how the rate should vary.

27. DOE requests comment on its proposal to require testing of ice makers in a 72 °F ambient temperature condition and its proposal to otherwise apply to ice makers all of the set-up requirements applicable to ice makers that are currently required for refrigerators, refrigerator-freezers, and freezers. DOE also seeks comment on its assumption that ice makers are not opened as frequently as other refrigeration products.

28. DOE requests comment on whether its proposed water temperature conditions for portable and non-portable ice makers are appropriate: 72 ± 2 °F temperature and 60 ± 15 psig pressure for non-portable ice makers, and 55 ± 2 °F temperature for portable ice makers.

29. DOE requests comment on all aspects of its proposed test conditions and test set-up requirements for ice makers. DOE also requests comment on its proposals for ice maker drain lines and for drain pumps. DOE also requests information regarding the power consumption of such pumps.

30. DOE requests comment on the proposed two-hour stabilization period for the icemaking portion of the test for ice makers.

31. DOE requests comment on its proposal to require that ice be retrieved within two-minutes after the end of the icemaking test period and seeks suggestions and alternative ice collection delay limits. DOE also seeks any supporting data regarding the proposed and alternative limits.

32. DOE seeks comment on its proposed use of a perforated container and the container specifications, the proposed requirements for the scale used to measure the ice weight, the proposed requirement to leave the ice

produced during the stabilization period in the ice storage bin (*i.e.,* the six-hour test period), or any other aspect of the proposed test.

33. DOE requests comment on its proposed methodology for measuring ice storage energy consumption for both cooled-storage and uncooled-storage ice makers. In particular, it requests comment on whether its proposed duration for the uncooled-storage test period is of sufficient length to reduce the variability in test results that might be caused by the inconsistent intervals between ice production and idle periods when the ice maker is operating only to replenish melted ice.

34. DOE requests comment on its proposed adjustment to the icemaking energy use for continuous-type ice makers to account for ice hardness less than 100 percent, and its proposed approach that would allow use of either an ice hardness value measured using calorimetry or a standard ice hardness factor. DOE also requests comment on whether its proposed ice hardness factor of 0.85 is an appropriate value to represent the nugget ice expected to be used in consumer continuous-type ice makers.

35. DOE requests comment on its proposed method for calculating the daily energy consumption of ice makers. In addition, DOE requests comment on whether 0.5 is an appropriate annual usage adjustment factor for portable ice makers and seeks access to field or survey data that could help it develop a more representative assumption.

36. DOE requests comment on its proposal to change the term ''test period'' to ''test'' in sections 6.2.1.1, 6.2.1.2, 6.2.2.1, 6.2.3.1, and 6.2.4.1 of Appendix A and in sections 6.2.1.1 and 6.2.1.2 of Appendix B.

37. DOE requests comment on its proposal to refer to primary compartments as ''primary'' compartments rather than ''first'' compartments in its discussions of separate auxiliary compartments.

38. DOE requests comments on its proposal to replace ''should'' with ''must'' in its definition for variable defrost.

39. DOE requests comment on its proposed extension of the requirements of Appendix A, sections 2.4, 2.5, and 2.11 to the appropriate new products addressed by this notice.

40. DOE requests comment on the proposed clarifications to the refrigerated volume measurements in Appendices A and B, which are consistent with the August 2012 Guidance.

41. DOE requests comments on its proposal to modify the designation for adjusted volume to ''AV'' in Appendices A and B, and its proposal to require that the volumes of freezer, fresh food, and cellar compartments be rounded to the nearest 0.01 cubic foot before calculation of a product's total refrigerated volume or adjusted volume.

42. DOE seeks comment on its reasoning that the proposed test procedure changes would not have a significant impact on a substantial number of small entities.

VI. Approval of the Office of the Secretary

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

List of Subjects

10 CFR Part 429

Confidential business information, Energy conservation, Household appliances, Imports, Reporting and recordkeeping requirements.

10 CFR Part 430

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Incorporation by reference, Intergovernmental relations, Small businesses.

Issued in Washington, DC, on November 26, 2014.

Kathleen B. Hogan,

Deputy Assistant Secretary for Energy Efficiency, Energy Efficiency and Renewable Energy.

For the reasons stated in the preamble, DOE is proposing to amend parts 429 and 430 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.

■ 2. Amend § 429.14 by:

■ a. Revising the section heading and paragraph (a)(3); and

■ b. Adding paragraphs (c) and (d).

The revision and additions read as follows:

§ 429.14 Consumer refrigerators, refrigerator-freezers and freezers.

(a) * * *

(3) The value of total refrigerated volume of a basic model reported in accordance with paragraph (b)(2) of this section shall be the mean of the total refrigerated volumes measured for each tested unit of the basic model or the total refrigerated volume of the basic model as calculated in accordance with § 429.72(c). The value of adjusted total volume of a basic model reported in accordance with paragraph (b)(2) of this section shall be the mean of the adjusted total volumes measured for each tested unit of the basic model or the adjusted total volume of the basic model as calculated in accordance with § 429.72(c).

* * * * *

(c) *Rounding requirements for representative values, including certified and rated values.*

(1) The represented value of annual energy use must be rounded to the nearest kilowatt hour per year.

(2) The represented value of total refrigerated volume must be rounded to the nearest 0.1 cubic foot.

(3) The represented value of adjusted total volume must be rounded to the nearest 0.1 cubic foot.

(d) *Product category determination.* Each basic model shall be certified according to the appropriate product category as defined in § 430.2 based on compartment volumes and compartment temperatures.

(1) Compartment volumes used to determine product category shall be measured according to the provisions in section 5.3 of appendix A of subpart B of part 430 of this chapter for refrigerators and refrigerator-freezers and section 5.3 of appendix B of subpart B of part 430 of this chapter for freezers; and

(2) Compartment temperatures used to determine product category shall be measured according to the provisions section 5.1 of appendix A of subpart B of part 430 of this chapter for refrigerators and refrigerator-freezers and section 5.1 of appendix B of subpart B of part 430 of this chapter for freezers, except that the compartment temperatures shall be measured with an ambient temperature of 72.0±1.0 degrees Fahrenheit (22.2±0.6 degrees Celsius).

■ 3. Add § 429.61 to read as follows:

§ 429.61 Miscellaneous refrigeration products.

(a) Sampling plan for selection of units for testing.

(1) The requirements of § 429.11 are applicable to miscellaneous refrigeration products; and

(2) For each basic model of miscellaneous refrigeration product, a sample of sufficient size shall be randomly selected and tested to ensure that—

(i) Any represented value of estimated annual operating cost, energy consumption, or other measure of energy consumption of a basic model for which consumers would favor lower values shall be greater than or equal to the higher of:

(A) 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

(B) 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% one-tailed confidence interval with n-1 degrees of freedom (from appendix A of subpart B of part 430 of this chapter).

and

(ii) Any represented value of the energy factor or other measure of energy consumption of a basic model for which consumers would favor higher values shall be less than or equal to the lower of:

(A) 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

(B) The lower 95 percent confidence limit (LCL) of the true mean divided by 0.90, where:

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

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% one-tailed confidence interval with n-1 degrees of freedom (from appendix A of subpart B of part 430 of this chapter).

(3) The value of total refrigerated volume of a basic model reported in accordance with paragraph (b)(2) of this section shall be the mean of the total refrigerated volumes measured for each tested unit of the basic model or the total refrigerated volume of the basic model as calculated in accordance with § 429.72(d). The value of adjusted total volume of a basic model reported in accordance with paragraph (b)(2) of this section shall be the mean of the adjusted total volumes measured for each tested unit of the basic model or the adjusted total volume of the basic model as calculated in accordance with § 429.72(d).

(b) Certification reports.

(1) The requirements of § 429.12 are applicable to miscellaneous refrigeration products; and

(2) Pursuant to § 429.12(b)(13), a certification report shall include the following public product-specific information:

(i) For cooled cabinets, hybrid refrigeration products, and non-compressor refrigerators: the annual energy use in kilowatt hours per year (kWh/yr); the total refrigerated volume in cubic feet (cu ft) and the total adjusted volume in cubic feet (cu ft).

(ii) For non-compressor refrigerators and hybrid non-compressor refrigerators, the cold-setting fresh food compartment temperature average calculated for tests used for certification, if this value is greater than 39 °F.

(iii) For ice makers: The annual energy use in kilowatt-hours per year (kWh/yr), the harvest rate in pounds of ice per day (lb/day), and, for continuous-type ice makers, the ice hardness (as defined in section 5 of appendix BB to subpart B of part 430 of this chapter) used to calculate the energy use.

(3) Pursuant to § 429.12(b)(13), a certification report must include the following additional product-specific information for cooled cabinets, hybrid refrigeration products, and non-compressor refrigerators: Whether the basic model has variable defrost control (in which case, manufacturers must also report the values, if any, of CT_L and CT_M (For an example, see section 5.2.1.3 in appendix A to subpart B of part 430 of this chapter.) used in the calculation of energy consumption), whether the basic model has variable anti-sweat heater control (in which case, manufacturers must also report the values of heater Watts at the ten humidity levels 5%, 15%, through 95% used to calculate the variable anti-sweat heater ''Correction Factor''), and whether testing has been conducted with modifications to the standard temperature sensor locations specified by the figures referenced in section 5.1 of appendices A and B to subpart B of part 430 of this chapter.

(c) *Rounding requirements for representative values, including certified and rated values.*

(1) The represented value of annual energy use must be rounded to the nearest kilowatt hour per year.

(2) The represented value of total refrigerated volume must be rounded to the nearest 0.1 cubic foot.

(3) The represented value of adjusted total volume must be rounded to the nearest 0.1 cubic foot.

(4) The represented value of cold-setting fresh food compartment temperature must be rounded to the nearest 0.1 degree Fahrenheit.

(5) The represented value of harvest rate must be rounded to the nearest 0.1 pound of ice per day.

(6) The represented value of ice hardness (as defined in section 5 of appendix BB to subpart B of part 430 of this chapter) must be rounded to the nearest 0.01.

(d) *Product category determination.* Each basic model for miscellaneous refrigeration products other than ice makers shall be certified according to the appropriate product category as defined in § 430.2 based on compartment volumes and compartment temperatures.

(1) Compartment volumes used to determine product category shall be measured according to the provisions in section 5.3 of appendix A to subpart B of part 430 of this chapter; and

(2) Compartment temperatures used to determine product category shall be measured according to the provisions section 5.1 of appendix A to subpart B of part 430 of this chapter, except that the compartment temperatures shall be measured with an ambient temperature of 72.0 ± 1.0 degrees Fahrenheit (22.2 ± 0.6 degrees Celsius).

■ 4. Amend § 429.72 by adding paragraph (d) to read as follows:

§ 429.72 Alternative methods for determining non-energy ratings.

* * * * *

(d) *Miscellaneous refrigeration products.* The total refrigerated volume of a miscellaneous refrigeration product basic model may be determined by performing a calculation of the volume based upon computer-aided design (CAD) models of the basic model in lieu of physical measurements of a production unit of the basic model. Any value of total adjusted volume of a basic model reported to DOE in a certification of compliance in accordance with § 429.61(b)(2) must be calculated using the CAD-derived volume(s) and the applicable provisions in the test procedures in part 430 of this chapter for measuring volume. The calculated value must be within two percent, or 0.5 cubic feet (0.2 cubic feet for products with total refrigerated volume less than

7.75 cubic feet (220 liters)), whichever is greater, of the volume of a production unit of the basic model measured in accordance with the applicable test procedure in part 430 of this chapter.

■ 5. Amend § 429.134 by

■ a. Revising paragraph (b)(1)(ii)(B); and

■ b. Adding paragraph (c).

The addition and revision reads as follows:

§ 429.134 Product-specific enforcement provisions.

* * * * *

(b) * * *

(1) * * *

(ii) * * *

(B) If the certified total refrigerated volume is found to be invalid, the average measured adjusted total volume, rounded to the nearest 0.1 cubic foot, will serve as the basis for calculation of maximum allowed energy use for the tested basic model.

* * * * *

(c) *Miscellaneous refrigeration products*—

(1) *Verification of total refrigerated volume.* For all miscellaneous refrigeration products except ice makers, the total refrigerated volume of the basic model will be measured pursuant to the test requirements of part 430 of this chapter for each unit tested. The results of the measurement(s) will be averaged and compared to the value of total refrigerated volume certified by the manufacturer. The certified total refrigerated volume will be considered valid only if

(i) The measurement is within two percent, or 0.5 cubic feet (0.2 cubic feet for products with total refrigerated volume less than 7.75 cubic feet (220 liters)), whichever is greater, of the certified total refrigerated volume, or

(ii) The measurement is greater than the certified total refrigerated volume.

(A) If the certified total refrigerated volume is found to be valid, the certified adjusted total volume will be used as the basis for calculating the maximum allowed energy use for the tested basic model.

(B) If the certified total refrigerated volume is found to be invalid, the average measured adjusted total volume, rounded to the nearest 0.1 cubic foot, will serve as the basis for calculating the maximum allowed energy use for the tested basic model.

(2) For all miscellaneous refrigeration products except ice makers, test for models with two compartments, each having its own user-operable temperature control. The test described in section 3.3 of the applicable test procedure in appendix A to subpart B part 430 of this chapter shall be used for all units of a tested basic model before DOE makes a determination of noncompliance with respect to the basic model.

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

■ 6. The authority citation for part 430 continues to read as follows:

Authority: 42 U.S.C. 6291–6309; 28 U.S.C. 2461 note.

■ 7. Amend § 430.2 by:

■ a. Adding, in alphabetical order, definitions for ''all-refrigerator,'' ''batch-type ice maker,'' ''consumer refrigeration product,'' ''continuous-type ice maker,'' ''cooled cabinet,'' ''cooled-storage ice maker,'' ''hybrid all-refrigerator,'' ''hybrid freezer,'' ''hybrid non-compressor all-refrigerator,'' ''hybrid non-compressor refrigerator,'' ''hybrid refrigerator,'' ''hybrid refrigerator-freezer,'' ''hybrid refrigeration product,'' ''ice maker,'' ''miscellaneous refrigeration product,'' ''non-compressor all-refrigerator,'' ''non-compressor cooled cabinet,'' ''non-compressor refrigerator,'' ''portable ice maker,'' and ''uncooled-storage ice maker;''

■ b. Revising the definitions for ''freezer,'' ''refrigerator,'' and ''refrigerator-freezer;'' and

■ c. Removing the definitions for ''electric refrigerator'' and ''electric refrigerator-freezer.''

The additions and revisions read as follows:

§ 430.2 Definitions.

* * * * *

All-refrigerator means a refrigerator that does not include a compartment capable of maintaining compartment temperatures below 32 °F (0 °C) as determined according to the provisions in § 429.14(c)(2). It may include a compartment of 0.50 cubic-foot capacity (14.2 liters) or less for the freezing and storage of ice.

* * * * *

Batch-type ice maker means an ice maker that has alternating freezing and harvesting periods.

* * * * *

Consumer refrigeration product means a refrigerator, refrigerator-freezer, freezer, or miscellaneous refrigeration product as defined in this section.

Continuous-type ice maker means an ice maker that continually and simultaneously freezes and harvests ice.

* * * * *

Cooled cabinet means a cabinet that has a source of refrigeration requiring electric energy input only and is capable of maintaining compartment temperatures either (a) no lower than 39 °F (3.9 °C), or (b) in a range that extends no lower than 37 °F (2.8 °C) but at least as high as 60 °F (15.6 °C) as determined according to the provisions in § 429.61(c)(2).

Cooled-storage ice maker means an ice maker that maintains ice storage bin temperatures below 32 °F (0 °C).

* * * * *

Freezer means a cabinet that has a source of refrigeration that requires single phase alternating current electric energy input only and is capable of maintaining compartment temperatures of 0 °F (−17.8 °C) or below as determined according to the provisions in § 429.14(c)(2). It does not include any refrigerated cabinet that consists solely of an automatic ice maker and an ice storage bin arranged so that operation of the automatic icemaker fills the bin to its capacity. A freezer may include one or more cellar compartments, as defined in Appendix B of subpart B of this part, whose combined refrigerated volume is less than half the total refrigerated volume of the product. However, the term does not include any product:

(1) With one or more permanently open compartments;

(2) Which does not include a compressor and condenser unit as an integral part of the cabinet assembly; or

(3) That is certified under one or more of the following commercial standards:

(i) ANSI/NSF 7–2009 *International Standard for Food Equipment—Commercial Refrigerators and Freezers;* or

(ii) ANSI/UL 471–2006 *UL Standard for Commercial Refrigerators and Freezers.*

* * * * *

Hybrid all-refrigerator means a hybrid refrigerator that does not include a compartment capable of maintaining compartment temperatures below 32 °F (0 °C) as determined according to the provisions in § 429.61(c)(2). It may include a compartment of 0.50 cubic-foot capacity (14.2 liters) or less for the freezing and storage of ice.

Hybrid freezer means a cabinet that has a source of refrigeration that includes a compressor and condenser unit and requires electric energy input only, and consists of two or more compartments where:

(1) At least half but not all of its refrigerated volume is comprised of one or more cellar compartments, as defined in Appendix A of subpart B of this part, and

(2) The remaining compartment(s) are capable of maintaining compartment temperatures at 0 °F (−17.8 °C) or

below as determined according to the provisions in § 429.61(c)(2).

Hybrid non-compressor all-refrigerator means a hybrid non-compressor refrigerator that does not include a compartment capable of maintaining compartment temperatures below 32 °F (0 °C) as determined according to the provisions in § 429.61(c)(2). It may include a compartment of 0.50 cubic-foot capacity (14.2 liters) or less for the freezing and storage of ice.

Hybrid non-compressor refrigerator means a non-compressor refrigerator with at least half of its refrigerated volume composed of one or more cellar compartments, as defined in Appendix A of subpart B of this part.

Hybrid refrigerator means a cabinet that has a source of refrigeration that includes a compressor and condenser unit and requires electric energy input only, and consists of two or more compartments where:

(1) At least half but not all of its refrigerated volume is comprised of one or more cellar compartments, as defined in Appendix A of subpart B of this part,

(2) At least one of the remaining compartments is capable of maintaining compartment temperatures above 32 °F (0 °C) and below 39 °F (3.9 °C) as determined according to § 429.61(c)(2),

(3) The cabinet may also include a compartment capable of maintaining compartment temperatures below 32 °F (0 °C) as determined according to § 429.61(c)(2), but

(4) It does not provide a separate low temperature compartment capable of maintaining compartment temperatures below 8 °F (−13.3 °C) as determined according to § 429.61(c)(2).

Hybrid refrigerator-freezer means a cabinet that has a source of refrigeration that includes a compressor and condenser unit and requires electric energy input only, and consists of three or more compartments where:

(1) At least half but not all of its refrigerated volume is comprised of one or more cellar compartments, as defined in Appendix A of subpart B of this part,

(2) At least one of the remaining compartments is capable of maintaining compartment temperatures above 32 °F (0 °C) and below 39 °F (3.9 °C) as determined according § 429.61(c)(2), and

(3) At least one other compartment is capable of maintaining compartment temperatures below 8 °F (−13.3 °C) and may be adjusted by the user to a temperature of 0 °F (−17.8 °C) or below as determined according to § 429.61(c)(2).

Hybrid refrigeration product means a hybrid refrigerator, hybrid refrigerator-freezer, hybrid freezer, or hybrid non-compressor refrigerator as defined in this section.

Ice maker means a consumer product other than a refrigerator, refrigerator-freezer, freezer, hybrid refrigeration product, non-compressor refrigerator, or cooled cabinet designed to automatically produce and harvest ice, but excluding any basic model that is certified under NSF/ANSI 12–2012 *Automatic Ice Making Equipment.* Such a product may also include a means for storing ice, dispensing ice, or storing and dispensing ice.

* * * * *

Miscellaneous refrigeration product means a consumer refrigeration product other than a refrigerator, refrigerator-freezer, or freezer, which includes hybrid refrigeration products, cooled cabinets, non-compressor refrigerators, and ice makers.

* * * * *

Non-compressor all-refrigerator means a non-compressor refrigerator that is not a hybrid non-compressor refrigerator and that does not include a compartment capable of maintaining compartment temperatures below 32 °F (0 °C) as determined according to § 429.61(c)(2). It may include a compartment of 0.50 cubic-foot capacity (14.2 liters) or less for the freezing and storage of ice.

Non-compressor cooled cabinet means a cooled cabinet that has a source of refrigeration that does not include a compressor and condenser unit.

Non-compressor refrigerator means a cabinet that has a source of refrigeration that does not include a compressor and condenser unit, requires electric energy input only, and is capable of maintaining compartment temperatures above 32 °F (0 °C) and below 39 °F (3.9 °C) as determined according to § 429.61(c)(2). A non-compressor refrigerator may include a compartment capable of maintaining compartment temperatures below 32 °F (0 °C) as determined according to § 429.61(c)(2). A non-compressor refrigerator also may include one or more cellar compartments, as defined in Appendix A of subpart B of this part, if the combined refrigerated volume of these compartments is less than half the total refrigerated volume of the product.

* * * * *

Portable ice maker means an ice maker that does not require connection to a household water supply for operation and is operable using one or more on-board reservoirs that must be manually supplied with water.

* * * * *

Refrigerator means a cabinet that has a source of refrigeration that requires single phase alternating current electric energy input only and is capable of maintaining compartment temperatures above 32 °F (0 °C) and below 39 °F (3.9 °C) as determined according to § 429.14(c)(2). A refrigerator may include a compartment capable of maintaining compartment temperatures below 32 °F (0 °C), but does not provide a separate low temperature compartment capable of maintaining compartment temperatures below 8 °F (−13.3 °C) as determined according to § 429.14(c)(2). A refrigerator also may include one or more cellar compartments, as defined in Appendix A of subpart B of this part, if the combined refrigerated volume of the cellar compartment(s) is less than half the total refrigerated volume of the product. However, the term does not include any product:

(1) With one or more permanently open compartments;

(2) Which does not include a compressor and condenser unit as an integral part of the cabinet assembly; or

(3) That is certified under one or more of the following commercial standards:

(i) ANSI/NSF 7–2009 *International Standard for Food Equipment—Commercial Refrigerators and Freezers;* or

(ii) ANSI/UL 471–2006 *UL Standard for Commercial Refrigerators and Freezers.*

Refrigerator-freezer means a cabinet that has a source of refrigeration that requires single phase alternating current electric energy input only and consists of two or more compartments where at least one of the compartments is capable of maintaining compartment temperatures above 32 °F (0 °C) and below 39 °F (3.9 °C) as determined according to § 429.14(c)(2), and at least one other compartment is capable of maintaining compartment temperatures below 8 °F (−13.3 °C) and may be adjusted by the user to a temperature of 0 °F (−17.8 °C) or below as determined according to § 429.14(c)(2). A refrigerator-freezer may include one or more cellar compartments, as defined in Appendix A of subpart B of this part, if the total refrigerated volume of the cellar compartment(s) is less than half the total refrigerated volume of the product. However, the term does not include any cabinet:

(1) With one or more permanently open compartments;

(2) Which does not include a compressor and condenser unit as an integral part of the cabinet assembly; or

(3) That is certified under one or more of the following commercial standards:

(i) ANSI/NSF 7–2009 *International Standard for Food Equipment–Commercial Refrigerators and Freezers;* or

(ii) ANSI/UL 471–2006 *UL Standard for Commercial Refrigerators and Freezers.*

* * * * *

Uncooled-storage ice maker means an ice maker that does not maintain ice storage bin temperatures below 32 °F.

■ 8. Amend § 430.3 by:

■ a. Revising introductory paragraph (f) and paragraph (h)(6);

■ b. Removing paragraph (f)(1);

■ c. Redesignating paragraph (f)(2) as (f)(1);

■ d. Adding paragraph (f)(2); and

■ e. Removing and reserving paragraph (h)(5).

The revisions and additions read as follows:

§ 430.3 Materials incorporated by reference.

* * * * *

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

* * * * *

(2) 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; IBR approved for appendix BB of subpart B.

* * * * *

(h) * * *

(6) AHAM HRF–1–2008, (''HRF–1–2008''), Association of Home Appliance Manufacturers, Energy and Internal Volume of Refrigerating Appliances (2008), including Errata to Energy and Internal Volume of Refrigerating Appliances, Correction Sheet issued November 17, 2009, IBR approved for appendices A, B, and BB to subpart B.

* * * * *

■ 9. Amend § 430.23 by:

■ a. Revising paragraphs (a) and (b); and

■ b. Adding paragraphs (dd) and (ee).

The revisions and additions read as follows:

§ 430.23 Test procedures for the measurement of energy and water consumption.

(a) *Refrigerators and refrigerator-freezers.* (1) The estimated annual operating cost for models without an anti-sweat heater switch shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) The average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to section 6.2 of appendix A of this subpart; and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(2) The estimated annual operating cost for models with an anti-sweat heater switch shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) Half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to section 6.2 of appendix A of this subpart; and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(3) The estimated annual operating cost for any other specified cycle type shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) The average per-cycle energy consumption for the specified cycle type, determined according to section 6.2 of appendix A of this subpart; and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(4) The energy factor, expressed in cubic feet per kilowatt-hour per cycle, shall be:

(i) For models without an anti-sweat heater switch, the quotient of:

(A) The adjusted total volume in cubic feet, determined according to section 6.1 of appendix A of this subpart, divided by—

(B) The average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to section 6.2 of appendix A of this subpart, the resulting quotient then being rounded off to the second decimal place; and

(ii) For models having an anti-sweat heater switch, the quotient of:

(A) The adjusted total volume in cubic feet, determined according to section 6.1 of appendix A of this subpart, divided by—

(B) Half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to section 6.2 of appendix A of this subpart, the resulting quotient then being rounded off to the second decimal place.

(5) The annual energy use, expressed in kilowatt-hours per year, shall be the following, rounded to the nearest kilowatt-hour per year:

(i) For models without an anti-sweat heater switch, the representative average use cycle of 365 cycles per year multiplied by the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to section 6.2 of appendix A of this subpart, and

(ii) For models having an anti-sweat heater switch, the representative average use cycle of 365 cycles per year multiplied by half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to section 6.2 of appendix A of this subpart.

(6) Other useful measures of energy consumption shall be those measures of energy consumption that the Secretary determines are likely to assist consumers in making purchasing decisions which are derived from the application of appendix A of this subpart.

(7) The following principles of interpretation shall be applied to the test procedure. The intent of the energy test procedure is to simulate typical room conditions (72 °F (22.2 °C)) with door openings, by testing at 90 °F (32.2 °C) without door openings. Except for operating characteristics that are affected by ambient temperature (for example, compressor percent run time), the unit, when tested under this test procedure, shall operate in a manner equivalent to the unit's operation while in typical room conditions.

(i) The energy used by the unit shall be calculated when a calculation is provided by the test procedure. Energy consuming components that operate in typical room conditions (including as a result of door openings, or a function of humidity), and that are not exempted by this test procedure, shall operate in an equivalent manner during energy testing under this test procedure, or be accounted for by all calculations as provided for in the test procedure.

Examples:

(A) Energy saving features that are designed to operate when there are no door openings for long periods of time shall not be functional during the energy test.

(B) The defrost heater shall neither function nor turn off differently during the energy test than it would when in typical room conditions. Also, the product shall not recover differently during the defrost recovery period than it would in typical room conditions.

(C) Electric heaters that would normally operate at typical room conditions with door openings shall also operate during the energy test.

(D) Energy used during adaptive defrost shall continue to be measured and adjusted per the calculation provided for in this test procedure.

(ii) DOE recognizes that there may be situations that the test procedures do not completely address. In such cases, a manufacturer must obtain a waiver in accordance with the relevant provisions of 10 CFR part 430 if:

(A) A product contains energy consuming components that operate differently during the prescribed testing than they would during representative average consumer use; and

(B) Applying the prescribed test to that product would evaluate it in a manner that is unrepresentative of its true energy consumption (thereby providing materially inaccurate comparative data).

(b) *Freezers.* (1) The estimated annual operating cost for freezers without an anti-sweat heater switch shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) The average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to section 6.2 of appendix B of this subpart; and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(2) The estimated annual operating cost for freezers with an anti-sweat heater switch shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) Half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to section 6.2 of appendix B of this subpart; and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(3) The estimated annual operating cost for any other specified cycle type for freezers shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) The average per-cycle energy consumption for the specified cycle type, determined according to section 6.2 of appendix B of this subpart; and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(4) The energy factor for freezers, expressed in cubic feet per kilowatt-hour per cycle, shall be:

(i) For freezers not having an anti-sweat heater switch, the quotient of:

(A) The adjusted net refrigerated volume in cubic feet, determined according to section 6.1 of appendix B of this subpart, divided by—

(B) The average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 of appendix B of this subpart, the resulting quotient then being rounded off to the second decimal place; and

(ii) For freezers having an anti-sweat heater switch, the quotient of:

(A) The adjusted net refrigerated volume in cubic feet, determined according to 6.1 of appendix B of this subpart, divided by—

(B) Half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to section 6.2 of appendix B of this subpart, the resulting quotient then being rounded off to the second decimal place.

(5) The annual energy use of all freezers, expressed in kilowatt-hours per year, shall be the following, rounded to the nearest kilowatt-hour per year:

(i) For freezers not having an anti-sweat heater switch, the representative average use cycle of 365 cycles per year multiplied by the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to section 6.2 of appendix B of this subpart, and

(ii) For freezers having an anti-sweat heater switch, the representative average use cycle of 365 cycles per year multiplied by half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to section 6.2 of appendix B of this subpart.

(6) Other useful measures of energy consumption for freezers shall be those measures the Secretary determines are likely to assist consumers in making purchasing decisions and are derived from the application of appendix B of this subpart.

(7) The following principles of interpretation should be applied to the test procedure. The intent of the energy test procedure is to simulate typical room conditions (72 °F (22.2 °C)) with door openings by testing at 90 °F (32.2 °C) without door openings. Except for operating characteristics that are affected by ambient temperature (for example, compressor percent run time), the unit, when tested under this test procedure, shall operate in a manner equivalent to the unit's operation while in typical room conditions.

(i) The energy used by the unit shall be calculated when a calculation is provided by the test procedure. Energy consuming components that operate in typical room conditions (including as a result of door openings, or a function of humidity), and that are not exempted by this test procedure, shall operate in an equivalent manner during energy testing under this test procedure, or be accounted for by all calculations as provided for in the test procedure. Examples:

(A) Energy saving features that are designed to operate when there are no door openings for long periods of time shall not be functional during the energy test.

(B) The defrost heater shall neither function nor turn off differently during the energy test than it would when in typical room conditions. Also, the product shall not recover differently during the defrost recovery period than it would in typical room conditions.

(C) Electric heaters that would normally operate at typical room conditions with door openings shall also operate during the energy test.

(D) Energy used during adaptive defrost shall continue to be measured and adjusted per the calculation provided for in this test procedure.

(ii) DOE recognizes that there may be situations that the test procedures do not completely address. In such cases, a manufacturer must obtain a waiver in accordance with the relevant provisions of 10 CFR part 430 if:

(A) A product contains energy consuming components that operate differently during the prescribed testing than they would during representative average consumer use and

(B) Applying the prescribed test to that product would evaluate it in a manner that is unrepresentative of its true energy consumption (thereby providing materially inaccurate comparative data).

* * * * *

(dd) *Cooled cabinets, non-compressor refrigerators, and hybrid refrigeration products.*

(1) The estimated annual operating cost for models without an anti-sweat heater switch shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) The average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to section 6.2 of appendix A of this subpart; and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(2) The estimated annual operating cost for models with an anti-sweat heater switch shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) Half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to section 6.2 of appendix A of this subpart; and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(3) The estimated annual operating cost for any other specified cycle type shall be the product of the following three factors, the resulting product then being rounded off to the nearest dollar per year:

(i) The representative average-use cycle of 365 cycles per year;

(ii) The average per-cycle energy consumption for the specified cycle type, determined according to section 6.2 of appendix A to this subpart; and

(iii) The representative average unit cost of electricity in dollars per kilowatt-hour as provided by the Secretary.

(4) The energy factor, expressed in cubic feet per kilowatt-hour per cycle, shall be:

(i) For models without an anti-sweat heater switch, the quotient of:

(A) The adjusted total volume in cubic feet, determined according to section 6.1 of appendix A of this subpart, divided by—

(B) The average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to section 6.2 of appendix A of this subpart, the resulting quotient then being rounded off to the second decimal place; and

(ii) For models having an anti-sweat heater switch, the quotient of:

(A) The adjusted total volume in cubic feet, determined according to section 6.1 of appendix A of this subpart, divided by —

(B) Half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to section 6.2 of appendix A of this subpart, the resulting quotient then being rounded off to the second decimal place.

(5) The annual energy use, expressed in kilowatt-hours per year, shall be the following, rounded to the nearest kilowatt-hour per year:

(i) For models without an anti-sweat heater switch, the representative average use cycle of 365 cycles per year multiplied by the average per-cycle energy consumption for the standard cycle in kilowatt-hours per cycle, determined according to 6.2 of appendix A of this subpart, and

(ii) For models having an anti-sweat heater switch, the representative average use cycle of 365 cycles per year multiplied by half the sum of the average per-cycle energy consumption for the standard cycle and the average per-cycle energy consumption for a test cycle type with the anti-sweat heater switch in the position set at the factory just before shipping, each in kilowatt-hours per cycle, determined according to section 6.2 of appendix A of this subpart.

(6) Other useful measures of energy consumption shall be those measures of energy consumption that the Secretary determines are likely to assist consumers in making purchasing decisions which are derived from the application of appendix A of this subpart.

(7) The following principles of interpretation shall be applied to the test procedure. The intent of the energy test procedure is to simulate operation in typical room conditions (72 °F (22.2 °C)) with door openings. For all products that are tested with 90 °F (32.2 °C) ambient temperature without door openings, the higher ambient temperature is intended to represent the heat load associated with door openings. For all products that are tested with 72 °F (22.2 °C) ambient temperature without door openings, an adjustment factor is applied to the test results to account for the heat load associated with door openings. Except for operating characteristics that are affected by ambient temperature (for example, compressor percent run time), the unit, when tested under this test procedure, shall operate in a manner equivalent to the unit's operation while in typical room conditions.

(i) The energy used by the unit shall be calculated when a calculation is provided by the test procedure. Energy consuming components that operate in typical room conditions (including as a result of door openings, or a function of humidity), and that are not exempted by this test procedure, shall operate in an equivalent manner during energy testing under this test procedure, or be accounted for by all calculations as provided for in the test procedure.

Examples:

(A) Energy saving features that are designed to operate when there are no door openings for long periods of time shall not be functional during the energy test.

(B) The defrost heater shall neither function nor turn off differently during the energy test than it would when in typical room conditions. Also, the product shall not recover differently during the defrost recovery period than it would in typical room conditions.

(C) Electric heaters that would normally operate at typical room conditions with door openings shall also operate during the energy test.

(D) Energy used during adaptive defrost shall continue to be measured and adjusted per the calculation provided for in this test procedure.

(ii) DOE recognizes that there may be situations that the test procedures do not completely address. In such cases, a manufacturer must obtain a waiver in accordance with the relevant provisions of 10 CFR part 430 if:

(A) A product contains energy consuming components that operate differently during the prescribed testing than they would during representative average consumer use; and

(B) Applying the prescribed test to that product would evaluate it in a manner that is unrepresentative of its true energy consumption (thereby providing materially inaccurate comparative data).

(8) For non-compressor models, ''compressor'' and ''compressor cycles'' as used in appendix A of this subpart shall be interpreted to mean ''refrigeration system'' and ''refrigeration system cycles,'' respectively.

(ee) *Ice makers.* (1) The annual energy use of ice makers, expressed in kilowatt-hours per year, shall be the product of the following two factors, rounded to the nearest kilowatt-hour per year:

(i) 365 days per year; and

(ii) The daily energy consumption in kilowatt-hours per day, determined according to section 6.3 of appendix BB of this subpart.

Appendix A—[Amended]

■ 10. Amend appendix A to subpart B by:

■ a. Revising the heading and removing the introductory note; and

■ b. Revising sections 1. Definitions, 2. Test Conditions, 3. Test Control Settings, 5. Test Measurements, 6. Calculation of Derived Results from Test Measurements and 7. Test Procedure Waivers.

The revisions read as follows:

Appendix A to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Refrigerators, Refrigerator-Freezers, and Miscellaneous Refrigeration Products Other Than Ice Makers

1. Definitions

Section 3, *Definitions,* of HRF–1–2008 (incorporated by reference; see § 430.3) applies to this test procedure, except that the term ''wine chiller'' means ''cooled cabinet'' as defined in § 430.2 and the term ''wine chiller compartment'' means ''cellar compartment'' as defined in this appendix.

Anti-sweat heater means a device incorporated into the design of a product to prevent the accumulation of moisture on the exterior or interior surfaces of the cabinet.

Anti-sweat heater switch means a user-controllable switch or user interface which modifies the activation or control of anti-sweat heaters.

AS/NZS 4474.1:2007 means Australian/New Zealand Standard 4474.1:2007, Performance of household electrical appliances—Refrigerating appliances, Part 1: Energy consumption and performance. Only sections of AS/NZS 4474.1:2007 (incorporated by reference; see § 430.3) specifically referenced in this test procedure are part of this test procedure. In cases where there is a conflict, the language of the test procedure in this appendix takes precedence over AS/NZS 4474.1:2007.

Automatic defrost means a system in which the defrost cycle is automatically initiated and terminated, with resumption of normal refrigeration at the conclusion of the defrost operation. The system automatically prevents the permanent formation of frost on all refrigerated surfaces.

Automatic icemaker means a device that can be supplied with water without user intervention, either from a pressurized water supply system or by transfer from a water reservoir located inside the cabinet, that automatically produces, harvests, and stores ice in a storage bin and with means to automatically interrupt the harvesting operation when the ice storage bin is filled to a pre-determined level.

Cellar compartment means a refrigerated compartment within a consumer refrigeration product that is capable of maintaining compartment temperatures either (a) no lower than 39 °F (3.9 °C), or (b) in a range that extends no lower than 37 °F (2.8 °C) but at least as high as 60 °F (15.6 °C) as determined according to § 429.14(c)(2) or § 429.61(c)(2).

Compartment means either:

(a) A space within a refrigeration product cabinet that is enclosed when all product doors are closed and that has no subdividing barriers that divide the space. A subdividing barrier is a solid (non-perforated) barrier that may contain thermal insulation and is sealed around all of its edges or has edge gaps insufficient to allow thermal convection transfer from one side to the other sufficient to equilibrate temperatures on the two sides; or

(b) All of the enclosed spaces within a refrigeration product cabinet that provide the same type of storage, for instance fresh food, freezer, or cellar.

Complete temperature cycle means a time period defined based upon the cycling of compartment temperature that starts when the compartment temperature is at a maximum and ends when the compartment temperature returns to an equivalent maximum (within 0.5 °F of the starting temperature), having in the interim fallen to a minimum and subsequently risen again to reach the second maximum. Alternatively, a complete temperature cycle can be defined to start when the compartment temperature is at a minimum and ends when the compartment temperature returns to an equivalent minimum (within 0.5 °F of the starting temperature), having in the interim risen to a maximum and subsequently fallen again to reach the second minimum.

Cycle means a 24-hour period for which the energy use of a product is calculated based on the consumer-activated compartment temperature controls being set to maintain the standardized temperatures (see section 3.2 of this appendix).

Cycle type means the set of test conditions having the calculated effect of operating a product for a period of 24 hours, with the consumer-activated controls, other than those that control compartment temperatures, set to establish various operating characteristics.

Defrost cycle type means a distinct sequence of control whose function is to remove frost and/or ice from a refrigerated surface. There may be variations in the defrost control sequence, such as the number of defrost heaters energized. Each such variation establishes a separate, distinct defrost cycle type. However, defrost achieved regularly during the compressor off-cycles by warming of the evaporator without active heat addition, although a form of automatic defrost, does not constitute a unique defrost cycle type for the purposes of identifying the test period in accordance with section 4 of this appendix.

HRF–1–2008 means AHAM Standard HRF–1–2008, Association of Home Appliance Manufacturers, Energy and Internal Volume of Refrigerating Appliances (2008), including Errata to Energy and Internal Volume of Refrigerating Appliances, Correction Sheet issued November 17, 2009. Only sections of HRF–1–2008 (incorporated by reference; see § 430.3) specifically referenced in this test procedure are part of this test procedure. In cases where there is a conflict, the language of the test procedure in this appendix takes precedence over HRF–1–2008.

Ice storage bin means a container in which ice can be stored.

Long-time automatic defrost means an automatic defrost system whose successive defrost cycles are separated by 14 hours or more of compressor operating time.

Multiple compressor product means a consumer refrigeration product with more than one compressor.

Multiple refrigeration system product means a multiple compressor product or a miscellaneous refrigeration product with more than one refrigeration system for which the operation of the systems is not coordinated. For non-compressor multiple refrigeration system products, ''multiple compressor product'' as used in this appendix shall be interpreted to mean ''multiple refrigeration system product.''

Precooling means operating a refrigeration system before initiation of a defrost cycle to reduce one or more compartment temperatures significantly (more than 0.5 °F) below its minimum during stable operation between defrosts.

Recovery means operating a refrigeration system after the conclusion of a defrost cycle to reduce the temperature of one or more compartments to the temperature range that the compartment(s) exhibited during stable operation between defrosts.

Separate auxiliary compartment means a separate freezer, fresh food, or cellar compartment that is not the primary freezer, primary fresh food, or primary cellar compartment. Separate auxiliary compartments may also be convertible (*e.g.,* from fresh food to freezer). Separate auxiliary compartments may not be larger than the primary compartment of their type, but such size restrictions do not apply to separate auxiliary convertible compartments.

Special compartment means any compartment other than a butter conditioner, without doors directly accessible from the exterior, and with a separate temperature control (such as crispers convertible to meat keepers) that is not convertible from the fresh food temperature range to the freezer or cellar temperature ranges.

Stable operation means operation after steady-state conditions have been achieved but excluding any events associated with defrost cycles. During stable operation the average rate of change of compartment temperatures must not exceed 0.042 °F (0.023 °C) per hour for all compartment temperatures. Such a calculation performed for compartment temperatures at any two times, or for any two periods of time comprising complete cycles, during stable operation must meet this requirement.

(a) If compartment temperatures do not cycle, the relevant calculation shall be the difference between the temperatures at two points in time divided by the difference, in hours, between those points in time.

(b) If compartment temperatures cycle as a result of compressor cycling or other cycling operation of any system component (*e.g.,* a damper, fan, heater, etc.), the relevant calculation shall be the difference between compartment temperature averages evaluated for the whole compressor cycles or complete temperature cycles divided by the difference, in hours, between either the starts, ends, or mid-times of the two cycles.

Stabilization period means the total period of time during which steady-state conditions are being attained or evaluated.

Standard cycle means the cycle type in which the anti-sweat heater control, when provided, is set in the highest energy-consuming position.

Through-the-door ice/water dispenser means a device incorporated within the cabinet, but outside the boundary of the refrigerated space, that delivers to the user on demand ice and may also deliver water from within the refrigerated space without opening an exterior door. This definition includes dispensers that are capable of dispensing ice and water or ice only.

Variable anti-sweat heater control means an anti-sweat heater control that varies the average power input of the anti-sweat heater(s) based on operating condition variable(s) and/or ambient condition variable(s).

Variable defrost control means an automatic defrost system in which successive defrost cycles are determined by an operating condition variable or variables other than solely compressor operating time. This includes any electrical or mechanical device performing this function. A control scheme that changes the defrost interval from a fixed length to an extended length (without any intermediate steps) is not considered a variable defrost control. A variable defrost control feature predicts the accumulation of frost on the evaporator and react accordingly. Therefore, the times between defrost must vary with different usage patterns and include a continuum of periods between defrosts as inputs vary.

2. Test Conditions

2.1 Ambient Temperature Measurement. Temperature measuring devices shall be shielded so that indicated temperatures are not affected by the operation of the condensing unit or adjacent units.

2.1.1 Ambient Temperature. Measure and record the ambient temperature at points located 3 feet (91.5 cm) above the floor and 10 inches (25.4 cm) from the center of the two sides of the unit under test. For products other than non-compressor cooled cabinets, the ambient temperature shall be 90.0±1 °F (32.2±0.6 °C) during the stabilization period and the test period. For non-compressor cooled cabinets, the ambient temperature shall be 72.0±1.0 °F (22.2±0.6 °C) during the stabilization period and the test period.

2.1.2 Ambient Temperature Gradient. The test room vertical ambient temperature gradient in any foot of vertical distance from 2 inches (5.1 cm) above the floor or supporting platform to a height of 1 foot (30.5 cm) above the top of the unit under test is not to exceed 0.5 °F per foot (0.9 °C per meter). The vertical ambient temperature gradient at locations 10 inches (25.4 cm) out from the centers of the two sides of the unit being tested is to be maintained during the test. To demonstrate that this requirement has been met, test data must include measurements taken using temperature sensors at locations 10 inches (25.4 cm) from the center of the two sides of the unit under test at heights of 2 inches (5.1 cm) and 36 inches (91.4 cm) above the floor or supporting platform and at a height of 1 foot (30.5 cm) above the unit under test.

2.1.3 Platform. A platform must be used if the floor temperature is not within 3 °F (1.7 °C) of the measured ambient temperature. If a platform is used, it is to have a solid top with all sides open for air circulation underneath, and its top shall extend at least 1 foot (30.5 cm) beyond each side and front of the unit under test and extend to the wall in the rear.

2.2 Operational Conditions. The unit under test shall be installed and its operating conditions maintained in accordance with HRF–1–2008, (incorporated by reference; see § 430.3), sections 5.3.2 through 5.5.5.5. Exceptions and clarifications to the cited sections of HRF–1–2008 are noted in sections 2.3 through 2.8, and 5.1 of this appendix.

2.2 Operational Conditions. The unit under test shall be installed and its operating conditions maintained in accordance with HRF–1–2008 (incorporated by reference; see § 430.3), sections 5.3.2 through section 5.5.5.5 (excluding section 5.5.5.4). Exceptions and clarifications to the cited sections of HRF–1–2008 are noted in sections 2.3 through 2.8, and 5.1 of this appendix.

2.3 Anti-Sweat Heaters. The anti-sweat heater switch is to be on during one test and off during a second test. In the case of a unit equipped with variable anti-sweat heater control, the standard cycle energy use shall be the result of the calculation described in section 6.2.5 of this appendix.

2.4 Conditions for Automatic Defrost Refrigerator-Freezers, Hybrid Refrigerator-Freezers and Hybrid Freezers. For these products, the freezer compartments shall not be loaded with any frozen food packages during testing. Cylindrical metallic masses of dimensions 1.12±0.25 inches (2.9±0.6 cm) in diameter and height shall be attached in good thermal contact with each temperature sensor within the refrigerated compartments. All temperature measuring sensor masses shall be supported by low-thermal-conductivity supports in such a manner to ensure that there will be at least 1 inch (2.5 cm) of air space separating the thermal mass from contact with any interior surface or hardware inside the cabinet. In case of interference with hardware at the sensor locations specified in section 5.1 of this appendix, the sensors shall be placed at the nearest adjacent location such that there will be a 1-inch air space separating the sensor mass from the hardware.

2.5 Conditions for All-Refrigerators, Hybrid All-Refrigerators, Non-compressor All-Refrigerators, and Hybrid Non-compressor All-Refrigerators. There shall be no load in the freezer compartment during the test.

2.6 The cabinet and its refrigerating mechanism shall be assembled and set up in accordance with the printed consumer instructions supplied with the cabinet. Set-up of the test unit shall not deviate from these instructions, unless explicitly required or allowed by this test procedure. Specific required or allowed deviations from such set-up include the following:

(a) Connection of water lines and installation of water filters are not required;

(b) Clearance requirements from surfaces of the product shall be as described in section 2.8 of this appendix;

(c) The electric power supply shall be as described in HRF–1–2008 (incorporated by reference; see § 430.3), section 5.5.1;

(d) Temperature control settings for testing shall be as described in section 3 below. Settings for convertible compartments and other temperature-controllable or special compartments shall be as described in section 2.7 of this appendix;

(e) The product does not need to be anchored or otherwise secured to prevent tipping during energy testing;

(f) All the product's chutes and throats required for the delivery of ice shall be free of packing, covers, or other blockages that may be fitted for shipping or when the icemaker is not in use; and

(g) Ice storage bins shall be emptied of ice.

For cases in which set-up is not clearly defined by this test procedure, manufacturers must submit a petition for a waiver (see section 7 of this appendix).

2.7 Compartments that are convertible (*e.g.,* from fresh food to freezer or cellar) shall be operated in the highest energy use position. A compartment may be considered to be convertible to a cellar compartment if it is capable of maintaining compartment temperatures at least as high as 55 °F (12.8 °C) and also capable of operating at storage temperatures less than 37 °F. For the special case of convertible separate auxiliary compartments, this means that the compartment shall be treated as a freezer compartment, a fresh food compartment, or a cellar compartment, depending on which of these represents the highest energy use.

Special compartments shall be tested with controls set to provide the coldest temperature. However, for special compartments in which temperature control is achieved using the addition of heat (including resistive electric heating, refrigeration system waste heat, or heat from any other source, but excluding the transfer of air from another part of the interior of the product) for any part of the controllable temperature range of that compartment, the product energy use shall be determined by averaging two sets of tests. The first set of tests shall be conducted with such special compartments at their coldest settings, and the second set of tests shall be conducted with such special compartments at their warmest settings. The requirements for the warmest or coldest temperature settings of this section do not apply to features or functions associated with temperature controls (such as fast chill compartments) that are initiated manually and terminated automatically within 168 hours.

Cellar compartments with their own temperature control that are a part of refrigerators, refrigerator-freezers, or non-compressor refrigerators shall be tested according to the requirements for special compartments as described in this section.

Moveable subdividing barriers (see compartment definition (a) in section 1 of this appendix) that separate compartments of different types (*e.g.,* fresh food on one side and cellar on the other side) shall be placed in the median position. If such a subdividing barrier has an even number of positions, the near-median position representing the smallest volume of the warmer compartment(s) shall be used.

2.8 Rear Clearance.

(a) General. The space between the lowest edge of the rear plane of the cabinet and a vertical surface (the test room wall or simulated wall) shall be the minimum distance in accordance with the manufacturer's instructions, unless other provisions of this section apply. The rear plane shall be considered to be the largest flat surface at the rear of the cabinet, excluding features that protrude beyond this surface, such as brackets or compressors.

(b) Maximum clearance. The clearance shall not be greater than 2 inches (51 mm) from the lowest edge of the rear plane to the vertical surface, unless the provisions of paragraph (c) of this section apply.

(c) If permanent rear spacers or other components that protrude beyond the rear plane extend further than the 2 inch (51 mm) distance, or if the highest edge of the rear plane is in contact with the vertical surface when the unit is positioned with the lowest edge of the rear plane at or further than the 2 inch (51 mm) distance from the vertical surface, the appliance shall be located with the spacers or other components protruding beyond the rear plane, or the highest edge of the rear plane, in contact with the vertical surface.

(d) Rear-mounted condensers. If the product has a flat rear-wall-mounted condenser (*i.e.*, a rear-wall-mounted condenser with all refrigerant tube centerlines within 0.25 inches (6.4 mm) of the condenser plane), and the area of the condenser plane represents at least 25% of the total area of the rear wall of the cabinet, then the spacing to the vertical surface may be measured from the lowest edge of the condenser plane.

2.9 Steady-State Condition. Steady-state conditions exist if the temperature measurements in all measured compartments taken at 4-minute intervals or less during a stabilization period are not changing at a rate greater than 0.042 °F (0.023 °C) per hour as determined by the applicable condition of paragraphs (a) or (b), of this section.

(a) The average of the measurements during a 2-hour period if no cycling occurs or during a number of complete repetitive compressor cycles occurring through a period of no less than 2 hours is compared to the average over an equivalent time period with 3 hours elapsing between the two measurement periods.

(b) If paragraph (a) of this section cannot be used, the average of the measurements during a number of complete repetitive compressor cycles occurring through a period of no less than 2 hours and including the last complete cycle before a defrost period (or if no cycling occurs, the average of the measurements during the last 2 hours before a defrost period) are compared to the same averaging period before the following defrost period.

2.10 Products with Demand-Response Capability. Products that have a communication module for demand-response functions that is located within the cabinet shall be tested with the communication module in the configuration set at the factory just before shipping.

3. Test Control Settings

3.1 Model with No User Operable Temperature Control. A test shall be performed to measure the compartment temperatures and energy use. A second test shall be performed with the temperature control electrically short circuited to cause the compressor to run continuously (or to cause the non-compressor refrigeration system to run continuously at maximum capacity).

3.2 Models with User Operable Temperature Control. Testing shall be performed in accordance with the procedure in this section using the following standardized temperatures:

All-refrigerator or non-compressor all-refrigerator: 39 °F (3.9 °C) fresh food compartment temperature;

Hybrid all-refrigerator, or hybrid non-compressor all-refrigerator: 39 °F (3.9 °C) fresh food compartment temperature, and 55 °F (12.8 °C) cellar compartment temperature;

Refrigerator or non-compressor refrigerator: 15 °F (−9.4 °C) freezer compartment temperature and 39 °F (3.9 °C) fresh food compartment temperature;

Hybrid refrigerator or hybrid non-compressor refrigerator: 15 °F (−9.4 °C) freezer compartment temperature, 39 °F (3.9 °C) fresh food compartment temperature, and 55 °F (12.8 °C) cellar compartment temperature;

Refrigerator-freezer: 0 °F (−17.8 °C) freezer compartment temperature and 39 °F (3.9 °C) fresh food compartment temperature;

Hybrid refrigerator-freezer: 0 °F (−17.8 °C) freezer compartment temperature, 39 °F (3.9 °C) fresh food compartment temperature, and 55 °F (12.8 °C) cellar compartment temperature;

Hybrid freezer: 0 °F (−17.8 °C) freezer compartment temperature and 55 °F (12.8 °C) cellar compartment temperature;

Cooled cabinet, including non-compressor models: 55 °F (12.8 °C) cellar compartment temperature.

For the purposes of comparing compartment temperatures with standardized temperatures, as described in sections 3.2.1 and 3.2.2 of this appendix, the freezer compartment temperature shall be as specified in section 5.1.4 of this appendix, the fresh food compartment temperature shall be as specified in section 5.1.3 of this appendix, and the cellar compartment temperature shall be as specified in section 5.1.5 of this appendix.

3.2.1 *Temperature Control Settings and Tests to Use for Energy Use Calculations.*

3.2.1.1 *Setting Temperature Controls.* For mechanical control systems, (a) knob detents shall be mechanically defeated if necessary to attain a median setting, and (b) the warmest and coldest settings shall correspond to the positions in which the indicator is aligned with control symbols indicating the warmest and coldest settings. For electronic control systems, the test shall be performed with all compartment temperature controls set at the average of the coldest and warmest settings; if there is no setting equal to this average, the setting closest to the average shall be used. If there are two such settings equally close to the average, the higher of these temperature control settings shall be used.

3.2.1.2 *Test Sequence.* A first test shall be performed with all compartment temperature controls set at their median position midway between their warmest and coldest settings. A second test shall be performed with all controls set at their warmest setting or all controls set at their coldest setting (not electrically or mechanically bypassed). For units with a single standardized temperature (*e.g.,* all-refrigerator or cooled cabinet), this setting shall be the appropriate setting that attempts to achieve compartment temperatures measured during the two tests that bound (*i.e.,* one is above and one is below) the standardized temperature. For other units, the second test shall be conducted with all controls at their coldest setting, unless all compartment temperatures measured during the first test are lower than the standardized temperatures, in which case the second test shall be conducted with all controls at their warmest setting.

3.2.1.3 *Tests to Use for Energy Use Calculations.* For non-compressor refrigerators, if any compartment is warmer than its standardized temperature for a test with all controls at their coldest position, the energy calculation shall be based on the cold setting and the average compartment temperature of the cold setting shall be recorded. For all other products covered by this appendix, if any compartment is warmer than its standardized temperature for a test with all controls at their coldest position, the energy use shall be calculated based on tests conducted with the temperature controls in the cold setting for the first test and in the warm setting for the second test, subject to the restriction that, (a) the compartment temperatures must be warmer for the test conducted with the controls set in the warm position than their measurements with the controls set in the cold position, and (b) the measured energy use for the warm position must be lower than the measured energy for the cold position. If condition (a) or (b) is not met, the manufacturer must submit a petition for a waiver (see section 7 of this appendix).

3.2.1.4 *Temperature Setting Tables.* Refer to Table 1 of this section for products that have only a single refrigerated compartment (*e.g.*, all-refrigerators) or Table 2 of this section for products that have fresh food and freezer compartments (*e.g.*, refrigerators with freezer compartments or refrigerator-freezers) to determine which test results to use in the energy consumption calculation. See Table 3 of this section for a general description of which settings to use and which test results to use in the energy consumption calculation for products with one, two, or three standardized temperatures.

TABLE 1—TEMPERATURE SETTINGS FOR SINGLE-COMPARTMENT PRODUCTS

[*E.g.*, all-refrigerators]

First test		Second test		Energy calculation based on:
Settings	Results	Settings	Results	
Mid	Low	Warm	Low	Second Test Only.
			High	First and Second Tests.
	High	Cold	Low	First and Second Tests.
			High	Cold- and Warm-Setting Tests.* **

* If compartment temperature is warmer and energy use is lower for the warm-setting test.
** Except for non-compressor all-refrigerators, for which the energy calculation shall be based on the second test only.

TABLE 2—TEMPERATURE SETTINGS FOR REFRIGERATION PRODUCTS WITH FREEZER COMPARTMENTS AND FRESH FOOD COMPARTMENTS

First test		Second test		Energy calculation based on:
Settings	Results	Settings	Results	
Fzr Mid FF Mid	Fzr Low FF Low	Fzr Warm FF Warm	Fzr Low FF Low.	Second Test Only.
			Fzr Low FF High.	First and Second Tests.
			Fzr High FF Low.	First and Second Test.
			Fzr High FF High.	First and Second Test.
	Fzr Low FF High	Fzr Cold FF Cold	Fzr Low FF High.	Cold- and Warm-Setting Tests.* **
			Fzr Low FF Low.	First and Second Tests.
	Fzr High FF Low	Fzr Cold FF Cold	Fzr High FF Low.	Cold- and Warm-Setting Tests.* **
			Fzr Low FF Low	First and Second Tests.
	Fzr High FF High	Fzr Cold FF Cold	Fzr Low FF Low.	First and Second Tests.
			Fzr Low FF High.	Cold- and Warm-Setting Tests.* **
			Fzr High FF Low.	Cold- and Warm-Setting Tests.* **
			Fzr High FF High.	Cold- and Warm-Setting Tests.* **

Notes: Fzr = Freezer Compartment, FF = Fresh Food Compartment.
* If compartment temperature is warmer and energy use is lower for the warm-setting test.
** Except for non-compressor refrigerators, for which the energy calculation shall be based on the second test only.

TABLE 3—TEMPERATURE SETTINGS: GENERAL CHART FOR ALL PRODUCTS

First test		Second test		Energy calculation based on:
Setting	Results	Setting	Results	
Mid for all compartments.	All compartments low	Warm for all compartments.	All compartments low	Second Test Only.
			One or more compartments high.	First and Second Test.
	One or more compartments high.	Cold for all compartments.	All compartments low	First and Second Test.
			One or more compartments high.	Cold- and Warm-Setting Tests.* **

* If compartment temperature is warmer and energy use is lower for the warm-setting test.
** Except for non-compressor refrigerators, for which the energy calculation shall be based on the second test only.

3.2.2 Alternatively, a first test may be performed with all temperature controls set at their warmest setting. If all compartment temperatures are below the appropriate standardized temperatures, then the result of this test alone will be used to determine energy consumption. If this condition is not met, then the unit shall be tested in accordance with 3.2.1 of this appendix.

3.2.3 Temperature Settings for Separate Auxiliary Convertible Compartments. For separate auxiliary convertible compartments tested as freezer compartments, the median setting shall be within 2 °F (1.1 °C) of the standardized freezer compartment temperature, and the warmest setting shall be at least 5 °F (2.8 °C) warmer than the standardized temperature. For separate auxiliary convertible compartments tested as fresh food compartments, the median setting shall be within 2 °F (1.1 °C) of 39 °F (3.9 °C), the coldest setting shall be below 34 °F (1.1 °C), and the warmest setting shall be above 43 °F (6.1 °C). For separate auxiliary convertible compartments tested as cellar compartments, the median setting shall be within 2 °F (1.1 °C) of 55 °F (12.8 °C), and the coldest setting shall be below 50 °F (10.0 °C). For compartments where control settings are not expressed as particular temperatures, the measured temperature of the convertible compartment rather than the settings shall meet the specified criteria.

3.3 Optional Test for Models with Two Compartments and User Operable Controls. As an alternative to section 3.2 of this appendix, perform three tests such that the set of tests meets the ''minimum requirements for interpolation'' of AS/NZS 4474.1:2007 (incorporated by reference; see § 430.3) appendix M, section M3, paragraphs (a) through (c) and as illustrated in Figure M1. The target temperatures t_{xA} and t_{xB} defined in section M4(a)(i) of AS/NZ 4474.1:2007 shall be the standardized temperatures defined in section 3.2 of this appendix.

* * * * *

5. Test Measurements

5.1 *Temperature Measurements.* (a) Temperature measurements shall be made at the locations prescribed in HRF–1–2008 (incorporated by reference; see § 430.3) Figure 5.1 for cellar and fresh food compartments and Figure 2 for freezer compartments and shall be accurate to within ±0.5 °F (0.3 °C). No freezer temperature measurements need be taken in an all-refrigerator, hybrid all-refrigerator, non-compressor all-refrigerator, or hybrid non-compressor all-refrigerator. No cellar compartment temperature measurements need be taken in a refrigerator, refrigerator-freezer, or non-compressor refrigerator.

(b) If the interior arrangements of the unit under test do not conform with those shown in Figures 5.1 or 5.2 of HRF–1–2008, as appropriate, the unit must be tested by relocating the temperature sensors from the locations specified in the figures to avoid interference with hardware or components within the unit, in which case the specific locations used for the temperature sensors shall be noted in the test data records maintained by the manufacturer in accordance with 10 CFR 429.71, and the certification report shall indicate that non-standard sensor locations were used. If any temperature sensor is relocated by any amount from the location prescribed in Figure 5.1 or 5.2 of HRF–1–2008 in order to maintain a minimum 1-inch air space from adjustable shelves or other components that could be relocated by the consumer, except in cases in which the Figures prescribe a temperature sensor location within 1 inch of a shelf or similar feature (*e.g.,* sensor T_3 in Figure 5–1), this constitutes a relocation of temperature sensors that must be recorded in the test data and reported in the certification report as described above.

5.1.1 Measured Temperature. The measured temperature of a compartment is the average of all sensor temperature readings taken in that compartment at a particular point in time. Measurements shall be taken at regular intervals not to exceed 4 minutes. Measurements for multiple refrigeration system products shall be taken at regular intervals not to exceed one minute.

5.1.2 Compartment Temperature. The compartment temperature for each test period shall be an average of the measured temperatures taken in a compartment during the test period as defined in section 4 of this appendix. For long-time automatic defrost models, compartment temperatures shall be those measured in the first part of the test period specified in section 4.2.1 of this appendix. For models with variable defrost controls, compartment temperatures shall be those measured in the first part of the test period specified in section 4.2.2 of this appendix. For models with automatic defrost that is neither long-time nor variable defrost, the compartment temperature shall be an average of the measured temperatures taken in a compartment during a stable period of compressor operation that

(a) Includes no defrost cycles or events associated with a defrost cycle, such as precooling or recovery,

(b) Is no less than three hours in duration, and

(c) Includes two or more whole compressor cycles. If the compressor does not cycle, the stable period used for the temperature average shall be three hours in duration.

5.1.3 Fresh Food Compartment Temperature. The fresh food compartment temperature shall be calculated as:

$$TR = \frac{\sum_{i=1}^{R}(TR_i) \times (VR_i)}{\sum_{i=1}^{R}(VR_i)}$$

Where:

R is the total number of applicable fresh food compartments, including the primary fresh food compartment and any separate auxiliary fresh food compartments (including separate auxiliary convertible compartments tested as fresh food compartments in accordance with section 2.7 of this appendix), but excluding any cellar compartments;

TR_i is the compartment temperature of fresh food compartment ''i'' determined in accordance with section 5.1.2 of this appendix; and

VR_i is the volume of fresh food compartment ''i.''

5.1.4 Freezer Compartment Temperature. The freezer compartment temperature shall be calculated as:

$$TF = \frac{\sum_{i=1}^{F}(TF_i) \times (VF_i)}{\sum_{i=1}^{F}(VF_i)}$$

Where:

F is the total number of applicable freezer compartments, which include the first freezer compartment and any number of separate auxiliary freezer compartments (including separate auxiliary convertible compartments tested as freezer compartments in accordance with section 2.7 of this appendix);

TF_i is the compartment temperature of freezer compartment ''i'' determined in accordance with section 5.1.2 of this appendix; and

VF_i is the volume of freezer compartment ''i''.

5.1.5 Cellar Compartment Temperature. The cellar compartment temperature shall be calculated with the following equation provided that the model is a hybrid refrigeration product or cooled cabinet:

$$TC = \frac{\sum_{i=1}^{C}(TC_i) \times (VC_i)}{\sum_{i=1}^{C}(VC_i)}$$

Where:

C is the total number of applicable cellar compartments, which include all cellar compartments that are not considered to be part of the fresh food compartment (including separate auxiliary convertible compartments tested as cellar compartments in accordance with section 2.7 of this appendix);

TC_i is the compartment temperature of cellar compartment ''i'' determined in accordance with section 5.1.2 of this appendix; and

VC_i is the volume of cellar compartment ''i.''

5.2 Energy Measurements

5.2.1 Per-Day Energy Consumption. The energy consumption in kilowatt-hours per day, ET, for each test period shall be the energy expended during the test period as specified in section 4 of this appendix adjusted to a 24-hour period. The adjustment shall be determined as follows.

5.2.1.1 Non-Automatic Defrost and Automatic Defrost. The energy consumption in kilowatt-hours per day shall be calculated equivalent to:

$$ET = (EP \times 1440 \times K)/T$$

Where:

ET = test cycle energy expended in kilowatt-hours per day;

EP = energy expended in kilowatt-hours during the test period;

T = length of time of the test period in minutes; and

1440 = conversion factor to adjust to a 24-hour period in minutes per day.

K = dimensionless correction factor of 1.0 for refrigerators, refrigerator-freezers, and non-compressor refrigerators; 0.55 for cooled cabinets with a compressor and condenser unit as an integral part of the cabinet assembly; 1.20 for non-compressor cooled cabinets; and 0.85 for hybrid refrigeration products to adjust for average household usage.

5.2.1.2 Long-time Automatic Defrost. If the two-part test method is used, the energy consumption in kilowatt-hours per day shall be calculated equivalent to:

ET = (1440 × K × EP1/T1) + (EP2 − (EP1 × T2/T1)) × K × (12/CT)

Where:

ET, 1440, and K are defined in section 5.2.1.1 of this appendix;
EP1 = energy expended in kilowatt-hours during the first part of the test;
EP2 = energy expended in kilowatt-hours during the second part of the test;
T1 and T2 = length of time in minutes of the first and second test parts respectively;
CT = defrost timer run time or compressor run time between defrosts in hours required to cause it to go through a complete cycle, rounded to the nearest tenth of an hour; and
12 = factor to adjust for a 50-percent run time of the compressor in hours per day.

5.2.1.3 Variable Defrost Control. The energy consumption in kilowatt-hours per day shall be calculated equivalent to:

ET = (1440 × K × EP1/T1) + (EP2 − (EP1 × T2/T1)) × K × (12/CT),

Where:

1440 and K are defined in section 5.2.1.1 of this appendix and EP1, EP2, T1, T2, and 12 are defined in section 5.2.1.2 of this appendix;
CT = (CT_L × CT_M)/(F × (CT_M − CT_L) + CT_L);
CT_L = the shortest compressor run time between defrosts used in the variable defrost control algorithm (greater than or equal to 6 but less than or equal to 12 hours), or the shortest compressor run time between defrosts observed for the test (if it is shorter than the shortest run time used in the control algorithm and is greater than 6 hours), or 6 hours (if the shortest observed run time is less than 6 hours), in hours rounded to the nearest tenth of an hour;
CT_M = maximum compressor run time between defrosts in hours rounded to the nearest tenth of an hour (greater than CT_L but not more than 96 hours);
F = ratio of per day energy consumption in excess of the least energy and the maximum difference in per-day energy consumption and is equal to 0.20.

For variable defrost models with no values for CT_L and CT_M in the algorithm, the default values of 6 and 96 shall be used, respectively.

5.2.1.4 Multiple Compressor Products with Automatic Defrost. For multiple compressor products, the two-part test method in section 4.2.3.4 of this appendix must be used. The energy consumption in kilowatt-hours per day shall be calculated equivalent to:

$$ET = (1440 \times K \times EP1/T1) + \sum_{i=1}^{D}\left[\left(EP2_i - (EP1 \times T2_i/T1)\right) \times K \times (12/CT_i)\right]$$

Where:

1440 and K are defined in section 5.2.1.1 of this appendix and EP1, T1, and 12 are defined in section 5.2.1.2 of this appendix;
i = a variable that can equal 1, 2, or more that identifies each individual compressor system that has automatic defrost;
D = the total number of compressor systems with automatic defrost.
$EP2_i$ = energy expended in kilowatt-hours during the second part of the test for compressor system i;
$T2_i$ = length of time in minutes of the second part of the test for compressor system i;
CT_i = the compressor run time between defrosts for compressor system i in hours rounded to the nearest tenth of an hour, for long-time automatic defrost control equal to a fixed time in hours, and for variable defrost control equal to

(CT_{Li}× CT_{Mi})/(F × (CT_{Mi} − CT_{Li}) + CT_{Li});

Where:

CT_{Li} = for compressor system i, the shortest compressor run time between defrosts used in the variable defrost control algorithm (greater than or equal to 6 but less than or equal to 12 hours), or the shortest compressor run time between defrosts observed for the test (if it is shorter than the shortest run time used in the control algorithm and is greater than 6 hours), or 6 hours (if the shortest observed run time is less than 6 hours), in hours rounded to the nearest tenth of an hour;
CT_{Mi} = for compressor system i, the maximum compressor run time between defrosts in hours rounded to the nearest tenth of an hour (greater than CT_{Li} but not more than 96 hours);
F = default defrost energy consumption factor, equal to 0.20.

For variable defrost models with no values for CT_{Li} and CT_{Mi} in the algorithm, the default values of 6 and 96 shall be used, respectively.

5.2.1.5 Long-time or Variable Defrost Control for Systems with Multiple Defrost Cycle Types. The energy consumption in kilowatt-hours per day shall be calculated equivalent to:

$$ET = \left(1440 \times K \times \frac{EP1}{T1}\right) + \sum_{i=1}^{D}[\left(EP2_i - \left(EP1 \times \frac{T2_i}{T1}\right)\right) \times K \times \left(\frac{12}{CT_i}\right)]$$

Where:

1440 and K are defined in section 5.2.1.1 of this appendix and EP1, T1, and 12 are defined in section 5.2.1.2 of this appendix;
i is a variable that can equal 1, 2, or more that identifies the distinct defrost cycle types applicable for the product;
$EP2_i$ = energy expended in kilowatt-hours during the second part of the test for defrost cycle type i;
$T2_i$ = length of time in minutes of the second part of the test for defrost cycle type i;
CT_i is the compressor run time between instances of defrost cycle type i, for long-time automatic defrost control equal to a fixed time in hours rounded to the nearest tenth of an hour, and for variable defrost control equal to

(CT_{Li} × CT_{Mi})/(F × (CT_{Mi} − CT_{Li}) + CT_{Li});

CT_{Li} = least or shortest compressor run time between instances of defrost cycle type i in hours rounded to the nearest tenth of an hour (CT_L for the defrost cycle type with the longest compressor run time between defrosts must be greater than or equal to 6 but less than or equal to 12 hours);
CT_{Mi} = maximum compressor run time between instances of defrost cycle type i in hours rounded to the nearest tenth of an hour (greater than CT_{Li} but not more than 96 hours);

For cases in which there are more than one fixed CT value (for long-time defrost models) or more than one CT_M and/or CT_L value (for variable defrost models) for a given defrost cycle type, an average fixed CT value or average CT_M and CT_L values shall be selected for this cycle type so that 12 divided by this value or values is the frequency of occurrence of the defrost cycle type in a 24 hour period, assuming 50% compressor run time.

F = default defrost energy consumption factor, equal to 0.20.

For variable defrost models with no values for CT_{Li} and CT_{Mi} in the algorithm, the default values of 6 and 96 shall be used, respectively.

D is the total number of distinct defrost cycle types.

5.3 Volume Measurements. (a) The unit's total refrigerated volume, VT, shall be measured in accordance with HRF–1–2008, (incorporated by reference; see § 430.3), section 3.30 and sections 4.2 through 4.3. The measured volume shall include all spaces within the insulated volume of each compartment except for the volumes that must be deducted in accordance with section 4.2.2 of HRF–1–2008, as provided in paragraph (b) of this section, and be calculated equivalent to:

VT = VF + VFF + VC

Where:

VT = total refrigerated volume in cubic feet,
VF = freezer compartment volume in cubic feet,
VFF = fresh food compartment volume in cubic feet, and
VC = cellar compartment volume in cubic feet.

(b) The following component volumes shall not be included in the compartment volume measurements: Icemaker compartment insulation (*e.g.,* insulation isolating the icemaker compartment from the fresh food compartment of a product with a bottom-mounted freezer with through-the-door ice service), fountain recess, dispenser insulation, and ice chute (if there is a plug, cover, or cap over the chute per Figure 4–2 of HRF–1–2008). The following component volumes shall be included in the compartment volume measurements: icemaker auger motor (if housed inside the insulated space of the cabinet), icemaker kit, ice storage bin, and ice chute (up to the dispenser flap, if there is no plug, cover, or cap over the ice chute per Figure 4–3 of HRF–1–2008).

(c) Total refrigerated volume is determined by physical measurement of the test unit. Measurements and calculations used to determine the total refrigerated volume shall be retained as part of the test records underlying the certification of the basic model in accordance with 10 CFR 429.71.

(d) Compartment classification shall be based on subdivision of the refrigerated volume into zones separated from each other by subdividing barriers: No evaluated compartment shall be a zone of a larger compartment unless the zone is separated from the remainder of the larger compartment by subdividing barriers; if there are no such subdividing barriers within the larger compartment, the larger compartment must be evaluated as a single compartment rather than as multiple compartments. If the cabinet contains a moveable subdividing barrier, it must be placed as described in section 2.7 of this appendix.

(e) Freezer, fresh food, and cellar compartment volumes shall be calculated and recorded to the nearest 0.01 cubic feet. Total refrigerated volume shall be calculated and recorded to the nearest 0.1 cubic feet.

6. Calculation of Derived Results From Test Measurements

6.1 Adjusted Total Volume. The adjusted total volume of each tested unit must be determined based upon the volume measured in section 5.3 of this appendix using the following calculations. Where volume measurements for the freezer, fresh food, and cellar compartment are recorded in liters, the measured volume must be converted to cubic feet and rounded to the nearest 0.01 cubic foot prior to calculating the adjusted volume. Adjusted total volume shall be calculated and recorded to the nearest 0.1 cubic feet.

6.1.1 Refrigerators, Hybrid Refrigerators, and Non-compressor Refrigerators. The adjusted total volume, AV, for refrigerators, hybrid refrigerators, or non-compressor refrigerators under test, shall be defined as:

$AV = (VF \times CR) + VFF + (VC \times CC)$

Where:

AV = adjusted total volume in cubic feet;
VF, VFF, and VC are defined in section 5.3 of this appendix;
CR = dimensionless adjustment factor for freezer compartments of 1.00 for all-refrigerators, hybrid all-refrigerators, non-compressor all-refrigerators, and hybrid non-compressor all-refrigerators, or 1.47 for other types of refrigerators, hybrid refrigerators, and non-compressor refrigerators; and
CC = dimensionless adjustment factor of 0.69 for cellar compartments.

6.1.2 Refrigerator-Freezers, Hybrid Refrigerator-freezers, and Hybrid Freezers. The adjusted total volume, AV, for refrigerator-freezers, hybrid refrigerator-freezers, and hybrid freezers under test shall be calculated as follows:

$AV = (VF \times CRF) + VFF + (VC \times CC)$

Where:

VF, VFF, and VC are defined in section 5.3 and AV is defined in section 6.1.1 of this appendix;
CRF = dimensionless adjustment factor for freezer compartments of 1.76; and
CC = dimensionless adjustment factor for cellar compartments of 0.69.

6.1.3 Cooled Cabinets. The adjusted volume, AV, for cooled cabinets under test shall be equal to the cellar compartment volume, VC, which is defined in section 5.3 of this appendix.

6.2 Average Per-Cycle Energy Consumption. The average per-cycle energy consumption for a cycle type, E, is expressed in kilowatt-hours per cycle to the nearest one hundredth (0.01) kilowatt-hour and shall be calculated according to the sections below.

6.2.1 All-Refrigerator and Non-compressor All-Refrigerator Models. The average per-cycle energy consumption shall depend upon the temperature attainable in the fresh food compartment as shown below.

6.2.1.1 If the fresh food compartment temperature is always below 39.0 °F (3.9 °C), the average per-cycle energy consumption shall be equivalent to:

E = ET1

Where:

ET is defined in section 5.2.1 of this appendix; and
The number 1 indicates the test during which the highest fresh food compartment temperature is measured.

6.2.1.2 If the product is a non-compressor all-refrigerator and the fresh food compartment temperature is above 39 °F (3.9 °C) for the test conducted using the cold temperature control setting, the average per-cycle energy consumption shall be equivalent to:

E = ET2

Where:

ET is defined in section 5.2.1 of this appendix; and
The number 2 indicates the test conducted for the cold temperature control setting.

6.2.1.3 If the conditions of sections 6.2.1.1 and 6.2.1.2 of this appendix do not apply, the average per-cycle energy consumption shall be equivalent to:

$E = ET1 + ((ET2 - ET1) \times (39.0 - TR1)/(TR2 - TR1))$

Where:

ET is defined in section 5.2.1 of this appendix;
TR = fresh food compartment temperature determined according to section 5.1.3 of this appendix in degrees F;
The numbers 1 and 2 indicate measurements taken during the two tests to be used to calculate energy consumption, as specified in section 3 of this appendix; and
39.0 = standardized fresh food compartment temperature in degrees F.

6.2.2 Cooled Cabinets. The average per-cycle energy consumption shall depend upon the temperature attainable in the cellar compartment as shown below.

6.2.2.1 If the cellar compartment temperature is always below 55.0 °F (12.8 °C), the average per-cycle energy consumption shall be equivalent to:

E = ET1

Where:

ET is defined in section 5.2.1 of this appendix; and
The number 1 indicates the test during which the highest cellar compartment temperature is measured.

6.2.2.2 If the cellar compartment temperature measured for at least one of the tests is greater than 55.0 °F (12.8 °C), the average per-cycle energy consumption shall be equivalent to:

$E = ET1 + ((ET2 - ET1) \times (55.0 - TC1)/(TC2 - TC1))$

Where:

ET is defined in section 5.2.1 of this appendix;
TC = cellar compartment temperature determined according to section 5.1.5 of this appendix in degrees F;
The numbers 1 and 2 indicate measurements taken during the two tests to be used to calculate energy consumption, as specified in section 3 of this appendix; and
55.0 = standardized cellar compartment temperature in degrees F.

6.2.3 Refrigerators, Refrigerator-Freezers, and Non-Compressor Refrigerators. The average per-cycle energy consumption shall be defined in one of the following ways as applicable.

6.2.3.1 If the fresh food compartment temperature is always below 39 °F (3.9 °C) and the freezer compartment temperature is always below 15 °F (−9.4 °C) in both tests of a refrigerator or a non-compressor refrigerator or always below 0 °F (−17.8 °C) in both tests of a refrigerator-freezer, the average per-cycle energy consumption shall be:

E = ET1 + IET

Where:

ET is defined in section 5.2.1 of this appendix;
IET, expressed in kilowatt-hours per cycle, equals 0.23 for a product with an automatic icemaker and otherwise equals 0 (zero); and
The number 1 indicates the test during which the highest freezer compartment temperature was measured.

6.2.3.2 If the product is a non-compressor refrigerator and the fresh food compartment temperature is above 39 °F (3.9 °C) or the freezer compartment temperature is above 15 °F (−9.4 °C) for the test conducted using the cold temperature control setting, the average per-cycle energy consumption shall be equivalent to:

E = ET2

Where:

ET is defined in section 5.2.1 of this appendix; and
The number 2 indicates the test conducted for the cold temperature control setting.

6.2.3.3 If the conditions of sections 6.2.3.1 and 6.2.3.2 of this appendix do not apply, the average per-cycle energy consumption shall be defined by the higher of the two values calculated by the following two formulas:

E = ET1 + ((ET2 − ET1) × (39.0 − TR1)/(TR2 − TR1)) + IET

and

E = ET1 + ((ET2 − ET1) × (k − TF1)/(TF2 − TF1)) + IET

Where:

ET is defined in section 5.2.1 of this appendix;
IET is defined in section 6.2.3.1 of this appendix;
TR and the numbers 1 and 2 are defined in section 6.2.1.3 of this appendix;
TF = freezer compartment temperature determined according to section 5.1.4 of this appendix in degrees F;
39.0 is a specified fresh food compartment temperature in degrees F; and
k is a constant 15.0 for refrigerators and non-compressor refrigerators or 0.0 for refrigerator-freezers, each being standardized freezer compartment temperatures in degrees F.

6.2.4 Hybrid Refrigeration Products. The average per-cycle energy consumption shall be defined in one of the following ways as applicable.

6.2.4.1 If the compartment temperatures are always below their compartments' standardized temperatures as defined in section 3.2 of this appendix (the fresh food compartment temperature is at or below 39 °F (3.9 °C); the cellar compartment temperature is at or below 55 °F (12.8 °C); and the freezer compartment temperature is at or below 15 °F (−9.4 °C) for a hybrid refrigerator or hybrid non-compressor refrigerator, or the freezer compartment temperature is at or below 0 °F (−17.8 °C) for a hybrid refrigerator-freezer or hybrid freezer), the average per-cycle energy consumption shall be:

E = ET1 + IET

Where:

ET is defined in section 5.2.1 of this appendix;
IET is defined in section 6.2.3.1 of this appendix;
The number 1 indicates the test during which the highest freezer compartment temperature is measured. If the product has no freezer compartment, the number 1 indicates the test during which the highest fresh food compartment temperature is measured.

6.2.4.2 If the product is a hybrid non-compressor refrigerator and the fresh food compartment temperature is above 39 °F (3.9 °C) or the freezer compartment temperature is above 15 °F (−9.4 °C) or the cellar compartment temperature is above 55 °F (12.8 °C) for the test conducted using the cold temperature control setting, the average per-cycle energy consumption shall be equivalent to:

E = ET2

Where:

ET is defined in section 5.2.1 of this appendix; and
The number 2 indicates the test conducted for the cold temperature control setting.

6.2.4.3 If the conditions of sections 6.2.4.1 and 6.2.4.2 of this appendix do not apply, the average per-cycle energy consumption shall be defined by the highest of the two or three values calculated by the following three formulas:

E = (ET1 + ((ET2 − ET1) × (39.0 − TR1)/(TR2 − TR1)) + IET if the product has a fresh food compartment;
E = (ET1 + ((ET2 − ET1) × (k − TF1)/(TF2 − TF1)) + IET if the product has a freezer compartment; and
E = (ET1 + ((ET2 − ET1) × (55.0 − TC1)/(TC2 − TC1)) + IET

Where:

ET is defined in section 5.2.1 of this appendix;
IET is defined in section 6.2.3.1 of this appendix;
TR and the numbers 1 and 2 are defined in section 6.2.1.3 of this appendix;
TF is defined in section 6.2.3.2 of this appendix;
TC is defined in section 6.2.2.2 of this appendix;
39.0 is a specified fresh food compartment temperature in degrees F;
k is a constant 15.0 for hybrid refrigerators and hybrid non-compressor refrigerators or 0.0 for hybrid refrigerator-freezers and hybrid freezers, each being standardized freezer compartment temperatures in degrees F; and
55.0 is a specified cellar compartment temperature in degrees F.

6.2.5 Variable Anti-Sweat Heater Models. The standard cycle energy consumption of a model with a variable anti-sweat heater control (E_{std}), expressed in kilowatt-hours per day, shall be calculated equivalent to:

E_{std} = E + (Correction Factor) where E is determined by sections 6.2.1, 6.2.2, 6.2.3, or 6.2.4 of this appendix, whichever is appropriate, with the anti-sweat heater switch in the ''off'' position or, for a product without an anti-sweat heater switch, the anti-sweat heater in its lowest energy use state.

Correction Factor = (Anti-sweat Heater Power × System-loss Factor) × (24 hrs/1 day) × (1 kW/1000 W)

Where:

Anti-sweat Heater Power = 0.034 * (Heater Watts at 5%RH)
+0.211 * (Heater Watts at 15%RH)
+0.204 * (Heater Watts at 25%RH)
+0.166 * (Heater Watts at 35%RH)
+0.126 * (Heater Watts at 45%RH)
+0.119 * (Heater Watts at 55%RH)
+0.069 * (Heater Watts at 65%RH)
+0.047 * (Heater Watts at 75%RH)
+0.008 * (Heater Watts at 85%RH)
+0.015 * (Heater Watts at 95%RH)

Heater Watts at a specific relative humidity = the nominal watts used by all heaters at that specific relative humidity, 72 °F (22.2 °C) ambient, and DOE reference temperatures of fresh food (FF) average temperature of 39 °F (3.9 °C) and freezer (FZ) average temperature of 0 °F (−17.8 °C).
System-loss Factor = 1.3.

7. Test Procedure Waivers

To the extent that the procedures contained in this appendix do not provide a means for determining the energy consumption of a basic model, a manufacturer must obtain a waiver under 10 CFR 430.27 to establish an acceptable test procedure for each such basic model. Such instances could, for example, include situations where the test set-up for a particular basic model is not clearly defined by the provisions of section 2 of this appendix. For details regarding the criteria and procedures for obtaining a waiver, please refer to 10 CFR 430.27.

Appendix A1—[Removed]

■ 11. Remove Appendix A1 to subpart B.

Appendix B—[Amended]

■ 12. Amend Appendix B to subpart B of part 430 as follows:
■ a. Remove the introductory note.
■ b. Revise section 1. Definitions;
■ c. In section 2. Test Conditions, revise sections 2.3 and 2.5;
■ d. In section 3. Test Control Settings, revise section 3.2.1 and table 1, and add sections 3.2.1.1, 3.2.1.2, and 3.2.1.3;
■ e. In section 5. Test Measurements, revise sections 5.1(b), 5.1.3, and 5.3;
■ f. In section 6. Calculation of Derived Results From Test Measurements, revise sections 6.1, 6.2.1 and 6.2.2;
■ g. Revise section 7. Test Procedure Waivers.

The revisions read as follows:

Appendix B to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Freezers

1. Definitions

Section 3, *Definitions,* of HRF–1–2008 (incorporated by reference; see § 430.3) applies to this test procedure, except that the term ''wine chiller compartment'' means ''cellar compartment'' as defined in this appendix.

Anti-sweat heater means a device incorporated into the design of a freezer to prevent the accumulation of moisture on the exterior or interior surfaces of the cabinet.

Anti-sweat heater switch means a user-controllable switch or user interface which modifies the activation or control of anti-sweat heaters.

Automatic defrost means a system in which the defrost cycle is automatically initiated and terminated, with resumption of normal refrigeration at the conclusion of the defrost operation. The system automatically prevents the permanent formation of frost on all refrigerated surfaces.

Automatic icemaker means a device that can be supplied with water without user intervention, either from a pressurized water supply system or by transfer from a water reservoir located inside the cabinet, that automatically produces, harvests, and stores ice in a storage bin, with means to automatically interrupt the harvesting operation when the ice storage bin is filled to a pre-determined level.

Cellar compartment means a refrigerated compartment within a consumer refrigeration product that is capable of maintaining compartment temperatures either (a) no lower than 39 °F (3.9 °C), or (b) in a range that extends no lower than 37 °F (2.8 °C) but at least as high as 60 °F (15.6 °C) as determined according to the provisions in § 429.14(c)(2) or § 429.61(c)(2).

Compartment means either:

(a) A space within a refrigeration product cabinet that is enclosed when all product doors are closed and that has no subdividing barriers that divide the space. A subdividing barrier is a solid (non-perforated) barrier that may contain thermal insulation and is sealed around all of its edges or has edge gaps insufficient to allow thermal convection transfer from one side to the other sufficient to equilibrate temperatures on the two sides; or

(b) All of the enclosed spaces within a refrigeration product cabinet that provide the same type of storage, for instance fresh food, freezer, or cellar.

Complete temperature cycle means a time period defined based upon the cycling of compartment temperature that starts when the compartment temperature is at a maximum and ends when the compartment temperature returns to an equivalent maximum (within 0.5 °F of the starting temperature), having in the interim fallen to a minimum and subsequently risen again to reach the second maximum. Alternatively, a complete temperature cycle can be defined to start when the compartment temperature is at a minimum and ends when the compartment temperature returns to an equivalent minimum (within 0.5 °F of the starting temperature), having in the interim risen to a maximum and subsequently fallen again to reach the second minimum.

Cycle means a 24-hour period for which the energy use of a freezer is calculated based on the consumer activated compartment temperature controls being set to maintain the standardized temperatures (see section 3.2).

Cycle type means the set of test conditions having the calculated effect of operating a freezer for a period of 24 hours, with the consumer-activated controls, other than those that control compartment temperatures, set to establish various operating characteristics.

HRF–1–2008 means AHAM Standard HRF–1–2008, Association of Home Appliance Manufacturers, Energy and Internal Volume of Refrigerating Appliances (2008), including Errata to Energy and Internal Volume of Refrigerating Appliances, Correction Sheet issued November 17, 2009. Only sections of HRF–1–2008 (incorporated by reference; see § 430.3) specifically referenced in this test procedure are part of this test procedure. In cases where there is a conflict, the language of the test procedure in this appendix takes precedence over HRF–1–2008.

Ice storage bin means a container in which ice can be stored.

Long-time automatic defrost means an automatic defrost system whose successive defrost cycles are separated by 14 hours or more of compressor operating time.

Precooling means operating a refrigeration system before initiation of a defrost cycle to reduce one or more compartment temperatures significantly (more than 0.5 °F) below its minimum during stable operation between defrosts.

Recovery means operating a refrigeration system after the conclusion of a defrost cycle to reduce the temperature of one or more compartments to the temperature range that the compartment(s) exhibited during stable operation between defrosts.

Separate auxiliary compartment means a separate freezer or cellar compartment that is not the primary freezer or primary cellar compartment. Access to a separate auxiliary compartment is through a separate exterior door or doors rather than through the door or doors of another compartment. Separate auxiliary freezer compartments may not be larger than the primary freezer compartment and separate auxiliary cellar compartments may not be larger than the primary cellar compartment.

Special compartment means any compartment without doors directly accessible from the exterior, and with a separate temperature control that is not convertible from the fresh food temperature range to the freezer or cellar temperature ranges.

Stable operation means operation after steady-state conditions have been achieved but excluding any events associated with defrost cycles. During stable operation the average rate of change of compartment temperatures must not exceed 0.042 °F (0.023 °C) per hour for all compartment temperatures. Such a calculation performed for compartment temperatures at any two times, or for any two periods of time comprising complete cycles, during stable operation must meet this requirement.

(a) If compartment temperatures do not cycle, the relevant calculation shall be the difference between the temperatures at two points in time divided by the difference, in hours, between those points in time.

(b) If compartment temperatures cycle as a result of compressor cycling or other cycling operation of any system component (*e.g.,* a damper, fan, heater, etc.), the relevant calculation shall be the difference between compartment temperature averages evaluated for the whole compressor cycles or complete temperature cycles divided by the difference, in hours, between either the starts, ends, or mid-times of the two cycles.

Stabilization period means the total period of time during which steady-state conditions are being attained or evaluated.

Standard cycle means the cycle type in which the anti-sweat heater switch, when provided, is set in the highest energy-consuming position.

Through-the-door ice/water dispenser means a device incorporated within the cabinet, but outside the boundary of the refrigerated space, that delivers to the user on demand ice and may also deliver water from within the refrigerated space without opening an exterior door. This definition includes dispensers that are capable of dispensing ice and water or ice only.

Variable defrost control means an automatic defrost system in which successive defrost cycles are determined by an operating condition variable or variables other than solely compressor operating time. This includes any electrical or mechanical device performing this function. A control scheme that changes the defrost interval from a fixed length to an extended length (without any intermediate steps) is not considered a variable defrost control. A variable defrost control feature predicts the accumulation of frost on the evaporator and react accordingly. Therefore, the times between defrost must vary with different usage patterns and include a continuum of periods between defrosts as inputs vary.

2. Test Conditions

* * * * *

2.3 Anti-Sweat Heaters. The anti-sweat heater switch is to be on during one test and off during a second test. In the case of a freezer with variable anti-sweat heater control, the standard cycle energy use shall be the result of the calculation described in 6.2.2 of this appendix.

* * * * *

2.5 Special compartments shall be tested with controls set to provide the coldest temperature. However, for special compartments in which temperature control is achieved using the addition of heat (including resistive electric heating, refrigeration system waste heat, or heat from any other source, but excluding the transfer of air from another part of the interior of the product) for any part of the controllable temperature range of that compartment, the product energy use shall be determined by averaging two sets of tests. The first set of tests shall be conducted with such special compartments at their coldest settings, and the second set of tests at their warmest settings. The requirements for the warmest or coldest temperature settings of this section do not apply to features or functions associated with temperature control (such as quick freeze) that are initiated manually and terminated automatically within 168 hours.

Cellar compartments with their own temperature control that are a part of freezers shall be tested according to the requirements for special compartments as described in this section.

Moveable subdividing barriers (see compartment definition (a) in section 1 of this appendix) that separate compartments of different types (*e.g.,* freezer on one side and cellar on the other side) shall be placed in the median position. If such a subdividing barrier has an even number of positions, the near-median position representing the smallest volume of the warmer compartment(s) shall be used.

* * * * *

3. Test Control Settings

* * * * *

3.2.1 *Temperature Control Settings and Tests to Use for Energy Use Calculations.*

3.2.1.1 *Setting Temperature Controls.* For mechanical control systems, (a) knob detents shall be mechanically defeated if necessary to attain a median setting, and (b) the warmest and coldest settings shall correspond to the positions in which the indicator is aligned with control symbols indicating the warmest and coldest settings. For electronic control systems, the test shall be performed with all compartment temperature controls set at the average of the coldest and warmest settings; if there is no setting equal to this average, the setting closest to the average shall be used. If there are two such settings equally close to the average, the higher of these temperature control settings shall be used.

3.2.1.2 *Test Sequence.* A first test shall be performed with all temperature controls set at their median position midway between their warmest and coldest settings. A second test shall be performed with all controls set at either their warmest or their coldest setting (not electrically or mechanically bypassed), whichever is appropriate, to attempt to achieve compartment temperatures measured during the two tests that bound (*i.e.,* one is above and one is below) the standardized temperature.

3.2.1.3 *Tests to Use for Energy Use Calculations.* If the compartment temperatures measured during these two tests bound the standardized temperature, then these test results shall be used to determine energy consumption. If the compartment temperature measured with all controls set at their coldest setting is above the standardized temperature, energy use shall be calculated based on tests conducted with the temperature controls in the cold setting for the first test and in the warm setting for the second test, subject to the restriction that (a) the compartment temperature must be warmer for the test conducted with the controls set in the warm position than its measurement with the controls set in the cold position, and (b) the measured energy use for the warm position must be lower than the measured energy for the cold position. If condition (a) or (b) are not met, the manufacturer must submit a petition for a waiver (see section 7 of this appendix). If the compartment temperature measured with all controls set at their warmest setting is below the standardized temperature, then the result of this test alone will be used to determine energy consumption. Also see Table 1 of this appendix, which summarizes these requirements.

TABLE 1—TEMPERATURE SETTINGS FOR FREEZERS

First test		Second test		Energy calculation based on:
Settings	Results	Settings	Results	
Mid	Low	Warm	Low	Second Test Only.
			High	First and Second Tests.
	High	Cold	Low	First and Second Tests.
			High	Cold- and Warm-Setting Tests*.

* If compartment temperature is warmer and energy use is lower for the warm-setting test.

* * * * *

5. Test Measurements

5.1 Temperature Measurements.

* * * * *

(b) If the interior arrangements of the unit under test do not conform with those shown in Figure 5.2 of HRF–1–2008, the unit must be tested by relocating the temperature sensors from the locations specified in the figures to avoid interference with hardware or components within the unit, in which case the specific locations used for the temperature sensors shall be noted in the test data records maintained by the manufacturer in accordance with 10 CFR 429.71, and the certification report shall indicate that non-standard sensor locations were used. If any temperature sensor is relocated by any amount from the location prescribed in Figure 5.2 of HRF–1–2008 in order to maintain a minimum 1-inch air space from adjustable shelves or other components that could be relocated by the consumer, except in cases in which the Figures prescribe a temperature sensor location within 1 inch of a shelf or similar feature (*e.g.,* sensor T_3 in Figure 5–1), this constitutes a relocation of temperature sensors that must be recorded in the test data and reported in the certification report as described above.

* * * * *

5.1.3 Freezer Compartment Temperature. The freezer compartment temperature shall be calculated as:

$$TF = \frac{\sum_{i=1}^{F}(TF_i) \times (VF_i)}{\sum_{i=1}^{F}(VF_i)}$$

Where:

F is the total number of applicable freezer compartments, which include the primary freezer compartment and any number of separate auxiliary freezer compartments;

TF_i is the compartment temperature of freezer compartment ''i'' determined in accordance with section 5.1.2 of this appendix; and

VF_i is the volume of freezer compartment ''i''.

* * * * *

5.3 Volume Measurements. (a) The unit's total refrigerated volume, VT, shall be measured in accordance with HRF–1–2008, (incorporated by reference; see § 430.3), section 3.30 and sections 4.2 through 4.3. The measured volume shall include all spaces within the insulated volume of each compartment except for the volumes that must be deducted in accordance with section 4.2.2 of HRF–1–2008, as provided in paragraph (b) of this section, and be calculated equivalent to:

VT = VF + VC

Where:

VT = total refrigerated volume in cubic feet;

VF = freezer compartment volume in cubic feet; and

VC = cellar compartment volume in cubic feet, for freezers with cellar compartments.

(b) The following component volumes shall not be included in the compartment volume measurements: Icemaker compartment insulation (*e.g.,* insulation isolating the icemaker compartment from the fresh food compartment of a product with a bottom-mounted freezer with through-the-door ice service), fountain recess, dispenser insulation, and ice chute (if there is a plug, cover, or cap over the chute per Figure 4–2 of HRF–1–2008). The following component volumes shall be included in the compartment volume measurements: Icemaker auger motor (if housed inside the insulated space of the cabinet), icemaker kit, ice storage bin, and ice chute (up to the dispenser flap, if there is no plug, cover, or cap over the ice chute per Figure 4–3 of HRF–1–2008).

(c) Total refrigerated volume is determined by physical measurement of the test unit. Measurements and calculations used to determine the total refrigerated volume shall be retained as part of the test records underlying the certification of the basic model in accordance with 10 CFR 429.71.

(d) Compartment classification shall be based on subdivision of the refrigerated volume into zones separated from each other by subdividing barriers: No evaluated compartment shall be a zone of a larger compartment unless the zone is separated from the remainder of the larger compartment by subdividing barriers; if there are no such subdividing barriers within the larger compartment, the larger compartment must be evaluated as a single compartment rather than as multiple compartments. If the cabinet contains a moveable subdividing barrier, it must be placed as described in section 2.5 of this appendix.

(e) Freezer and cellar compartment volumes shall be calculated and recorded to the nearest 0.01 cubic feet. Total refrigerated volume shall be calculated and recorded to the nearest 0.1 cubic feet.

6. Calculation of Derived Results From Test Measurements

6.1 Adjusted Total Volume. The adjusted total volume of each tested unit must be determined based upon the volume measured in section 5.3 using the following calculations. Where volume measurements for the freezer and cellar compartment are recorded in liters, the measured volume must be converted to cubic feet and rounded to the nearest 0.01 cubic foot prior to calculating the adjusted volume. Adjusted total volume shall be calculated and recorded to the nearest 0.1 cubic feet. The adjusted total volume, AV, for freezers under test shall be defined as:

$$AV = (VF \times CF) + (VC \times CC)$$

Where:

AV = adjusted total volume in cubic feet;
VF and VC are defined in section 5.3 of this appendix;
CF = dimensionless correction factor of 1.76 for freezer compartments; and
CC = dimensional correction factor of 0.69 for cellar compartments.

* * * * *

6.2.1 If the compartment temperature is always below 0.0 °F (−17.8 °C), the average per-cycle energy consumption shall be equivalent to:

$$E = ET1 + IET$$

Where:

E = total per-cycle energy consumption in kilowatt-hours per day;
ET is defined in 5.2.1;
The number 1 indicates the test during which the highest compartment temperature is measured; and
IET, expressed in kilowatt-hours per cycle, equals 0.23 for a product with an automatic icemaker and otherwise equals 0 (zero).

6.2.2 If one of the compartment temperatures measured for a test is greater than 0.0 °F (17.8 °C), the average per-cycle energy consumption shall be equivalent to:

$$E = ET1 + ((ET2 - ET1) \times (0.0 - TF1)/(TF2 - TF1)) + IET$$

Where:

E and IET are defined in 6.2.1 and ET is defined in 5.2.1;
TF = freezer compartment temperature determined according to section 5.1.3 of this appendix in degrees F;
The numbers 1 and 2 indicate measurements taken during the two tests to be used to calculate energy consumption, as specified in section 3 of this appendix; and
0.0 = standardized compartment temperature in degrees F.

* * * * *

7. Test Procedure Waivers

To the extent that the procedures contained in this appendix do not provide a means for determining the energy consumption of a basic model, a manufacturer must obtain a waiver under 10 CFR 430.27 to establish an acceptable test procedure for each such basic model. Such instances could, for example, include situations where the test set-up for a particular basic model is not clearly defined by the provisions of section 2. For details regarding the criteria and procedures for obtaining a waiver, please refer to 10 CFR 430.27.

Appendix B1—[Removed]

■ 13. Remove appendix B1 to subpart B.
■ 14. Add appendix BB to subpart B to read as follows:

Appendix BB to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Ice Makers

1. Definitions

Harvest means the process of freeing or removing ice pieces from an ice maker icemaking mold or evaporator.

Harvest rate means the amount of ice (at 32 °F (0 °C)) in pounds produced per 24 hours.

HRF–1–2008 means AHAM Standard HRF–1–2008, Association of Home Appliance Manufacturers, Energy and Internal Volume of Refrigerating Appliances (2008), including Errata to Energy and Internal Volume of Refrigerating Appliances, Correction Sheet issued November 17, 2009. Only sections of HRF–1–2008 (incorporated by reference; see § 430.3) specifically referenced in this test procedure are part of this test procedure. In cases where there is a conflict, the language of the test procedure in this appendix takes precedence over HRF–1–2008.

Ice hardness factor means the latent heat capacity of harvested ice, in British thermal units per pound of ice (Btu/lb), divided by 144 Btu/lb, expressed as a percentage.

Ice storage bin means a container for ice storage that is part of an ice maker.

Icemaking cycle, defined for batch-type ice makers, means the period of time required to produce and harvest one batch of ice. The start and end of consecutive icemaking cycles are defined to occur at the end of harvest, when ice is removed from the ice maker's evaporator or icemaking mold.

Replacement cycle, defined for uncooled-storage ice makers, including portable ice makers, means one or more consecutive icemaking cycles for batch-type ice makers or a continuous period of icemaking for continuous-type ice makers, initiated automatically to refill the ice storage bin after a period of ice meltage and terminated automatically when the bin is full again.

2. Test Conditions and Set-Up.

2.1 Ambient Temperature Measurement. Temperature measuring devices shall be shielded so that indicated temperatures are not affected by the operation of the condensing unit or adjacent units.

2.1.1 Ambient Temperature.

2.1.1.1 The ambient temperature shall be 72 ± 1 °F (22.2 °C) during the stabilization period (see section 2.9 of this appendix) and the test period.

2.1.1.2 For ice makers that are not portable ice makers, the ambient temperature shall be recorded at points located 3 feet (91.5 cm) above the floor and 10 inches (25.4 cm) from the center of the two sides of the unit under test.

2.1.1.3 For portable ice makers, the ambient temperature shall be recorded at points located level with the top of the unit under test and 10 inches (25.4 cm) from the center of the two sides of the unit under test.

2.1.2 Ambient Temperature Gradient. The test room vertical ambient temperature gradient in any foot of vertical distance from 2 inches (5.1 cm) above the floor or supporting platform to a height of 7 feet (2.2 m) or to a height 1 foot (30.5 cm) above the top of the unit under test, whichever is greater, is not to exceed 0.5 °F per foot (0.9 °C per meter). The vertical ambient temperature gradient at locations 10 inches (25.4 cm) out from the centers of the two sides of the unit being tested is to be maintained during the test. To demonstrate that this requirement has been met, test data must include measurements taken using temperature sensors at locations 2 inches (5.1 cm) and 36 inches (91.4 cm) above the floor or supporting platform and at a height of 1 foot (30.5 cm) above the unit under test.

2.2 Operational Conditions. The ice maker shall be installed and its operating conditions maintained in accordance with HRF–1–2008 (incorporated by reference; see § 430.3), section 5.3 through section 5.5.5.1 (excluding sections 5.5.2(a), (b), (c), (d), (g), (h), (j), (k), and (m), and section 5.5.3). Exceptions and clarifications to the cited sections of HRF–1–2008 are noted in sections 2.3 through 2.8 of this appendix.

2.3 Set-up. The ice maker shall be assembled and set up in accordance with the printed consumer instructions supplied with the cabinet. Set-up of the ice maker shall not deviate from these instructions, unless explicitly required or allowed by this test procedure. Specific required or allowed deviations from such set-up include the following:

(a) Clearance requirements from surfaces of the product shall be as described in section 2.4 of this appendix;

(b) The electric power supply shall be as described in HRF–1–2008 (incorporated by reference; see § 430.3), section 5.5.1;

(c) Temperature control settings for testing shall be as described in section 2.7 of this appendix.

(d) The product does not need to be anchored or otherwise secured to prevent tipping during energy testing; and

(e) If the product dispenses ice, all the product's chutes and throats required for the delivery of ice shall be free of packing, covers, or other blockages that may be fitted for shipping or when the ice maker is not in use.

For cases in which set-up is not clearly defined by this test procedure, manufacturers must submit a petition for a waiver (see section 7).

2.4 Rear Clearance.

(a) General. The space between the lowest edge of the rear plane of the cabinet and a vertical surface (the test room wall or simulated wall) shall be the minimum distance in accordance with the manufacturer's instructions, unless other provisions of this section apply. The rear plane shall be considered to be the largest flat surface at the rear of the cabinet, excluding features that protrude beyond this surface, such as brackets, the compressor, or compressors.

(b) The clearance shall not be greater than 2 inches (51 mm) from the lowest edge of the rear plane to the vertical surface, unless the provisions of subsection (c) of this section apply.

(c) If permanent rear spacers or other components that protrude beyond the rear plane extend further than the 2-inch (51 mm) distance, or if the highest edge of the rear plane is in contact with the vertical surface when the unit is positioned with the lowest edge of the rear plane at or further than the 2-inch (51 mm) distance from the vertical surface, the appliance shall be located with the spacers or other components protruding beyond the rear plane, or the highest edge of the rear plane in contact with the vertical surface.

(d) Rear-mounted condensers. If the product has a flat rear-wall-mounted condenser (*i.e.,* a rear-wall-mounted condenser with all refrigerant tube centerlines within 0.25 inches (6.4 mm) of the condenser plane), and the area of the condenser plane represents at least 25% of the total area of the rear wall of the cabinet, then the spacing to the vertical surface may be measured from the lowest edge of the condenser plane.

2.5 Inlet Water.

2.5.1 For ice makers that are not portable ice makers, connection of water lines is required. If the product provides for installation of a water filter, a water filter shall be installed as recommended by the printed consumer instructions supplied with the cabinet. Inlet water temperature shall be 72 ± 2 °F. The water supply system shall be designed to assure that inlet water temperature stays within this specified range at all times during the test. Inlet water pressure shall be 60 ± 15 psig while the water is flowing.

2.5.2 For portable ice makers, the water reservoir shall be completely filled prior to the start of the test with water at a temperature of 55 ± 2 °F.

2.6 Ice Piece Size Control. If the ice maker has a control for adjusting the size of ice pieces that is described in the printed consumer instructions supplied with the cabinet as being intended for user adjustment, set this control at the largest ice piece size setting.

2.7 Temperature Control Settings. For products that have user-operable temperature controls, set the temperature controls in the median position for all parts of the test. The ice maker internal temperature shall be measured with a weighted thermocouple as described in HRF–1–2008 (incorporated by reference; see § 430.3) section 5.5.4, located such that the temperature sensor is 1 inch (2.5 cm) above the typical fill level of the ice bin as close to the center of the ice bin as possible without interfering with the falling of ice from the mold or evaporator into the bin.

2.8 Drain Lines. For ice makers with drain outlets, install drain lines using pipe or tubing material as specified in the printed consumer instructions supplied with the product. Unless otherwise required by these consumer instructions, run drain lines downward from the drain outlet. Use of optional pumps for pumping drain water to higher elevations is not permitted. If the ice maker has integrated into its cabinet a pump whose purpose according to the printed consumer instructions supplied with the product is to pump water to higher elevations, and if the installation instructions indicate that this pump must always be connected during use, such a pump shall be utilized during the test. However, if installation instructions indicate that this pump can be switched off or disconnected during use, such a pump shall be switched off or disconnected for the test.

2.9 Steady-State Condition. Steady-state conditions exist if the ice maker internal temperature measurements are not changing at a rate greater than 0.042 °F per hour as determined by comparing the average of the measurements during a two-hour period if no compressor cycling occurs or during a number of complete repetitive compressor cycles occurring through a period of no less than 2 hours to the average over an equivalent time period with 3 hours elapsing between the two measurement periods.

2.10 Data Collection. Data collection frequency for temperatures, power, and energy shall be no less than once per minute.

2.11 Icemaking Cycle Indication for Batch-Type Ice Makers. Icemaking cycles shall be determined from collected power input data by identifying the time when (a) the compressor power input level changes after completion of the harvest cycle, or (b) the electric harvest heater is de-energized at the end of the harvest cycle. If icemaking cycles cannot be identified by examining the electric input power data because either the compressor power input does not change sufficiently at the end of a harvest cycle or ice is made using a mold without a mold heater of 50W or greater power input, use one of the following measurement approaches to indicate the start and end of icemaker cycles at a data acquisition frequency interval no less than the data acquisition frequency used for the test. The method used must be recorded in the test data underlying the certification of the basic model that the manufacturer is required to retain in accordance with 10 CFR 429.71.

2.11.1 Mold or Evaporator Temperature. Measure icemaker mold or evaporator temperature during the test with a temperature sensor adhered to the bottom of the icemaker mold or a location on the evaporator. Ensure that the temperature sensor is installed so that the icemaker operation, including operations such as twisting of the icemaker mold and ice dropping into the ice bin, will not be impeded by the temperature sensor and its connecting wire(s), and that neither the temperature sensor nor its connecting wire(s) will be dislodged or damaged by icemaker operation.

2.11.2 Water Supply Temperature. Measure the temperature of the water at any location in the water supply line. If the temperature changes consistently and measurably (within the required tolerance of water supply temperature as specified in section 2.5.1 of this appendix) when the icemaker water supply valve opens, this change may be used to provide an indication of when a new icemaker cycle has started.

2.11.3 Solenoid Valve Activation. Measure power input, voltage, or current supplied to the icemaker water supply solenoid valve to indicate when the valve is energized. Make this measurement at a frequency sufficient to ensure indication of valve activation, or use an event counter to track valve activation events.

3. Icemaking Test

3.1 Special Apparatus.

3.1.1 Perforated Container. The container used to collect the harvested ice shall be shaped and sized as necessary to collect all harvested ice produced by the unit under test between the time of the container's insertion into the ice bin and the termination of the icemaking test period. The container shall be perforated such that the ice produced by the unit under test cannot fall through the perforations and the water hold-up weight is no more than 1.0 percent of the weight of the smallest amount of ice collected and weighed using the container. The water hold-up weight is the maximum weight of water that can be measured as follows: (i) Immerse the container in water oriented as it would be for catching ice, (ii) gently lift the container out of the water and allow to drain for 30 seconds without shaking, (iii) weigh the container and the held-up water, and (iv) subtract the container's dry weight.

3.1.2 Ice Mass Measurement Scale. Use a scale having accuracy and precision no greater than 1 percent of the measured quantity.

3.2 Icemaking Test Procedure.

3.2.1 Batch-Type Ice Makers.

3.2.1.1 Stabilization and Start of Icemaking Test Period. Verify that the ice storage bin is empty and initiate icemaking. After a two-hour stabilization period, wait till the next batch of ice drops into the storage bin. The icemaking test period starts when this ice has dropped.

3.2.1.2 Icemaking Test Period. Within one minute after the batch of ice signaling the end of the stabilization period drops, place a perforated container (as specified in section 3.1.1 of this appendix) in the ice storage bin, oriented so that it will catch all the harvested ice. Each door opening to place the perforated container in the unit or to retrieve it shall have a duration of no more than 15 seconds. The icemaking test period starts as described above and consists of a whole number of icemaking cycles lasting at least 6 hours or until the ice storage bin becomes full and ice production stops. Remove the container and measure the ice mass within two minutes after the last batch of ice harvested during the test period drops into the ice storage bin. Determine the mass of ice produced, M_{ICE}, expressed in pounds, by weighing the perforated container when it contains the ice made during the test and subtracting the weight of the empty perforated container.

3.2.1.3 Ice Collection with Smaller Container. If a perforated container that can hold all of the ice produced during the specified icemaking test period cannot be placed into the ice storage bin, use a smaller container that can hold the ice produced by at least five icemaking cycles. Retrieve the ice multiple times during the test period, no more frequently than once every five icemaking cycles. During each time the ice is retrieved, weigh and record the weight of the ice and the container, transfer the ice to the ice storage bin, and replace the container in the bin, allowing the ice maker door to be open for a total of no more than 15 seconds for each retrieval and weighing of ice. Determine the mass of ice produced during each retrieval of ice, M_{ICE_i}, expressed in pounds, by subtracting the weight of the empty perforated container from the individual measurement. Determine the mass of ice produced M_{ICE}, expressed in pounds, by summing the individual calculations M_{ICE_i}.

3.2.2 Continuous-type Ice Makers.

3.2.2.1 Stabilization and Start of Icemaking Test Period. Verify that the ice storage bin is empty and initiate icemaking. After a two-hour stabilization period, place a perforated container (as specified in section 3.1.1 of this appendix) in the ice storage bin, oriented so that it will catch all the harvested ice. Record the time of container insertion and correlate it with the collected power input data.

3.2.2.2 Icemaking Test Period. The icemaking test period lasts 6 hours or until the ice storage bin becomes full and ice production stops. Remove the container and measure the ice mass at the end of the test period or within two minutes after ice production stops. Determine the mass of ice produced, M_{ICE}, expressed in pounds, by weighing the perforated container when it contains the ice made during the test and subtracting the weight of the empty perforated container.

3.2.2.3 Ice Collection with Smaller Container. If a perforated container that can hold all of the ice produced during the specified icemaking test period cannot be placed into the ice storage bin, use a smaller container that can hold the ice produced in at least an hour of ice production. Retrieve the ice multiple times during the test period, no more frequently than once per hour. During each time the ice is retrieved, weigh and record the weight of the ice and the container, transfer the ice to the ice storage bin, and replace the container in the bin, allowing the ice maker door to be open for a total of no more than 15 seconds for each retrieval and weighing of ice. Determine the mass of ice produced during each retrieval of ice, M_{ICE_i}, expressed in pounds, by subtracting the weight of the empty perforated container from the individual measurement. Determine the mass of ice produced M_{ICE}, expressed in pounds, by summing the individual calculations M_{ICE_i}.

4. Ice Storage Test

4.1 Ice Storage Test for Cooled-Storage Ice Makers.

4.1.1 Stabilization. After the icemaking test period ends and the mass of harvested ice has been determined, place the harvested ice back into the ice storage bin. Allow the ice maker to produce ice until the storage bin is full and ice production stops automatically. Wait until steady-state conditions have been confirmed, as defined in section 2.9 of this appendix. The ice storage bin shall not be emptied of ice.

4.1.2 Ice Storage Test Period. The test period shall start when steady-state conditions have been achieved and shall be no less than 3 hours in duration. During the test period, the compressor motor shall complete two or more whole compressor cycles. (A compressor cycle is a complete ''on'' and a complete ''off'' period of the motor.) If no ''off'' cycling will occur, the test period shall be 3 hours.

4.2 Ice Storage Test for Uncooled-Storage Ice Makers.

4.2.1 After the icemaking test period ends and the mass of ice has been determined, place the ice back into the ice storage bin. Allow the ice maker to operate until the storage bin is full and ice production stops automatically.

4.2.2 Ice Storage Test Period for Batch-type Uncooled-Storage Ice Makers. The ice storage test period shall start when ice production stops automatically after the measured ice has been placed back into the ice storage bin. If ice production is not occurring after replacement of the ice, the test period shall start at the end of the first replacement cycle. The ice storage bin shall not be emptied of ice. The test period shall be no less than 48 hours in duration and shall end at the end of a replacement cycle.

4.2.3 Ice Storage Test Period for Continuous-type Uncooled-Storage Ice Makers. The ice storage test period shall start when ice production stops automatically after the measured ice has been placed back into the ice storage bin. If ice production is not occurring after replacement of the ice, the test period shall start at the end of the first replacement cycle. The ice storage bin shall not be emptied of ice. The test period shall be no less than 48 hours in duration and shall end at the end of a period of ice production.

5. Ice Hardness (Continuous-Type Ice Makers Only).

For continuous-type ice makers, the ice hardness factor, I_H, shall be set equal to 0.85. Alternatively, the ice hardness factor may be measured according to the procedure in Annex A: Method of Calorimetry in AHSI/ASHRAE 29–2009 (incorporated by reference; see § 430.3).

6. Calculations

6.1 Energy Use per Ice Mass, EIM, expressed in kilowatt-hours per pound, shall be calculated as:

$$EIM = \frac{EI}{M_{ICE}} \times I_{HAF}$$

Where:

EI is the energy in kWh measured for the icemaking test period as described in section 3.2.1 or 3.2.2. of this appendix;

M_{ICE} is the ice mass in pounds, measured for the icemaking test period as described in section 3.2.1 or 3.2.2 of this appendix; and

I_{HAF} is the ice hardness adjustment factor, a dimensionless value which shall be equal to 1.0 for batch-type ice makers and calculated for continuous-type ice makers as:

$$I_{HAF} = \frac{144\frac{Btu}{lb} + 40\frac{Btu}{lb}}{\left(144\frac{Btu}{lb} \times I_H\right) + 40\frac{Btu}{lb}}$$

Where:

I_H is the ice hardness factor, determined as specified in section 5 of this appendix.

6.2 Harvest Rate. Harvest rate, H, expressed in pounds of ice per day, shall be calculated and rounded to the nearest 0.1 pound per day as:

$$H = \frac{1{,}440 \times M_{ICE}}{TI}$$

Where:

M_{ICE} is defined in section 6.1;

TI is the icemaking test period in minutes as described in section 3.2.1 or 3.2.2 of this appendix; and

1,440 is the number of minutes in one day.

6.3 Daily Energy Use.

6.3.1 For ice makers with a harvest rate greater than 4 pounds of ice per day, daily energy use E_T, expressed in kilowatt-hours per day, shall be calculated as:

$$E_T = (4 \times EIM \times K) + \left[\frac{ES}{TS} \times \left(1{,}440 - \frac{4 \times TI}{M_{ICE}}\right) \times K\right]$$

Where:

M_{ICE} is defined in section 6.1 of this appendix;

EIM is calculated as described in section 6.1 of this appendix;

ES is the energy use in kWh for the ice storage test period as described in section 4.1.2, 4.2.2, or 4.2.3 of this appendix;

TS is the ice storage test period in minutes as described in section 4.1.2, 4.2.2 or 4.2.3 of this appendix;
1,440 and TI are defined in section 6.2 of this appendix;
4 is the average daily ice consumption rate in pounds per day; and
K is a dimensionless correction factor equal to 0.5 for portable ice makers and 1.0 for non-portable ice makers to adjust for average household usage.

6.3.2 For ice makers with a harvest rate less than or equal to 4 pounds of ice per day, daily energy use E_T, expressed in kilowatt-hours per day, shall be calculated as:

$E_T = 4 \times EIM \times K$

Where:

4 is defined in section 6.3.1 of this appendix;
EIM is calculated as described in section 6.1 of this appendix; and
K is defined in section 6.3.1 of this appendix.

7. Test Procedure Waivers

To the extent that the procedures contained in this appendix do not provide a means for determining the energy consumption of an ice maker, a manufacturer must obtain a waiver under 10 CFR 430.27 to establish an acceptable test procedure for each such product. Such instances could, for example, include situations where the test set-up for a particular ice maker basic model is not clearly defined by the provisions of section 2. For details regarding the criteria and procedures for obtaining a waiver, please refer to 10 CFR 430.27.

■ 15. Amend section 430.32 by revising paragraph (a) to read as follows:

§ 430.32 Energy and water conservation standards and their compliance dates.

(a) *Refrigerators/refrigerator-freezers/freezers.* These standards do not apply to refrigerators and refrigerator-freezers with total refrigerated volume exceeding 39 cubic feet (1,104 liters) or freezers with total refrigerated volume exceeding 30 cubic feet (850 liters). The energy standards as determined by the equations of the following table(s) shall be rounded off to the nearest kWh per year. If the equation calculation is halfway between the nearest two kWh per year values, the standard shall be rounded up to the higher of these values.

The following standards remain in effect from July 1, 2001 until September 15, 2014:

Product class	Energy standard equations for maximum energy use (kWh/yr)
1. Refrigerators and refrigerator-freezers with manual defrost	8.82AV + 248.4 0.31av + 248.4
2. Refrigerator-freezers—partial automatic defrost	8.82AV + 248.4 0.31av + 248.4
3. Refrigerator-freezers—automatic defrost with top-mounted freezer without through-the-door ice service and all-refrigerator—automatic defrost.	9.80AV + 276.0 0.35av + 276.0
4. Refrigerator-freezers—automatic defrost with side-mounted freezer without through-the-door ice service	4.91AV + 507.5 0.17av + 507.5
5. Refrigerator-freezers—automatic defrost with bottom-mounted freezer without through-the-door ice service	4.60AV + 459.0 0.16av + 459.0
6. Refrigerator-freezers—automatic defrost with top-mounted freezer with through-the-door ice service	10.20AV + 356.0 0.36av + 356.0
7. Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service	10.10AV + 406.0 0.36av + 406.0
8. Upright freezers with manual defrost	7.55AV + 258.3 0.27av + 258.3
9. Upright freezers with automatic defrost	12.43AV + 326.1 0.44av + 326.1
10. Chest freezers and all other freezers except compact freezers	9.88AV + 143.7 0.35av + 143.7
11. Compact refrigerators and refrigerator-freezers with manual defrost	10.70AV + 299.0 0.38av + 299.0
12. Compact refrigerator-freezer—partial automatic defrost	7.00AV + 398.0 0.25av + 398.0
13. Compact refrigerator-freezers—automatic defrost with top-mounted freezer and compact all-refrigerator—automatic defrost.	12.70AV + 355.0 0.45av + 355.0
14. Compact refrigerator-freezers—automatic defrost with side-mounted freezer	7.60AV + 501.0 0.27av + 501.0
15. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer	13.10AV + 367.0 0.46av + 367.0
16. Compact upright freezers with manual defrost	9.78AV + 250.8 0.35av + 250.8
17. Compact upright freezers with automatic defrost	11.40AV + 391.0 0.40av + 391.0
18. Compact chest freezers	10.45AV + 152.0 0.37av + 152.0

AV: Adjusted Volume in ft^3; av: Adjusted Volume in liters (L).

The following standards apply to products manufactured starting on September 15, 2014:

Product class	Equations for maximum energy use (kWh/yr)	
	Based on AV (ft^3)	Based on av (L)
1. Refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost	7.99AV + 225.0	0.282av + 225.0
1A. All-refrigerators—manual defrost	6.79AV + 193.6	0.240av + 193.6
2. Refrigerator-freezers—partial automatic defrost	7.99AV + 225.0	0.282av + 225.0
3. Refrigerator-freezers—automatic defrost with top-mounted freezer without an automatic icemaker	8.07AV + 233.7	0.285av + 233.7
3–BI. Built-in refrigerator-freezer—automatic defrost with top-mounted freezer without an automatic icemaker.	9.15AV + 264.9	0.323av + 264.9
3I. Refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker without through-the-door ice service.	8.07AV + 317.7	0.285av + 317.7
3I–BI. Built-in refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker without through-the-door ice service.	9.15AV + 348.9	0.323av + 348.9
3A. All-refrigerators—automatic defrost	7.07AV + 201.6	0.250av + 201.6
3A–BI. Built-in All-refrigerators—automatic defrost	8.02AV + 228.5	0.283av + 228.5
4. Refrigerator-freezers—automatic defrost with side-mounted freezer without an automatic icemaker.	8.51AV + 297.8	0.301av + 297.8
4–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer without an automatic icemaker.	10.22AV + 357.4	0.361av + 357.4
4I. Refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker without through-the-door ice service.	8.51AV + 381.8	0.301av + 381.8
4I–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker without through-the-door ice service.	10.22AV + 441.4	0.361av + 441.4
5. Refrigerator-freezers—automatic defrost with bottom-mounted freezer without an automatic icemaker.	8.85AV + 317.0	0.312av + 317.0
5–BI. Built-In Refrigerator-freezers—automatic defrost with bottom-mounted freezer without an automatic icemaker.	9.40AV + 336.9	0.332av + 336.9
5I. Refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker without through-the-door ice service.	8.85AV + 401.0	0.312av + 401.0
5I–BI. Built-In Refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker without through-the-door ice service.	9.40AV + 420.9	0.332av + 420.9
5A. Refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	9.25AV + 475.4	0.327av + 475.4
5A–BI. Built-in refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service.	9.83AV + 499.9	0.347av + 499.9
6. Refrigerator-freezers—automatic defrost with top-mounted freezer with through-the-door ice service.	8.40AV + 385.4	0.297av + 385.4
7. Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service.	8.54AV + 432.8	0.302av + 432.8
7–BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service.	10.25AV + 502.6	0.362av + 502.6
8. Upright freezers with manual defrost	5.57AV + 193.7	0.197av + 193.7
9. Upright freezers with automatic defrost without an automatic icemaker	8.62AV + 228.3	0.305av + 228.3
9I. Upright freezers with automatic defrost with an automatic icemaker	8.62AV + 312.3	0.305av + 312.3
9–BI. Built-In Upright freezers with automatic defrost without an automatic icemaker	9.86AV + 260.9	0.348av + 260.9
9I–BI. Built-in upright freezers with automatic defrost with an automatic icemaker	9.86AV + 344.9	0.348av + 344.9
10. Chest freezers and all other freezers except compact freezers	7.29AV + 107.8	0.257av + 107.8
10A. Chest freezers with automatic defrost	10.24AV + 148.1	0.362av + 148.1
11. Compact refrigerator-freezers and refrigerators other than all-refrigerators with manual defrost	9.03AV + 252.3	0.319av + 252.3
11A. Compact all-refrigerators—manual defrost	7.84AV + 219.1	0.277av + 219.1
12. Compact refrigerator-freezers—partial automatic defrost	5.91AV + 335.8	0.209av + 335.8
13. Compact refrigerator-freezers—automatic defrost with top-mounted freezer	11.80AV + 339.2	0.417av + 339.2
13I. Compact refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker.	11.80AV + 423.2	0.417av + 423.2
13A. Compact all-refrigerators—automatic defrost	9.17AV + 259.3	0.324av + 259.3
14. Compact refrigerator-freezers—automatic defrost with side-mounted freezer	6.82AV + 456.9	0.241av + 456.9
14I. Compact refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker.	6.82AV + 540.9	0.241av + 540.9
15. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer	11.80AV + 339.2	0.417av + 339.2
15I. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker.	11.80AV + 423.2	0.417av + 423.2
16. Compact upright freezers with manual defrost	8.65AV + 225.7	0.306av + 225.7
17. Compact upright freezers with automatic defrost	10.17AV + 351.9	0.359av + 351.9
18. Compact chest freezers	9.25AV + 136.8	0.327av + 136.8

AV = Total adjusted volume, expressed in ft^3 and rounded to the nearest 0.1 ft^3, as determined in appendices A and B of subpart B of this part.

av = Total adjusted volume, expressed in liters.

[FR Doc. 2014–28789 Filed 12–15–14; 8:45 am]

BILLING CODE 6450–01–P