[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 430

EERE-2017-BT-TP-0004

RIN 1904-AD84

Energy Conservation Program: Test Procedures for Consumer Refrigeration Products

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

ACTION: Notice of proposed rulemaking and request for comment.

SUMMARY: The U.S. Department of Energy ("DOE") proposes to amend the test procedures for consumer refrigerators, refrigerator-freezers, and freezers, and miscellaneous refrigeration products (collectively "consumer refrigeration products") to more accurately measure energy use of consumer refrigeration products during a representative average use cycle and reduce test procedure burden. The proposed test procedure amendments would replace references to the relevant industry standard to reflect an updated version of the standard, define the term "compartment," revise the method for including the energy use of automatic icemakers and certain other energy-using functions, and incorporate additional direction to test setup and conditions. As revising the method for including the energy use of automatic icemakers would alter the measured energy use for certain consumer refrigeration products, DOE is proposing to adjust the standards for these products to ensure that this change in test methodology does not: require manufacturers to increase the efficiency of already compliant products in order to meet the current energy conservation standard; or allow previously non-compliant products to meet

the current energy conservation standard. DOE is seeking comment from interested parties on the proposal. As part of this proposal, DOE is announcing a public meeting and comment period to collect comments and data on its proposal. DOE also welcomes comment on methods to reduce regulatory burden while ensuring the test procedures' representativeness of energy use during an average use cycle or period of use.

DATES: *Meeting*: DOE will hold a public meeting on January 9, 2019 from 9 a.m. to 4 p.m., in Washington, DC. The meeting will also be broadcast as a webinar. See section V, "Public Participation," of this document for webinar registration information, participant instructions, and information about the capabilities available to webinar participants.

DOE will accept comments, data, and information regarding this proposal no later than [**INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***]. 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. Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *http://www.regulations.gov*. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE-2017-BT-TP-0004, by any of the following methods:

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

2) *E-mail: ConsumerRefrigFreezer2017TP0004@ee.doe.gov*. Include the docket number EERE-2017-BT-TP-0004 or regulatory information number (RIN) 1904-AD84 in the subject line of the message.
3) *Postal Mail:* Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 287-1445. If possible, please submit all items on a compact disc ("CD"), in which case it is not necessary to include printed copies.
4) *Hand Delivery/Courier:* Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC, 20024. Telephone: (202) 287-1445. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

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

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 *http://www.regulations.gov*. All documents in the docket are listed in the *http://www.regulations.gov* index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

The docket web page can be found at *http://www.regulations.gov/#!docketDetail;D=EERE-2017-BT-TP-0004*. The docket web page contains instructions on how to access all documents, including public comments, in the docket. See section V for information on how to submit comments through *http://www.regulations.gov*.

FOR FURTHER INFORMATION CONTACT:

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

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

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

SUPPLEMENTARY INFORMATION:

DOE proposes to incorporate by reference the following industry standard into 10 CFR part 430:

AHAM HRF-1-2016, ("HRF-1-2016"), Energy and Internal Volume of Refrigerating Appliances (January 1, 2016), including Errata to Energy and Internal Volume of Refrigerating Appliances, Correction Sheet issued August 3, 2016.

Copies of HRF-1-2016 can be obtained from the Association of Home Appliance Manufacturers, 1111 19th Street, NW., Suite 402, Washington, DC 20036, (202) 872-5955, or go to *http://www.AHAM.org*. See section IV.N of this document for a more detailed discussion of this industry standard.

Table of Contents

I. Authority and Background

Consumer refrigerators, refrigerator-freezers, and freezers are included in the list of "covered products" for which DOE is authorized to establish and amend energy conservation standards and test procedures. (42 U.S.C. 6292(a)(1)) DOE's energy conservation standards for consumer refrigerators, refrigerator-freezers, and freezers are currently prescribed at title 10 of the Code of Federal Regulations ("CFR") 430.32(a). DOE's test procedures are currently prescribed at 10 CFR 430.23(a) and part 430, subpart B, appendix A ("Appendix A") for

refrigerators and refrigerator-freezers, and 10 CFR 430.23(b) and 10 CFR part 430, subpart B, appendix B ("Appendix B") for freezers.

Additionally, under 42 U.S.C. 6292(a)(20), DOE may extend coverage over a particular type of consumer product provided that DOE determines that classifying products of such type as covered products is necessary or appropriate to carry out the purposes of EPCA, and specified requirements are met. See 42 U.S.C. 6292(b)(1) and 6295(l)(1). Consistent with its statutory obligations, DOE established regulatory coverage over miscellaneous refrigeration products ("MREFs").[1] 81 FR 46768 (July 18, 2016). The current test procedures for MREFs are prescribed at 10 CFR 430.23(ff) and Appendix A.

The following sections discuss DOE's authority to establish and amend test procedures for consumer refrigerators, refrigerator-freezers, freezers, and MREFs, as well as relevant background information regarding DOE's proposed amendments to the test procedures for these products.

A. Authority

The Energy Policy and Conservation Act of 1975, as amended, (EPCA)[2] among other things, authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment (42 U.S.C. 6291–6317). Title III, Part B[3] of EPCA established the

[1] An MREF is defined as a consumer refrigeration product other than a refrigerator, refrigerator-freezer, or freezer, which includes coolers and combination cooler refrigeration products. 10 CFR 430.2.
[2] All references to EPCA in this document refer to the statute as amended through America's Water Infrastructure Act of 2018, Public Law 115–270 (October 23, 2018).
[3] For editorial reasons, upon codification in the U.S. Code, Part B was redesignated Part A.

Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency. These products include consumer refrigerators, refrigerator-freezers, and freezers, the subject of this document. (42 U.S.C. 6292(a)(1))

Under EPCA, DOE's energy conservation program consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42 U.S.C. 6291), energy conservation standards (42 U.S.C. 6295), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The Federal 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 pursuant to EPCA (42 U.S.C. 6295(s)), and (2) making representations about the efficiency of those consumer products (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the products comply with relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

Federal energy efficiency requirements for covered products established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (See 42 U.S.C. 6297) DOE may, however, grant waivers of Federal preemption

for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA. (42 U.S.C. 6297(d))

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. EPCA requires that any test procedures prescribed or amended under this section be reasonably designed to produce test results which measure energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use and not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

Further, when amending a test procedure, DOE must determine the extent to which, if any, the proposal would alter the measured energy use of a given product as determined under the existing test procedure. (42 U.S.C. 6293(e)(1)) If DOE determines that the amended test procedure would alter the measured energy use of a covered product, DOE must also amend the applicable energy conservation standard during the rulemaking carried out with respect to such test procedure. (42 U.S.C. 6293(e)(2)) In determining the amended energy conservation standard, the Secretary shall measure, pursuant to the amended test procedure, the energy efficiency, energy use, or water use of a representative sample of covered products that minimally comply with the existing standard. The average of such energy efficiency, energy use, or water use levels determined under the amended test procedure shall constitute the amended energy conservation standard for the applicable covered products. *Id.*

In addition, EPCA requires that DOE amend its test procedures for all covered products to integrate measures of standby mode and off mode energy consumption. (42 U.S.C. 6295(gg)(2)(A)) Standby mode and off mode energy consumption must be incorporated into the overall energy efficiency, energy consumption, or other energy descriptor for each covered product unless the current test procedures already account for and incorporate standby 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 technically feasible. (42 U.S.C. 6295(gg)(2)(A)(ii)) Any such amendment must consider the most current versions of the International Electrotechnical Commission (IEC) Standard 62301[4] and IEC Standard 62087[5] as applicable. (42 U.S.C. 6295(gg)(2)(A))

If DOE determines that a test procedure amendment is warranted, it must publish proposed test procedures and offer the public an opportunity to present oral and written comments on them. (42 U.S.C. 6293(b)(2)) EPCA also requires that, at least once every 7 years, DOE evaluate test procedures for each type of covered product, including consumer refrigeration products, to determine whether amended test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that measure energy efficiency, energy use, and estimated operating costs during a representative average use cycle or period of use. (42 U.S.C. 6293(b)(1)(A)) If the Secretary determines, on his own behalf or in response to a petition by any

[4] IEC 62301, *Household electrical appliances—Measurement of standby power* (Edition 2.0, 2011-01).
[5] IEC 62087, *Methods of measurement for the power consumption of audio, video, and related equipment* (Edition 3.0, 2011-04).

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

B. Background

As described, DOE's existing test procedure for consumer refrigerators, refrigerator-freezers, and MREFs appears at Appendix A ("Uniform Test Method for Measuring the Energy Consumption of Refrigerators, Refrigerator-Freezers, and Miscellaneous Refrigeration Products"). DOE's existing test procedure for freezers appears at Appendix B ("Uniform Test Method for Measuring the Energy Consumption of Freezers").

These test procedures are the result of numerous evaluations and updates that have occurred since DOE initially established its test procedures for these products in a final rule published in the *Federal Register* on September 14, 1977. 42 FR 46140. The original test procedures were generally viewed as too complex, and industry stakeholders developed

alternative test procedures in conjunction with the Association of Home Appliance Manufacturers ("AHAM") that were incorporated into the 1979 version of AHAM Standard HRF-1, "Household Refrigerators, Combination Refrigerator-Freezers, and Household Freezers" ("HRF-1-1979"). Using this industry-created test procedure, DOE revised its test procedures on August 10, 1982, which were codified as a new Appendix A1 for refrigerators and refrigerator-freezers and a new Appendix B1 for freezers. 47 FR 34517.

On August 31, 1989, DOE amended the Appendix A1 and Appendix B1 test procedures further when it published a final rule establishing test procedures for variable-defrost control refrigeration products, dual-compressor refrigerator-freezers, and freezers equipped with "quick-freeze." 54 FR 36238.

DOE amended the Appendix A1 test procedure again on March 7, 2003, by modifying the test period used for products equipped with long-time automatic defrost or variable defrost. 68 FR 10957.

On December 16, 2010, DOE published a final and interim final rule (the "December 2010 Final Rule and Interim Final Rule") that amended the test procedures in Appendix A1 and Appendix B1 and established new test procedures in Appendix A and Appendix B. 75 FR 78810. The December 2010 Final Rule and Interim Final Rule established a number of comprehensive changes to improve the measurement of energy consumption of refrigerators, refrigerator-freezers, and freezers. These changes included, among other things: (1) adjusting the standardized compartment temperatures and volume-adjustment factors, (2) adding new

methods for measuring compartment volumes, (3) modifying the long-time automatic defrost test procedure to measure all energy use associated with the defrost function, (4) adding test procedures for products with a single compressor and multiple evaporators with separate active defrost cycles, and (5) updating the industry standard reference to the 2008 version of HRF-1, "Energy and Internal Volume of Refrigerating Appliances" ("HRF-1-2008"). Lastly, the December 2010 Final Rule and Interim Final Rule addressed icemaking energy use by including a fixed energy use adder for those products equipped with an automatic icemaker. Using available data submitted by stakeholders, this value was set at 84 kilowatt-hours ("kWh") per year. *Id*. On January 25, 2012, DOE finalized the test procedures established in the December 2010 Final Rule and Interim Final Rule and required use of the new test procedures at Appendix A and Appendix B for certifying basic models as compliant with the energy conservation standards starting on September 15, 2014. 77 FR 3559.

On July 10, 2013, DOE proposed further amending the consumer refrigerator and refrigerator-freezer test procedure to address products with multiple compressors and to allow an alternative method for measuring and calculating energy consumption for refrigerator-freezers and refrigerators with freezer compartments. 78 FR 41610 (the "July 2013 NOPR"). DOE also proposed to amend certain aspects of the consumer refrigerator, refrigerator-freezer, and freezer test procedures to ensure better accuracy and repeatability. Additionally, DOE solicited comment on a proposed automatic icemaker test procedure and on whether built-in products should be tested in a built-in configuration. *Id*. In response to the July 2013 NOPR, interested parties requested that DOE grant more time to respond to the proposal for measuring energy use associated with icemaking and to DOE's request for comment regarding testing of built-in

products in a built-in configuration. DOE granted the comment period extension request for these two topics. 78 FR 53374 (Aug. 29, 2013).

On April 21, 2014, DOE published a final rule for the refrigerator, refrigerator-freezer, and freezer test procedures (the "April 2014 Final Rule"). 79 FR 22320. The amendments enacted by the April 2014 Final Rule addressed products with multiple compressors and established an alternative method for measuring and calculating energy consumption for refrigerator-freezers and refrigerators with freezer compartments. The April 2014 Final Rule also amended certain aspects of the test procedures to improve test accuracy and repeatability. To allow additional time to review comments and data received during the comment period extension, DOE did not address automatic icemaking energy use or built-in testing configuration in the April 2014 Final Rule. *Id*.

On July 18, 2016, DOE published a final rule (the "July 2016 Final Rule") that established coverage and test procedures for MREFs.[6] 81 FR 46768. Included within this category are refrigeration products that include one or more compartments that maintain higher temperatures than typical refrigerator compartments, such as wine chillers and beverage coolers. Additionally, the July 2016 Final Rule amended Appendix A and Appendix B to include provisions for testing MREFs and to improve the clarity of certain existing test requirements. *Id*.

[6] As part of the rulemaking process to establish the scope of coverage, definitions, test procedures, and corresponding energy conservation standards for MREFs, DOE established an Appliance Standards and Rulemaking Federal Advisory Committee negotiated rulemaking working group (the "MREF Working Group"). See, 80 FR 17355 (April 1, 2015).

On June 30, 2017, DOE published a request for information (the "June 2017 RFI") to initiate a data collection process to inform DOE's decision on whether to amend its test procedures in Appendix A and Appendix B. 82 FR 29780. DOE received seven comments in response to the June 2017 RFI from the interested parties listed in Table I-I.

Table I-I June 2017 RFI Written Comments

Organization(s)	Reference in this NOPR	Organization Type
Appliance Standards Awareness Project, American Council for an Energy-Efficient Economy, Northeast Energy Efficiency Partnerships, Alliance to Save Energy, Natural Resources Defense Council, Northwest Energy Efficiency Alliance	Joint Commenters	Efficiency Organizations
Association of Home Appliance Manufacturers	AHAM	Trade Association
BSH Home Appliances Corporation	BSH	Manufacturer
Felix Storch, Inc.	FSI	Manufacturer
Samsung Electronics America	Samsung	Manufacturer
Sub Zero Group, Inc.	Sub Zero	Manufacturer
Whirlpool Corporation	Whirlpool	Manufacturer

DOE has considered the comments and information submitted by these interested parties in determining the proposals included in this NOPR. Summaries of the comments related to the proposals included in this NOPR submitted by interested parties and DOE's responses are included in the relevant sections of this proposed rule.[7]

II. Synopsis of the Notice of Proposed Rulemaking

[7] Comments received not related to the proposals in this NOPR will be considered and addressed as appropriate should DOE undertake additional rulemakings.

In this NOPR, DOE proposes a number of changes to the current test procedures for consumer refrigeration products. DOE has tentatively determined that two of the proposed amendments would alter the measured efficiency of certain consumer refrigeration products.

The proposal to amend the energy adder for products with automatic icemakers would alter the energy use of certain consumer refrigeration products as determined under the test procedure and would provide more representative energy use measurements for those products with automatic icemakers. As a result, in accordance with 42 U.S.C. 6293(e)(2), DOE proposes to amend the energy conservation standards for these products. Manufacturers would be required to comply with these amended standards one year after publication of a final rule incorporating these amendments. Correspondingly, use of the test procedure provisions that incorporate the updated icemaker energy adder would be required one year after publication of any final rule incorporating these amendments. During the one-year compliance lead-time period, manufacturers would be required to use the test procedure provisions that incorporate the current icemaker adder. DOE is proposing to provide separate sections within Appendix A and Appendix B to include both the current icemaker energy adder and the updated value.

Additionally, the proposal to test demand-response capable products[8] with the communication module off may reduce the measured energy consumption for certain products. However, DOE is not proposing to amend the energy conservation standards for these products based on this proposed test procedure change as discussed in section III.H.2 of this document.

[8] "Demand response" capability refers to product functionality that can be controlled, via signals from the electrical distribution grid, to improve the overall operation of the electrical grid; for example, by reducing energy consumption during peak periods and/or shifting power consumption to off-peak periods.

DOE has also tentatively determined that the proposed test procedure would not be unduly burdensome to conduct.

Specifically, as discussed in this document, DOE is proposing to:

- Establish a compartment definition that is consistent with the industry term;
- Update references to the relevant industry standard (HRF-1) to the sections of the current version;
- Update the fixed value used to represent the energy use of automatic icemakers;
- Amend the energy conservation standards for consumer refrigeration products with automatic ice makers in accordance with 42 U.S.C. 6293(e)(2);
- Provide additional detail on the test set-up regarding thermocouple placement, vented test chamber floors, and units with external controls;
- Provide additional detail on test conditions regarding maintenance and measurement of the vertical ambient temperature gradient, the use of data during the stabilization period, and the stabilization of units with multiple compressors;
- Require testing demand-response capable units with the communication module off; and
- Reinsert an inadvertently omitted method for calculating the average per-cycle energy consumption of refrigerators and refrigerator-freezers, and other corrections.

DOE's proposed actions are summarized in Table II-I and addressed in detail in section III of this proposed rule.

Table II-I. Summary of Changes in Proposed Test Procedure Relative to Current Test Procedure

Current DOE Test Procedure	Proposed Test Procedure	Attribution
No definition for term "compartment"	Defines "compartment" consistent with AS/NZS 4474.1:2007	Adopt industry standard
Incorporates by reference (IBR) AHAM HRF-1-2008	Updates IBR to AHAM HRF-1-2016	Harmonize with industry standard update
Energy use adder for automatic icemakers of 84 kWh/year	Updates energy use adder for automatic icemakers to 28 kWh/year	Provide more representative measure of average use cycle
Does not explicitly specify the setup for test chamber floors that have vents for airflow	Provides consistent specifications for test platform and floor requirements	Improves representativeness, repeatability, and reproducibility
Does not specify test setup for products with controls external to the cabinet	Specifies test setup for products with controls external to the cabinet	Address current waiver
Does not explicitly specify timing of required temperature range conditions and thermocouple placement in certain product configurations	Provides additional timing and thermocouple placement specifications	Improves repeatability and reproducibility
Specified time and temperature conditions may not apply to certain products with irregular compressor cycling or multiple compressors	Allows measuring average temperatures over multiple compressor cycles or for a given time period to determine stable operation	Address current waiver
Requires a separate stabilization and test period when conducting all energy tests	Allows test period to serve as stabilization period when conducting certain energy tests	Reduce test burden while maintaining representative results
Requires testing demand-response function communication modules in the as-shipped configuration	Requires testing demand-response function communication modules in the off configuration	Address representative average use

Current DOE Test Procedure	Proposed Test Procedure	Attribution
Inadvertently omits optional method for calculating average per-cycle energy consumption of refrigerators and refrigerator-freezers	Reinstates method and makes other non-substantive corrections	Correction

In this NOPR, DOE also requests feedback on additional topics for which it is not proposing test procedure amendments at this time, including: built-in product test configuration, door-in-door features, display screens, and connected functions (other than for demand-response capable products). Additionally, DOE requests feedback on any topics not specifically addressed in this NOPR.

III. Discussion

A. Scope of Applicability

The proposed amendments in this document apply to products that meet the definition for "consumer refrigeration product," as codified in 10 CFR 430.2. Consumer refrigeration products generally refer to cabinets used with one or more doors that are capable of maintaining temperatures colder than the ambient temperature. While these products are typically used for the storage and freezing of food or beverages, the definitions do not require that the products be designed or marketed for that purpose. The definitions only require that the product be capable of maintaining compartment temperatures within certain ranges, regardless of use. 10 CFR 430.2.

Consumer refrigeration products include consumer refrigerators, refrigerator-freezers, freezers, and MREFs. Because of the similarities between consumer refrigerators, refrigerator-

freezers, and MREFs, the test procedures for these products are all included in Appendix A. As a result, any amendments to Appendix A would be applicable to testing for each of these product categories. Section III.K of this document discusses the extent to which the proposed amendments, if finalized, would alter the measured energy consumption of consumer refrigeration products as compared to the existing Federal test procedures.

The amendments proposed in this NOPR would not change the scope of applicability of the test procedure.

B. Compartment Definitions

Although the term "compartment" is used throughout the DOE test procedures in Appendix A and Appendix B, it is not defined. The DOE test procedures use the term to refer to both individual enclosed spaces within a product (*e.g.*, referring to a specific freezer compartment), as well as all enclosed spaces within a product that meet the same temperature criteria (*e.g.*, referring to the freezer compartment temperature—a volume-weighted average temperature for all individual freezer compartments within a product).

The MREF Working Group[9] considered the issue of a compartment definition in its discussions. Working Group members indicated that the term "compartment," as included in the

[9] After reviewing the comments received in response to the NOPR published ahead of the July 2016 Final Rule, and in response to the preliminary analysis conducted for potential MREF energy conservation standards, DOE determined that its efforts would benefit from the direct and comprehensive input provided through the negotiated rulemaking process. On April 1, 2015, DOE published a notice of intent to establish a Working Group under the Appliance Standards and Rulemaking Federal Advisory Committee ("ASRAC") that would use the negotiated rulemaking process to discuss and, if possible, reach consensus recommendations on the scope of coverage, definitions, test procedures, and energy conservation standards for MREFs. 80 FR 17355. Subsequently, DOE formed a Miscellaneous Refrigeration Products Working Group ("MREF Working Group" or, in context, "the

existing test procedures, was well-understood by industry and test laboratories, and that a definition intended to cover the multiple uses in the test procedure would potentially introduce confusion. Accordingly, the MREF Working Group recommendation did not include a "compartment" definition and suggested that DOE address this issue in a future rulemaking for refrigerator, refrigerator-freezer, and freezer test procedures.[10]

In the July 2016 Final Rule, consistent with the MREF Working Group recommendation, DOE did not amend Appendix A or Appendix B to include a definition for the term "compartment." 81 FR 46768, 46779 (July 18, 2016).

In the June 2017 RFI, DOE requested comment on the issue of defining the term "compartment" in Appendix A and Appendix B. 82 FR 29784.

AHAM commented that it has previously suggested that DOE define the term "compartment' consistent with Australian/New Zealand Standard 4474.1:2007, "Performance of household electrical appliances – Refrigerating appliances, Part 1: Energy consumption and performance" (AS/NZS 4474.1:2007)[11] and use the term consistently throughout the test procedures, but that this undertaking is a complex one and requires a review of the entire test procedure. In addition, AHAM noted that the definition could reclassify certain compartments

Working Group") to address these issues. The Working Group consisted of 15 members, including two members from ASRAC and one DOE representative. The MREF Working Group met in-person during six sets of meetings held in 2015 on May 4–5, June 11–12, July 15–16, August 11–12, September 16–17, and October 20. On August 11, 2015, the MREF Working Group reached consensus on a term sheet (Term Sheet #1) that recommended the relevant scope of coverage, definitions, and test procedures for MREFs. See public docket EERE-2011-BT-STD-0043-0113.

[10] See Term Sheet #1, which recommended the relevant scope of coverage, definitions, and test procedures for MREFs, available in public docket EERE-2011-BT-STD-0043-0113.

[11] Available online at *https://infostore.saiglobal.com/en-us/Standards/AS-NZS-4474-1-2007-383878/*.

and would likely impact measured energy use. AHAM stated that this is one of the items it will review as part of its HRF-1 task force; accordingly, there is no need for DOE to duplicate those efforts. AHAM requested that DOE review the completed HRF-1 update as a reference for the "compartment" definition. (AHAM, No. 5 at pp. 9–10) Sub Zero also commented that the "compartment" definition should be addressed in the HRF-1 update to avoid DOE and industry duplicating efforts. (Sub Zero, No. 4 at pp. 2–3)

As recommended by the MREF Working Group, and as previously supported by AHAM, DOE is proposing to include a definition for "compartment" consistent with AS/NZS 4474.1:2007, but adapted to use the appropriate DOE terminology for certain terms within the definition. AS/NZS 4474.1:2007 defines 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." DOE is proposing to define compartment as "an enclosed space within a consumer refrigeration product that is directly accessible through one or more external doors and may be divided into sub-compartments." Based on this proposal, compartments would be treated in the same way as under the current test procedure. Accordingly, DOE does not expect that any compartments would be reclassified and the proposed definition would not impact measured energy consumption.

Additionally, to provide further understanding of the proposed definition for "compartment," DOE is proposing to define "sub-compartment" as an enclosed space within a compartment that may have a different operating temperature from the compartment within

which it is located. This definition, coupled with the new definition for "compartment," would remove the need to separately define "separate auxiliary compartment" and "special compartment" because these terms are redundant with the proposed compartment definitions. Use of the proposed terms "compartment" and "sub-compartment" would not change how compartments currently defined as "separate auxiliary compartment" and "special compartment" would be treated under the existing test procedure instructions. Therefore, DOE is proposing to remove the terms "separate auxiliary compartment" and "special compartment" from Appendix A and Appendix B and replace them with compartment or sub-compartment as appropriate.

DOE requests comment on its proposal to establish definitions for "compartment" and "sub-compartment" in Appendix A and Appendix B.

C. AHAM HRF-1 Standard

As discussed in section I.B of this document, Appendix A and Appendix B incorporate by reference the AHAM industry standard HRF-1-2008. DOE references HRF-1-2008 for definitions, installation and operating conditions, temperature measurements, and volume measurements. In August 2016, AHAM released an updated version of the HRF-1 standard, HRF-1-2016.

In the June 2017 RFI, DOE stated that based on review of HRF-1-2016, the majority of the updates from the 2008 standard were clarifications or other revisions to harmonize with DOE's test procedures. DOE requested comment on whether Appendix A and Appendix B should incorporate by reference the newer version of HRF-1 and whether the revisions between

the two versions of HRF-1 would substantively affect any of the test requirements in Appendix A and Appendix B. 82 FR 29785.

AHAM, BSH, and Sub Zero commented in support of DOE incorporating HRF-1-2016 by reference because the 2016 version is intended to harmonize with the current DOE test procedure, and therefore would not change the DOE test procedure. (AHAM, No. 5 at p. 11; BSH, No. 2 at p. 2; Sub Zero, No. 4 at p. 3) AHAM also stated that it is currently revising AHAM HRF-1-2016, and DOE should not duplicate those efforts. AHAM recommended that DOE instead participate in the HRF-1 task force to discuss potential changes to the test procedure. (AHAM, No. 5 at p. 2)

As noted in comments from interested parties, the updates included in HRF-1-2016 harmonize with the current DOE test procedure. This includes updates to definitions, test requirements, formatting, and organization that are consistent with DOE's requirements. Therefore, DOE is proposing to incorporate by reference HRF-1-2016 in Appendix A and Appendix B. As indicated in the comments from interested parties, DOE does not expect that updating its references to HRF-1-2016 would substantively affect the existing test procedures in Appendix A and Appendix B. DOE is not proposing to require the use of HRF-1-2016 in its entirety. Certain of the updates made in HRF-1-2016 to harmonize with DOE are now out of date; for example, the product definitions included in HRF-1-2016 are harmonized with the DOE definitions included in 10 CFR 430.2 at the time HRF-1-2016 was published, but do not reflect the recent amendments made in the July 2016 Final Rule (*e.g.,* those related to MREFs). Furthermore, HRF-1-2016 covers only compressor-driven products, whereas the DOE test

procedure applies to all consumer refrigeration products, including those with non-compressor refrigeration systems.

As stated in the AHAM comment, the AHAM task force is working to revise HRF-1-2016. (AHAM, No. 5 at p. 2) AHAM has recently released a draft of an updated HRF-1-2019 for public review.[12] Based on a review of the draft for public review, the in-progress updates to HRF-1 are generally consistent with the proposals included in this NOPR. However, because the current version available from AHAM is a draft for public review and not available for distribution, DOE is not proposing to incorporate by reference this initial draft version of the standard. DOE would consider incorporating by reference the updated HRF-1 standard in its entirety when it is available for public distribution.

DOE requests feedback on its proposal to incorporate by reference the most current version of HRF-1, HRF-1-2016, rather than HRF-1-2008. DOE also requests feedback on a potential updated reference to HRF-1-2019 based on the public draft currently available for review. DOE also requests feedback on whether any of the differences between HRF-1-2008 and HRF-1-2016 (or HRF-1-2019) would substantively affect the requirements currently incorporated by reference in Appendix A and Appendix B – and if so, how.

D. Icemaking Energy Consumption

In 2010, DOE initiated a test procedure rulemaking to address a variety of test procedure-related issues, including energy use associated with automatic icemaking. On May 27, 2010,

[12] The draft revision for review is available at *http://www.aham.org/AHAM/Standard_Chart_Page.aspx* (accessed June 5, 2019).

DOE published a NOPR (the "May 2010 NOPR") proposing to use a fixed value of 84 kWh per year to represent the energy use associated with automatic icemaking. 75 FR 29824. The May 2010 NOPR also indicated that DOE would consider adopting an approach based on testing to determine icemaking energy use if a suitable test procedure could be developed. *Id*. at 29846–29847. A broad group of interested parties submitted a consensus recommendation comment supporting DOE's proposal to use a fixed value to represent the energy use of automatic icemakers, and requesting that DOE subsequently initiate a rulemaking to amend the test procedures to incorporate a laboratory-based measurement of icemaking energy use. (Test Procedure for Refrigerators, Refrigerator-Freezers, and Freezers, Docket Number EERE–2009–BT–TP–0003; Consensus Recommendation,[13] No. 20 at pp. 5–6) As noted, DOE adopted a fixed energy use adder for those products equipped with an automatic icemaker. 75 FR 78810.

In January 2012, AHAM provided DOE with a draft test procedure for measuring automatic icemaker energy usage. (AHAM Refrigerator, Refrigerator-Freezer and Freezer Ice Making Energy Test Procedure, Revision 1.0—12/14/11, No. 4)[14] AHAM then submitted a revised automatic icemaker test procedure on July 18, 2012. (AHAM Refrigerator, Refrigerator-Freezer and Freezer Ice Making Energy Test Procedure, Revision 2.0—7/10/12, No. 5)[15] In the subsequent July 2013 NOPR, as mentioned in section I.B of this document, DOE proposed a method for measuring the energy usage associated with automatic icemaking based on the

[13] The "Consensus Recommendation" was submitted by AHAM and the American Council for an Energy-Efficient Economy, on behalf of: Whirlpool, General Electric, Electrolux, LG Electronics, BSH, Alliance Laundry, Viking Range, Sub-Zero Wolf, Friedrich A/C, U- Line, Samsung, Sharp Electronics, Miele, Heat Controller, AGA Marvel, Brown Stove, Haier, Fagor America, Airwell Group, Arcelik, Fisher & Paykel, Scotsman Ice, Indesit, Kuppersbusch, Kelon, DeLonghi, Appliance Standards Awareness Project, Natural Resources Defense Council, Alliance to Save Energy, Alliance for Water Efficiency, Northwest Power and Conservation Council, Northeast Energy Efficiency Partnerships, Consumer Federation of America, and the National Consumer Law Center.
[14] Document No. 4 in Docket No. EERE–2012– BT–TP-0016, available for review at *https://www.regulations.gov*.
[15] Document No. 5 in Docket No. EERE–2012– BT–TP-0016, available for review at *https://www.regulations.gov*.

revised approach submitted by AHAM. 78 FR 41610, 41618–41629. In response to the July 2013 NOPR, AHAM submitted comments to DOE requesting that DOE grant its members more time to respond to the automatic icemaker testing proposal, which DOE granted. 78 FR 53374 (Aug. 29, 2013). In the April 2014 Final Rule, DOE maintained the fixed adder approach and stated that it would review comments received during the comment period extension to address the icemaking test procedure issue in a future notice. See 79 FR 22320, 22341–22342.

Multiple interested parties supported the development and adoption of a test procedure that measures the energy use of automatic icemakers. These commenters presented a number of reasons that they stated justified a laboratory-based icemaker energy test procedure, including: (1) a direct laboratory test would be more accurate and representative of actual icemaking energy use, and (2) the fixed adder approach would not reward improvements in icemaking efficiency or provide incentives to reduce icemaker energy consumption. (BSH, 2012 TP Rulemaking No. 21 at p. 1;[16] Joint Commenters,[17] 2012 TP Rulemaking No. 42 at pp. 1–5; Samsung, 2012 TP Rulemaking No. 39 at p. 2)

Other interested parties supported the existing fixed adder approach, stating that the proposed icemaking test procedure would create a significant test burden and that there are limited opportunities to reduce icemaking energy consumption. (AHAM, 2012 TP Rulemaking

[16] A notation in the form "BSH, 2012 TP Rulemaking No. 21 at p. 1" identifies a written comment: (1) made by BSH Home Appliances Corporation; (2) recorded in document number 21 that is filed in the docket of the test procedure rulemaking (Docket No. EERE–2012–BT–TP–0016) and available for review at *https://www.regulations.gov*; and (3) which appears on page 1 of document number 21.

[17] "Joint Commenters" refers to the Appliance Standards Awareness Project, American Council for an Energy-Efficient Economy, Consumer Federation of America, National Consumer Law Center, and Natural Resources Defense Council.

No. 37 at p. 2–5; GE Appliances ("GE"), 2012 TP Rulemaking No. 40 at p. 5; Sub Zero, 2012 TP Rulemaking No. 36 at p. 2)

Further, DOE received data indicating that consumers likely use less ice than assumed in calculating the 84 kWh per year adder. The Northwest Energy Efficiency Alliance ("NEEA") and Northwest Power & Conservation Council ("NPCC") conducted field research to assess the existing icemaking adder of 84 kWh per year. Their results showed average daily ice consumption of 0.83 pounds per day ("lbs/day") for through-the-door service models and 0.61 lbs/day for in-freezer models. NEEA and NPCC stated that this field research shows that the earlier estimate of 1.8 lbs/day (the basis for the 84 kWh per year adder) is significantly overestimated. NEEA and NPCC also stated that the distribution of annual icemaking cycles is skewed toward the lower end of the range, with the average being impacted by a relatively small number of frequent ice users; accordingly, NEEA and NPCC commented that median usage values of 0.63 lbs/day and 0.49 lbs/day for through-the-door and in-freezer models, respectively, would be more representative of typical use. (NEEA and NPCC, 2012 TP Rulemaking No. 41 at p. 2)

Similarly, a GE study on approximately 4,900 units found average ice consumption of 0.83 lbs/day, with a median consumption of 0.59 lbs/day. GE and AHAM both supported a revised fixed icemaking energy consumption adder of 28 kWh per year, based on the median usage rate of 0.59 lbs/day. (AHAM, 2012 TP Rulemaking No. 37 at p. 6; GE, 2012 TP Rulemaking No. 40 at pp. 3–4) AHAM further commented that it would oppose any adder

greater than 36 kWh per year, corresponding to the average daily ice use of 0.76 lbs/day from the NEEA and NPCC studies. (AHAM, 2012 TP Rulemaking No. 37 at p. 6)

In the June 2017 RFI, DOE again requested comment on how its test procedures should account for automatic icemaking energy consumption and on the availability of any additional consumer use data. 82 FR 29782–29783.

AHAM recommended that DOE adopt a permanent adder of 28 kWh per year for icemaker energy use. AHAM reiterated its 2014 comments, which indicated that the current understanding of consumer ice consumption rates supports a lower ice consumption than previously estimated. (AHAM, No. 5 at pp. 2–3) AHAM also noted that 28 kWh per year may even be an overestimate because it accounts for converting 90 °F water into ice. (AHAM, No. 5 at p. 3) Samsung noted that it had previously commented in support of measuring automatic icemaker energy consumption, but that was based on the fixed adder of 84 kWh per year. With more current ice usage data corresponding to a fixed adder of 28 kWh per year, the Samsung stated that the potential for energy savings is only around 2 percent and measuring icemaker energy use would not be appropriate, and instead supported a revised fixed adder of 28 kWh per year. (Samsung, No. 8 at p. 2) BSH also commented that more recent consumer use data indicates lower rates of ice consumption than assumed to develop the current 84 kWh per year adder. BSH stated that the lower ice consumption rate corresponds to 28 kWh per year, over half of which is the latent energy required for the phase change to make ice, so less than half of the energy use is the result of the automatic icemaker, and does not warrant any testing. Therefore,

BSH supported revising the adder from 84 kWh per year to 28 kWh per year. (BSH, No. 2 at pp. 1–2)

AHAM also commented that an icemaker energy test would significantly increase burden without a corresponding benefit to the representativeness or accuracy of the test procedure. (AHAM, No. 5 at p. 2) AHAM stated that an icemaker energy test would increase burden by 50 percent to account for only 2.5 to 4.5 percent of a product's energy use. (AHAM, No. 5 at p. 4) BSH commented that an icemaker test is very burdensome and would more than double the amount of time required to test the appliance, and therefore opposed an energy test for icemaking. (BSH, No. 2 at p. 2) FSI strongly supports the use of, or option to use, a placeholder value for icemaker installation because it stated that a test for automatic icemaking would be beyond the capabilities of smaller laboratories (meeting supply water conditions) and would significantly increase the costs for outside test laboratories. (FSI, No. 6 at pp. 1–2) Samsung also stated that because of the additional test burden and uncertainty in an icemaking measurement, it no longer believes that a measurement is appropriate and supports a revised fixed adder of 28 kWh per year. (Samsung, No. 8 at p. 2) Sub Zero referred to AHAM's estimate that half of icemaker energy use is the thermodynamic energy needed to freeze water, and therefore only 14 kWh per year is attributed to the automatic icemaker. Sub Zero commented that any feasible improvements to the icemaker would save a homeowner well less than a dollar per year, which is not worth the burden and cost of icemaker testing. (Sub Zero, No. 4 at p. 2)

The Joint Commenters commented that a test to measure actual icemaker energy use is the most appropriate approach to account for icemaker energy use. They stated that measured energy use is superior to the fixed adder approach currently in use not only because it provides consumers with more accurate information on the energy use associated with icemaking, but it provides manufacturers with an incentive to improve icemaker energy efficiency and drive reductions in total refrigerator energy consumption. (Joint Commenters, No. 7 at p. 3) The Joint Commenters noted that testing of 10 icemakers conducted by DOE and the National Institute of Standards and Technology ("NIST") found that some icemakers use up to twice as much energy per pound of ice produced as others and that differences in energy use were significant even among similar refrigerator models. They continued to urge DOE to investigate a method to measure icemaker energy use without adding undue additional test burden. (Joint Commenters, No. 7 at p. 3) The Joint Commenters further commented that if the fixed adder approach is retained for icemaker energy use, DOE should evaluate available data to determine a more appropriate value for the adder. They referred to field data from NEEA and one manufacturer suggesting that average ice production is closer to 0.8 lbs/day rather than 1.8 lbs/day, and to testing by DOE and NIST that found icemaker energy use ranging from 0.092 to 0.192 kWh per pound, or 27 to 56 kWh per year assuming an ice production rate of 0.8 lbs/day. The Joint Commenters stated that, given the small number of products tested, the range of energy use could be much larger and demonstrates the difficulty in establishing a single fixed adder value. (Joint Commenters, No. 7 at p. 4)

DOE agrees that the more recent consumer use data suggest that typical daily ice consumption is lower than previously estimated. Consistent with the recommendations from

interested parties during the previous test procedure rulemaking and in response to the June 2017 RFI, DOE has initially determined that the median ice consumption value of 0.59 lbs/day is representative of typical consumer use.

DOE initially considered a test procedure for icemaking energy consumption to better represent the energy consumption of units in the field and to incentivize manufacturers to improve efficiencies of automatic icemakers. However, based on a lower value of daily ice consumption as identified through data submitted by commenters, the overall energy consumption associated with icemaking in actual operation appears much lower than estimated for the current fixed adder. As a result, icemaker efficiency would have a much lower impact on a unit's overall energy consumption, and DOE expects that manufacturers would have even less incentive to pursue efficiency improvements through icemaker performance.

A laboratory-based icemaker test may allow for a more representative estimate of icemaking energy consumption for a given model, which could in some instances provide incentives for manufacturers to improve icemaking efficiency. However, DOE agrees with the comments from interested parties estimating that incorporation of an icemaking energy test procedure would increase testing time by 50 percent. Based on testing cost estimates provided in response to the June 2017 RFI, this would equate to a cost increase of $2,500 per test as compared to the current test procedure.[18] At ice consumption levels reported by NEEA and NPCC and GE, the benefits of a laboratory-based test procedure would likely not outweigh the burdens associated with this testing. Therefore, DOE is proposing to continue using the fixed

[18] The total cost per test is based on FSI's comment stating between $4,500 and $5,000 per refrigerator test conducted at outside laboratories. (FSI, No. 6 at p. 1)

adder approach, rather than a laboratory-based test method, to account for automatic icemaker energy consumption, with a revised value of 28 kWh per year (through an adder of 0.0767 kW in the per-day energy use calculations). DOE continues to request comment on whether the proposed fixed adder of 28 kWh per year is appropriate and on any additional consumer use data regarding automatic icemakers.

DOE is aware of products available on the market with two automatic icemakers. Typically, these products are certified as product class 5A (automatic defrost refrigerator-freezers with bottom-mounted freezers and through-the-door ice service) with an icemaker in the freezer compartment and another contained in the through-the-door ice service in the fresh food compartment. The refrigerator-based icemaker provides access for frequent through-the-door ice service, while the freezer-based icemaker provides an in-freezer storage container for infrequent bulk ice use. In the June 2017 RFI, DOE requested comment on how its test procedures should address products with multiple automatic icemakers. 82 FR 29783.

AHAM commented that consumer ice consumption rates likely do not change based on the number of automatic icemakers their product has because the second icemaker is typically used on occasions such as a party or to fill a cooler, which would likely be true for a consumer with one icemaker on those occasions. AHAM stated that the second icemaker is a matter of convenience rather than increased production, and therefore proposed applying the same fixed adder of 28 kWh per year for these products. (AHAM, No. 5 at p. 5)

Upon further consideration, including AHAM's comment, DOE understands that consumers with dual-icemaker products are not likely to use more ice than consumers with single-icemaker products. DOE is proposing that the same fixed adder would apply for any products with automatic icemaking, regardless of the number of icemakers in the product. DOE requests comment on this proposal and feedback regarding any available consumer use data for products with multiple automatic icemakers.

In response to the June 2017 RFI, AHAM also commented that DOE should not immediately require manufacturers to use the revised fixed adder. Instead, AHAM stated that DOE should wait until the compliance date of the next potentially amended standards, otherwise, manufacturers would have to re-certify and re-label their products. (AHAM, No. 5 at pp. 4–5)

DOE acknowledges AHAM's comment regarding the burden of re-certifying and re-labeling their products. However, as DOE has tentatively determined that the revised energy adder would more accurately measure energy use during a representative average use cycle, DOE is required to include the revised energy adder in the amended test procedure. (42 U.S.C. 6293(b)(1)(A)) Additionally, having tentatively determined that the revised energy adder will alter the measured energy use of consumer refrigeration products with automatic icemakers as determined under the existing test procedure, DOE is required to amend the energy conservation standards for these products during this test procedure rulemaking. (42 U.S.C. 6293(e)(2)) In determining the amended energy conservation standard, DOE must measure, pursuant to the amended test procedure, the energy use of a representative sample of these consumer refrigeration products with automatic icemakers that minimally comply with the existing

standard. The average of such energy use under the amended test procedure then must constitute the amended energy conservation standard for the applicable covered products. *Id.* In this case, as DOE is proposing to reduce the energy adder for automatic icemakers by 56 kWh per year (the difference between the current value of 84 kWh per year and the proposed value of 28 kWh per year), the measured energy use of minimally-compliant products will also decrease by 56 kWh per year. As such, DOE is proposing to amend the energy conservation standards for consumer refrigeration products with automatic icemakers to reflect a reduction of 56 kWh per year in the equation for maximum energy use. Further, in order to reduce the burden on manufacturers of re-certifying and re-labeling their products, DOE is proposing a one-year lead-time period before any amended standards would go into effect. Table III-I and Table III-II include the current and proposed amended energy conservation standards for the product classes with automatic icemakers.

Table III-I. Proposed Amended Energy Conservation Standards for Consumer Refrigerator, Refrigerator-Freezer, and Freezer Product Classes with Automatic Icemakers

Product class	Current equations for maximum energy use (kWh/yr)		Proposed equations for maximum energy use (kWh/yr)	
	Based on AV (ft^3)	Based on av (L)	Based on AV (ft^3)	Based on av (L)
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	8.07AV + 261.7	0.285av + 261.7
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	9.15AV + 292.9	0.323av + 292.9

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	8.51AV + 325.8	0.301av + 325.8
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	10.22AV + 385.4	0.361av + 385.4
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	8.85AV + 345.0	0.312av + 345.0
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	9.40AV + 364.9	0.332av + 364.9
5A. Refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service	9.25AV + 475.4	0.327av + 475.4	9.25AV + 419.4	0.327av + 419.4
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	9.83AV + 443.9	0.347av + 443.9
6. Refrigerator-freezers—automatic defrost with top-mounted freezer with through-the-door ice service	8.40AV + 385.4	0.297av + 385.4	8.40AV + 329.4	0.297av + 329.4
7. Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service	8.54AV + 432.8	0.302av + 432.8	8.54AV + 376.8	0.302av + 376.8
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	10.25AV + 446.6	0.362av + 446.6
9I. Upright freezers with automatic defrost with an automatic icemaker	8.62AV + 312.3	0.305av + 312.3	8.62AV + 256.3	0.305av + 256.3
9I-BI. Built-in upright freezers with automatic defrost with an automatic icemaker	9.86AV + 344.9	0.348av + 344.9	9.86AV + 288.9	0.348av + 288.9
13I. Compact refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker	11.80AV + 423.2	0.417av + 423.2	11.80AV + 376.2	0.417av + 376.2

14I. Compact refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker	6.82AV + 540.9	0.241av + 540.9	6.82AV + 484.9	0.241av + 484.9
15I. Compact refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker	11.80AV + 423.2	0.417av + 423.2	11.80AV + 367.2	0.417av + 367.2

Table III-II. Proposed Amended Energy Conservation Standards for Product Classes of Miscellaneous Refrigeration Products with Automatic Icemakers

Product class	**Current Maximum AEU (kWh/yr)**	**Proposed Maximum AEU (kWh/yr)**
C-9I. Cooler with upright freezer with automatic defrost with an automatic icemaker	5.58AV + 231.7	5.58AV + 175.7
C-9I-BI. Built-in cooler with upright freezer with automatic defrost with an automatic icemaker	6.38AV + 252.8	6.38AV + 196.8

E. Built-In Test Configuration

Built-in consumer refrigeration products generally are products that (1) have unfinished sides that are not intended to be viewable after installation; (2) are designed exclusively to be installed totally encased by cabinetry, fastened to the adjoining cabinetry, walls, or floor; and (3) are either equipped with a factory-finished face or accept a custom front panel. 10 CFR 430.2. In the July 2013 NOPR, DOE presented data indicating that testing in a built-in enclosure may affect measured energy consumption for certain configurations of built-in products. 79 FR 41610, 41649–41650. Specifically, those products that reject condenser heat at the back of the unit showed a potential increase in energy use when tested in an enclosure. DOE observed no significant change in energy use associated with the test configuration for those products that reject heat from the front of the unit. DOE did not propose any changes to the test requirements

for built-in products at that time, but requested comment on the appropriate test configuration for built-in refrigerators, refrigerator-freezers, and freezers. *Id*. DOE provided additional time to comment on the built-in testing issue prior to the April 2014 Final Rule, but did not address the issue in that rule.

In the rulemaking leading to the April 2014 Final Rule, DOE received multiple comments on testing for built-in products. Some commenters supported testing built-in products in an enclosure, stating that this would represent how the products are used in the field. (Joint Commenters, 2012 TP Rulemaking No. 42 at pp. 5–6; NEEA and NPCC, 2012 TP Rulemaking No. 41 at p. 4)

Other interested parties opposed the enclosure test setup, stating that it would result in a significant increase in test burden with little or no corresponding change in measured energy consumption. These interested parties also stated that, for the products with different measured energy use between the freestanding and enclosure test setups (*i.e.*, those products with heat rejection at the rear of the unit), the enclosure configuration that DOE used (based on Underwriters Laboratories ("UL") Standard 250, "Household Refrigerators and Freezers" ("UL 250")) was not necessarily consistent with manufacturer installation instructions. (AHAM, 2012 TP Rulemaking No. 37 at pp. 16–17; BSH, 2012 TP Rulemaking No. 21 at p. 1; Liebherr-Canada, Ltd. ("Liebherr"), 2012 TP Rulemaking No. 34 at pp. 1–4; Sub-Zero, 2012 TP Rulemaking No. 36 at p. 2) Liebherr provided additional test data indicating that units with rear condensers do not have significantly different measured energy consumption when tested

without an enclosure compared to that when testing in an enclosure consistent with the manufacturer installation instructions. (Liebherr, 2012 TP Rulemaking No. 34 at pp. 1–4)

In the June 2017 RFI, DOE requested further information on appropriate testing for built-in products, including energy impacts of testing in an enclosure, representativeness of test results compared to actual consumer use, test burden, and any potential alternative test approaches. 82 FR 29783–29784.

AHAM stated that there is no value in requiring built-in testing for products that reject heat out the front of the unit because doing so would not increase the representativeness of the test. (AHAM, No. 5 at p. 5) FSI stated that it strongly supports the current procedure of testing built-in appliances in a freestanding configuration. (FSI, No. 6 at p. 2)

AHAM commented that the UL 250 enclosure is not the most representative test for built-in products that reject heat from the back of the unit because it would not include proper venting according to the manufacturer installation instructions. AHAM noted that, when installed according to manufacturer instructions, these units would consume little or no additional energy when compared to the freestanding test. Therefore, AHAM opposed any revisions to the test procedure that would require testing built-in models in the built-in condition. (AHAM, No. 5 at pp. 5–6) BSH stated that its products discharge condenser air out the front of the product, and while there is some residual heat gain from an enclosure, it is minimal. BSH stated that the potential variation from misinterpretation of installation instructions is not worth the small amount of energy captured through an enclosure test procedure. (BSH, No. 2 at p. 2)

Sub Zero commented that, based on decades of testing, it sees no need to test built-in products in enclosures. Sub Zero stated that it has more experience with built-in products than any other manufacturers, and for its products that exhaust air through the front of the product, there is no technical reason to expect a difference when testing with or without an enclosure. (Sub Zero, No. 4 at p. 2)

BSH further commented that an enclosure for built-in products can lead to different interpretations and variations in the test because products can be installed in many different ways (*e.g.* side-by-side, with cabinets between the refrigerator and freezer, *etc.*), so installation instructions differ for the various applications. (BSH, No. 2 at p. 2) FSI stated that, unless instructions were followed precisely, reproducible results would be impossible because many units have specific installation instructions for ventilation. Additionally, FSI commented that if manufacturers must submit installation instructions to DOE, it would impose another reporting burden, and that preparing proper installation instructions may also be costly and difficult to reproduce for verification. (FSI, No. 6 at p. 2)

AHAM commented that requiring enclosures for built-in testing would significantly increase burden without a corresponding benefit to the representativeness or accuracy of the test procedure. AHAM commented that the built-in test would make the test procedure unduly burdensome to conduct because there are so many different sizes of built-in units and so many customizable configurations that would require an excessive number enclosures. According to data AHAM collected from its members, it is possible that manufacturers could be required to have from three to 12 different size enclosures in order to test built-in units. AHAM noted that

manufacturers would need more than one of each of those sizes, for example, up to four, which means that manufacturers could be required to build and house 12 to 48 enclosures. AHAM stated that number would increase even further were the enclosure to be built according to the manufacturer's installation instructions (as it would need to be for a representative measurement). Additionally, AHAM commented that third-party test laboratories would potentially need to have all of the possible enclosures available as well. AHAM noted that not only would there be an expense to create all of those enclosures, but neither manufacturer nor third-party laboratories have the capacity to store them, and the enclosure would increase test time to install units in a built-in configuration. (AHAM, No. 5 at p. 2, 6)

BSH, FSI, and Sub Zero echoed AHAM's comments, stating that an enclosure would make the test longer and more burdensome due to the different sizes of enclosures needed for the range of different size products available. (BSH, No. 2 at p. 2; FSI, No. 6 at p. 2; Sub Zero, No. 4 at p. 2) FSI further stated that the labor for a custom enclosure could add $1,000 or more to each energy test. (FSI, No. 6 at p. 2)

The Joint Commenters stated that built-in products should be tested in an enclosure, regardless of their configuration or heat-rejection approach. They commented that testing of built-in products in a built-in condition, as they are installed in the field, will be more representative of field energy consumption than testing in a free-standing condition. They also stated that DOE should establish guidelines for the test enclosure that are consistent with general installation instructions for these products. (Joint Commenters, No. 7 at p. 4)

DOE acknowledges that the test enclosures based on UL 250 are not consistent with all manufacturer instructions, which may provide for additional spacing and airflow pathways around the test unit to ensure adequate airflow across the condenser and heat transfer from the condenser to the ambient air. Accordingly, the test results presented in the July 2013 NOPR for the unit with a rear condenser when tested with an enclosure may not represent energy use when installed according to manufacturer instructions for all such units.

Test results from the July 2013 NOPR indicate that the test configuration does not have a significant impact on measured energy consumption when testing units that exhaust heat from the front of the unit. For units with rear condensers, test configuration appears to have no significant impact on measured energy consumption when tested in an enclosure consistent with manufacturer recommendations (according to additional data supplied by Liebherr in response to the July 2013 NOPR). Additionally, because of the variety of manufacturer installation instructions, a standardized test enclosure may not produce measurements of energy use representative of actual installations for all units with rear condensers. As such, DOE believes that testing with an enclosure would impose an unnecessary test burden on manufacturers and third-party test laboratories that would outweigh any corresponding improvement to measured energy consumption. DOE has tentatively determined that testing built-in units in enclosures consistent with the manufacturer installation instructions would have no significant difference compared to testing in a freestanding configuration. Therefore, DOE is not proposing to amend the current requirement that all units be tested in the freestanding configuration.

However, because any test procedure that DOE adopts must be reasonable designed to produce results that measure energy use of the relevant product during a representative average use cycle or period of use, and must not be unduly burdensome to conduct, DOE welcomes further comment and additional data on this issue. Specifically, DOE requests any information on how built-in products are installed in the field (*i.e.*, whether they are installed in accordance with manufacturers' instructions) and on whether the built-in installation, as installed in the field, has any impact on energy consumption.

F. Test Setup

1. Thermocouple Configuration for Freezer Drawers

As discussed in section III.C of this document, Appendix A and Appendix B incorporate by reference portions of HRF-1-2008 for testing requirements. Section 5.5.5.5 of HRF-1-2008 includes figures specifying thermocouple placement for several example fresh food and freezer compartment configurations. HRF-1-2008 also notes that in situations where the interior of a cabinet does not conform to the configurations shown in the example figures, measurements must be taken at locations chosen to represent approximately the entire cabinet.

In the June 2017 RFI, DOE discussed that HRF-1-2008 and HRF-1-2016 provide a specific thermocouple location diagram for freezer compartments in refrigerator-freezers (type 6 in Figure 5-2). However, the diagram for this configuration is based on an upright, front-opening freezer compartment, and does not explicitly address drawer-type freezer compartments. Based on its experience testing these products at third-party test laboratories, DOE noted that additional specification may be required regarding which thermocouple layout is appropriate for drawer-

type freezer compartments in refrigerator-freezers. DOE stated in the June 2017 RFI that sensor layout type 6 is likely appropriate for testing drawer-type freezer compartments in refrigerator-freezers and requested feedback on this clarification. 82 FR 29784.

AHAM commented that it had issued errata to HRF-1-2008 and HRF-1-2016 adding a note to Figure 5-2 indicating that if the compartment volume is less than 2 cubic feet, then a single thermocouple shall be located at the geometric center of the compartment. AHAM noted that this statement was previously included in HRF-1-2008 Section 5.8.1, but AHAM issued the errata because it believed placement of the sentence was causing confusion regarding thermocouple placement in freezer drawers (*i.e.*, freezers with compartment volume less than 2 cubic feet). AHAM stated that this change should resolve DOE's concern and urged DOE to acknowledge the errata as part of its incorporation by reference of Figure 5-2, and there would be no need for DOE to change the test procedure. AHAM commented that DOE could, perhaps, issue guidance acknowledging that the errata are included in DOE's incorporation by reference of Figure 5-2; alternatively, AHAM stated that DOE could incorporate by reference HRF-1-2016, for which AHAM has also issued the same errata. (AHAM, No. 5 at p. 9)

As stated in section III.C of this proposed rule, DOE is proposing to incorporate by reference HRF-1-2016 for both Appendix A and Appendix B. This incorporation by reference would also include any relevant errata to HRF-1-2016, including the clarification to Figure 5-2. DOE is also proposing to amend Appendix A and Appendix B to explicitly specify that for freezer drawers, the thermocouple setup for drawer-type freezer compartments shall follow sensor layout type 6 specified in HRF-1-2016. DOE expects that all drawer-type freezer

compartments are already tested using sensor layout type 6, and therefore, this proposed amendment would likely not affect how any units are currently tested. DOE requests feedback on whether this sensor layout or any other thermocouple configurations set forth in HRF-1-2016 require any additional detail.

2. Test Platform Requirements

Section 2.1.3 in both Appendix A and Appendix B requires that a test platform be used if the test chamber floor temperature is not within 3 °F of the measured ambient temperature. If a platform is used, it must have a solid top with all sides open for air circulation underneath, and its top shall extend at least 1 foot beyond each side and front of the unit under test and extend to the wall in the rear. DOE included this requirement to limit the variability of airflow near the unit during testing. Airflow directly at the base of the unit may increase heat transfer from the condenser and compressor compartment, resulting in better measured energy performance compared to a unit with no airflow at the base of the unit.

The text of section 2.1.3 in Appendix A and Appendix B does not explicitly address the setup for a test chamber floor that has vents for airflow. Such a test chamber floor is analogous to a "platform" because the floor is elevated above an airflow pathway. Therefore, testing should follow the same procedure required for a test platform. To limit potential confusion regarding appropriate test setup and corresponding variability in airflow at the base of a unit under test, DOE is proposing that a floor with holes or vents for airflow at the base of a test unit would need to meet the same requirements as a platform. Therefore, DOE is proposing to specify that for a test chamber floor that allows for airflow (*e.g.*, through a vent or holes), any

airflow pathways through the floor must be located at least 1 foot away from all sides of the unit. DOE requests comment on this proposed amendment, including information on any associated testing burden and whether additional instructions regarding airflow around the test unit may be necessary to limit test variability. Based on DOE's experience with third party laboratories, DOE believes that this proposal is consistent with current industry practice, and therefore DOE expects that this proposal would not impact measured energy use.

3. Separate External Temperature Controls

Certain refrigerators do not include integrated temperature controls within the cabinet assembly. Rather, the refrigerator is intended to be connected to a separate freezer that houses the controls for both the refrigerator and freezer cabinets. DOE granted a waiver to Liebherr Canada, Ltd. (Liebherr) to allow for testing such a product. 79 FR 19886 (April 10, 2014). Under the waiver approach, Liebherr must test the refrigerator according to Appendix A with the additional requirement that the freezer cabinet (with controls for both the refrigerator and freezer) be close enough to allow for the electrical connection to the refrigerator, but far enough away to avoid interfering with ambient airflow or other test conditions. The freezer must be set to the "off" position for testing. *Id.* at 19887–19888.

DOE is not aware of any other products for which the cabinet controls are housed in a separate product; however, DOE is proposing to amend Appendix A and Appendix B to address such cases to eliminate the potential need for additional test procedure waivers. DOE is proposing to follow the approach specified in the Liebherr waiver, but with revisions to be applicable to different cabinet configurations. The proposed test procedure specifies that if a

product's controls are external to the cabinet, the product shall be connected to the controls as needed for normal operation, but any additional equipment needed for testing shall not interfere with ambient airflow or other test conditions, and the controls for any other cabinets shall be set to the "off" position during testing. DOE is proposing to include these requirements in new sections 2.10 and 2.9 in Appendix A and Appendix B, respectively.

DOE requests comment on its proposed approach and on whether any further instructions would be needed to address products with temperature controls separate from the product cabinet.

G. Test Conditions

1. Vertical Gradient

Section 2.1.2 of both Appendix A and Appendix B requires that a test room vertical ambient temperature gradient of no more than 0.5 °F per foot (0.9 °C per meter) must be maintained during testing. To demonstrate that this requirement has been met, test data must include measurements taken using temperature sensors at locations 10 inches from the center of the two sides of the unit under test at heights of 2 inches and 36 inches above the floor or supporting platform and at a height of 1 foot above the unit under test.

Section 2.1.2 does not, however, specify when the vertical ambient temperature gradient must be maintained. Section 2.1.1 of both appendices specifies that the ambient temperature shall be maintained during both the stabilization period and test period. DOE believes that the vertical ambient temperature gradient should also be maintained during both the stabilization

period and test period to ensure consistent ambient conditions throughout both periods. Thus, DOE is proposing that the vertical ambient temperature gradient be maintained during both the stabilization period and test period. DOE expects that this proposal would reduce the potential for testing variability, but does not believe that this proposal would impact measured energy use.

Additionally, the requirement to measure temperature 1 foot above the unit under test does not explicitly address products with components that extend above the top of the refrigerated storage cabinet (*e.g.*, beer dispensers or "keg refrigerators" with taps on top of the cabinet). The test procedure does not specify whether the temperature measurement should be made 1 foot above the main storage cabinet or 1 foot above the highest point of the unit under test. DOE is proposing that when measuring the vertical gradient from 1 foot above the unit, the top of the unit should be determined by the refrigerated cabinet height, excluding any accessories or protruding components on the top of the unit (*e.g.*, taps/dispensers). DOE expects that this proposal would reduce the potential for testing variability and does not expect it to impact measured energy use, should it be adopted.

2. Stabilization

Section 2.9 in Appendix A and section 2.7 in Appendix B each provide two options for determining whether steady-state conditions exist, based on a maximum rate of change of average compartment temperatures, for a unit under test. The first option specifies determining the rate of change of compartment temperatures by comparing temperature measurements recorded during a period of at least 2 hours to the measurements recorded over an equivalent time period, with 3 hours elapsing between the two measurement periods.

For test units with cycling compressors, it may not be possible to measure temperatures over complete compressor cycles while allowing exactly 3 hours to elapse between the measurement periods. However, as DOE stated in the July 2013 NOPR discussion of this topic, DOE considers the 3-hour period to represent a minimum elapsed time between temperature checkpoint periods. 78 FR 41610, 41651. Accordingly, DOE is proposing that for the stability check, the time elapsed between measurement periods must be at least 3 hours. This proposed amendment is consistent with the steady-state condition requirements included in section 3.28 of HRF-1-2008 and section 3.32 of HRF-1-2016. Additionally, DOE is proposing to amend the Appendix B stabilization criteria to match the wording and formatting of Appendix A for consistency.

Additionally, in response to the June 2017 RFI, multiple interested parties commented regarding the use of the same data for the stabilization period and the test period when testing certain products. AHAM commented to reiterate its proposal that DOE include the stabilization period as part of the test period. Specifically, AHAM proposed that, in cases where part A stability (as stated in Appendix A, section 2.9) data can be used, the full stability data be used for the first part of the test instead of requiring a separate part one of the test. AHAM noted that this approach would shorten test time and allow testers to use data established over a long period of time (*e.g.*, 54 hours), instead of requiring that data to be essentially ignored. AHAM stated that with electronic data acquisition systems, there is no need to require separate data acquisition periods for stabilization and part one of the test. AHAM commented that this proposed change would not only reduce burden, but it would increase the accuracy of the test because part one of

the test would be based on known stability, not on however the product behaves on a separate part one of the test. AHAM noted that for part B stability (as stated in Appendix A, section 2.9), the procedure should remain as currently written. AHAM included a graphical representation of its proposal attached at Exhibit B in the submitted comment. (AHAM, No. 5 at p. 8) BSH and Sub Zero both commented in support of AHAM's comment. (BSH, No. 2 at p. 2; Sub Zero, No. 4 at p. 2)

DOE tentatively agrees that the stabilization period and part one of a two-part energy test capture essentially the same unit operation. As AHAM stated, using the stabilization period as the test period would also ensure that the product is stable. The current requirements establish stability prior to the test period. It could be possible, although unlikely, that a unit under test achieves stability during the stabilization period and reverts to unstable operation for the test period. Accordingly, DOE is proposing to amend the test period requirements in Appendix A and Appendix B to require that, if the part A stabilization criteria is used, that same period shall be used for test period data, where appropriate (*i.e.*, for the test periods that do not capture defrosts).

Additionally, DOE is aware that stabilization determinations may be difficult for products with multiple compressors or irregular compressor cycling. For these products, the average compartment temperatures over one complete compressor cycle may not be representative of the average compartment temperatures over a longer period of operation with multiple compressor cycles. For example, a product with a combination of long and short compressor on cycles during normal operation would likely have either higher or lower average compartment

temperatures over an individual compressor on/off cycle, when compared to the average compartment temperatures over a longer period of operation with multiple compressor cycles.

Products with this type of operation may not be able to meet the requirements for determining the start and end points for the defrost portion of the test when using the two-part test as provided in section 4.2.1.1 in Appendix A and Appendix B (and 4.2.3.4.2 in Appendix A for multiple-compressor products) because the average temperature of an individual compressor cycle may never match the average temperature over a longer period of operation including many compressor cycles. For these products using the two-part test method, DOE is proposing to include an alternate determination of when to start and end the defrost test period. To begin the period, DOE is proposing that average compartment temperatures be determined over one or more complete compressor cycles before a defrost. The average temperatures over the multiple complete compressor cycles must be within 0.5 °F of the average determined over the first part of the test, and all cycles included in the averaging period would be included within the defrost test period. Similarly, the test period would end with a period of complete compressor cycles after a defrost with the average compartment temperatures over that period within 0.5 °F of the average determined over the first part of the test. All compressor cycles included in the averaging period would be included in the defrost test period.

For products with multiple compressors, the asynchronous cycling of the different compressors may make it even more difficult to determine whether average compartment temperatures are within 0.5 °F of the average temperatures for the first part of the test. To address this issue, DOE is proposing that if a multiple compressor product cannot meet the 0.5

°F criteria, the test period shall include precool, defrost, and recovery time for the defrosted compartment, as well as sufficient dual compressor cycles to allow the length of the test period to be at least 24 hours, unless a second defrost occurs prior to completion of 24 hours, in which case the second part of the test shall include a whole number of complete primary compressor cycles comprising at least 18 hours. The test period would start at the end of a regular freezer compressor on-cycle after the previous defrost occurrence (refrigerator or freezer). The test period would also include the target defrost and following freezer compressor cycles, ending at the end of a freezer compressor on-cycle before the next defrost occurrence (refrigerator or freezer). This proposed approach is consistent with an existing waiver test method for a multiple compressor product, as described further in Section III.J.2.a of this document. [19]

DOE requests feedback on these proposed amendments and whether they would result in any unexpected testing issues. Additionally, DOE seeks comment on the proposed amendments for testing conditions, including the vertical ambient temperature gradient and stabilization provisions. DOE welcomes information on the testing burden and impacts on test repeatability and reproducibility associated with these proposed test conditions.

H. Features not Directly Addressed in Appendix A or Appendix B

1. Door-in-Door Designs

DOE's test procedures for consumer refrigeration products represent operation in typical room conditions with door openings by testing at an elevated ambient temperature with no door openings. 10 CFR 430.23(a)(7). The increased thermal load from the elevated ambient

[19] See case number RF-042.

temperature represents the thermal load associated with both door openings, as warmer ambient air mixes with the refrigerated air inside the cabinet, and the loading of warmer items in the cabinet.

As discussed in the June 2017 RFI, DOE is aware of certain products available on the market that incorporate a door-in-door design. This feature allows the consumer to access items loaded in the door shelves without opening an interior door that encloses the inner cabinet. This feature potentially prevents much of the cool cabinet air from escaping to the room and being replaced by warmer ambient air, as would be the case during a typical total door opening. 82 FR 29782.

In response to the June 2017 RFI, AHAM and BSH commented that they do not have consumer use data regarding door-in-door designs, and that DOE should not amend the test procedure to address these features without having consumer use data. (AHAM, No. 5 at pp. 6–7; BSH, No. 2 at p. 2) AHAM further stated that it would oppose any proposed change that would alter the closed door test, which is representative of consumer use because it is based on reliable data regarding ambient conditions and door openings. AHAM commented that door openings introduce significant variation into the test and dramatically increase test burden because of the need to control the door openings with precision; thus, the test should not be revised to include door openings even for only certain types of products. AHAM suggested that once statistically significant consumer data from field studies are available, DOE should evaluate possible calculation or other approaches that do not add test burden or change the representativeness, repeatability, or reproducibility of the test to account for door-in-door

designs. (AHAM, No. 5 at p. 7) Sub Zero further commented that the benefits of a 90 °F ambient closed-door test have been fully demonstrated and no other test method provides the same accuracy, repeatability, comparability among models and configurations, and reasonable burden and cost for testing. Sub Zero stated that it appreciates the need for this type of test as a smaller manufacturer striving to remain competitive with large multi-national producers. (Sub Zero, No. 4 at pp. 1–2)

The Joint Commenters stated that DOE's test procedures should be designed to capture the benefits of features that can provide energy savings in the field; therefore, additional investigation may be warranted to evaluate whether door-in-door designs have the potential to save a significant amount of energy, and if so, how these savings could be captured in the test procedure. The Joint Commenters provided the following example data regarding door-opening energy consumption: a Trinity University study estimated that door openings and container replacement account for about 17 to 23 percent of the overall cabinet load; and a study by the Florida Solar Energy Center similarly found that for a refrigerator with a rated annual energy consumption of 760 kWh per year, door openings were responsible for about 19 percent of the total energy consumption. The Joint Commenters noted that reducing the energy consumption associated with door openings may therefore represent an opportunity for energy savings. (Joint Commenters, No. 7 at pp. 1–2)

Samsung commented in support of accounting for door-in-door designs using a field use factor to be established by testing various product configurations to establish energy-saving potential, and provided an example of how such a factor may be determined. Samsung stated

that the door-in-door design on its products allows quick access to main door bins without opening the main refrigerator door, which reduces energy loss due to door openings. Limited Samsung testing indicated that the door-in-door feature reduces energy consumption by 7.4 percent assuming 12 door openings per day; assuming 40 door openings per day and 50 percent use of the outer door only, Samsung estimated that the door-in-door feature would save around 9.8 percent energy consumption. Samsung also commented that it has developed a camera and display system that shows food items inside the refrigerator without opening the door, which similarly reduces door openings and saves energy. (Samsung, No. 8 at pp. 1–2, 4–5)

DOE agrees with the Joint Commenters and Samsung that the door-in-door feature and camera/display systems have the potential to reduce energy consumption associated with door openings for these products. However, DOE does not believe that there is sufficient data regarding consumer usage patterns of this feature to warrant revisions to the test procedure at this time.

Additionally, DOE notes that the storage volume associated with door shelves is typically much smaller than the main cabinet storage volume. Accordingly, DOE expects that most door openings are intended to provide access to the main storage cabinet, and that consumers are unlikely to frequently use only the outer door of products with a door-in-door feature.

For these reasons, DOE is not proposing to amend its test procedures to address door-in-door designs (or other features that potentially reduce door openings, *e.g.*, internal cameras) in this NOPR.

To ensure that DOE's test procedures measure energy use of a product during a representative average use cycle or period of use, DOE continues to request comment on whether the existing test procedures should be amended to account for door-in-door designs or any other features that may reduce door openings. DOE also seeks information regarding what steps, if any, manufacturers are taking to estimate the energy use characteristics of products that use door-in-door designs. Further, DOE requests data, if any, on consumer use of the door-in-door feature or internal cameras (or any available consumer use information regarding door openings), including how often the outer door or camera is used in comparison to a full door opening, and the corresponding energy impacts of each type of door opening.

2. Display Screens and Connected Functions

DOE observes that consumer refrigeration products that include user control panels or displays located on the front of the product are being introduced into the market. Many products incorporating these more advanced user interfaces also include internet connections to allow for additional functions. These features, which can control the product's function and provide additional user features, such as television or internet access, operate with many different control schemes, including activation by proximity sensors.

The current DOE test procedures require that consumer refrigeration products that have a communication module for demand-response functions be tested with the communication module in the "as shipped" configuration. Section 2.10 of Appendix A and section 2.8 of Appendix B. Additionally, the current DOE test procedures, by referencing HRF-1-2008,

require testing with customer-accessible features not required for normal operation and which are electrically powered, manually initiated, and manually terminated, set at their lowest energy usage positions when adjustment is provided.

In the June 2017 RFI, DOE requested feedback on how consumers typically use these product features. Specifically, DOE sought information on typical settings, and the manner and frequency in which consumers use the features to inform appropriate test procedures. 82 FR 29782.

AHAM strongly objected to DOE amending the test procedure to address these features absent consumer use data. (AHAM, No. 5 at p. 6) AHAM, Samsung, and Sub Zero commented that connected products are in the early stages of development and meaningful data on consumer use for connected features or display screens are currently unavailable, as there has been limited market penetration. (AHAM, No. 5 at p. 7; Samsung, No. 8 at p. 3; Sub Zero, No. 4 at p. 2) AHAM and Samsung stated that DOE should continue to require testing with these features in their lowest energy-use positions to avoid limiting innovation. (AHAM, No. 5 at p. 7; Samsung, No. 8 at p. 3)

BSH commented that display screens consume energy in normal use and that energy is not captured during the existing test procedure. BSH supported a reasonable proposal to include some portion of the energy consumed by these features in the energy test, if they do not add burden to the test procedure. BSH noted that Appendix A refers to products with demand-response capability, and recommends that the test procedure instead refer to all connected

products. BSH stated that connected communication modules consume a small amount of energy and can be easily captured during the energy test. BSH recommended testing with the communication module in the on position but not connected, consistent with the European energy test. (BSH, No. 2 at p. 2)

The Joint Commenters encouraged DOE to amend the test procedure to capture energy consumption associated with display screens and connected functions. They noted that approximately 4 percent of ENERGY STAR-qualified products have connected capabilities. The Joint Commenters stated that there are at least two general types of display screens that are currently present in some consumer refrigeration products: one is a more advanced option screen for refrigerator functionality; the other, which is sometimes referred to as a "Smart Screen," is essentially a tablet embedded into the refrigerator and offers users a view into the refrigerator as well as access to other features (*e.g.*, to stream music, access the weather, *etc.*). The Joint Commenters recommended that DOE consider specifying that display screens be tested at their highest energy use position to provide both a consistent method for capturing the energy consumption associated with display screens and an incentive for manufacturers to provide display screen functionality with low power consumption. The Joint Commenters noted that the test procedure already uses the "highest energy use" approach for testing convertible compartments. The Joint Commenters also encouraged DOE to ensure that any network mode power consumption is captured in the test procedure, and referred to IEC Standard 62301 "Household electrical appliances – Measurement of standby power" (IEC Standard 62301) as a possible reference. (Joint Commenters, No. 7 at pp. 2–3)

DOE acknowledges that the current version of IEC Standard 62301 includes specifications for a "network mode"; however, that standard defines network mode as a mode in which at least one network function is activated (such as reactivation via network command or network integrity communication), but where the primary function is not active. DOE notes that for consumer refrigeration products, the primary function of refrigerating the cabinet requires continuous operation, and therefore would always be active. Accordingly, consumer refrigeration products would never operate in network mode as defined in IEC Standard 62301.

DOE expects that some consumers will use connected features if offered on a product. However, as noted by AHAM, Samsung, and Sub-Zero, connected products are in the early stages of development and meaningful data on consumer use for connected features or display screens are currently unavailable (AHAM, No. 5 at p. 7; Samsung, No. 8 at p. 3; Sub Zero, No. 4 at p. 2). While the Joint Commenters referred to a "network mode," DOE notes that Wi-Fi connectivity and associated display screens are relatively new features in consumer refrigeration products. DOE does not want to limit innovation or hinder manufacturers from offering these functions to consumers or impede the ability to provide potential utility that these features may offer. DOE understands that the connected features vary by model, and that further specifying a test to reflect the energy consumption of the various connected features would likely introduce test variability and increase test burden. Absent additional consumer use data, DOE is not proposing any amendments to the current test procedure approach.

DOE also proposes to remove sections 2.10 of Appendix A and 2.8 of Appendix B, which state that 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." DOE recently published an RFI on the emerging smart technology appliance and equipment market. 83 FR 46886 (Sept. 17, 2018). In that RFI, DOE sought information to better understand market trends and issues in the emerging market for appliances and commercial equipment that incorporate smart technology. DOE's intent in issuing the RFI was to ensure that DOE did not inadvertently impede such innovation in fulfilling its statutory obligations in setting efficiency standards for covered products and equipment. Additionally, as discussed in the RFI, DOE lacks data regarding consumer use of network features, including demand response. In this NOPR, consistent with the RFI, DOE proposes to remove the sections addressing products with demand-response capability from Appendix A and Appendix B. Under the proposed approach, the HRF-1-2016 requirement that customer accessible features not required for maintaining temperature be set at their lowest energy usage positions would apply to communication modules in demand-response capable products (with the "off" position as the lowest energy usage position). DOE seeks comment on this proposal and on the same issues presented in the RFI as they may be applicable to consumer refrigeration products.

As discussed, under the current regulations, demand-response capable products are only tested with the communication module in the on position if a manufacturer ships the product in that configuration. A manufacturer may ship the demand-response capable product with the communication module in the off position, in which case, the communication module remains off for testing. Whether the energy use associated with the communication module is measured during testing is dependent upon the manufacturer. While the proposed change regarding

demand-response capable products would affect the measured energy use for any demand-response capable products with the communication module shipped in the on position, DOE is not proposing to amend the energy conservation standards for these products in accordance with 42 U.S.C. 6293(e)(2). DOE is only aware of demand-response capable products available on the market that are also ENERGY STAR qualified. Because manufacturers have the option of setting the as-shipped position, if a manufacturer were to sell a minimally-compliant demand-response capable product, the manufacturer would likely set the as-shipped position of the communication module to the off position. Accordingly, DOE estimates that this proposed test procedure change would have no impact on the measured energy use of minimally-compliant products and no amendment to the energy conservation standards is required.

For other consumer-accessible features, such as display screens, DOE is proposing to maintain the existing approach, by referencing HRF-1-2016, that these features be tested in their lowest energy use position.. For displays screens, the lowest energy use position is with the screen off. Accordingly, the existing approach does not limit innovation or features available for use in display screens or similar consumer-accessible features, and is consistent with the discussion included in the September 2018 RFI.

Although the Joint Commenters referred to the "highest energy use" approach for convertible compartments in supporting similar requirements for testing display screens and connected functions, DOE notes that the convertible compartment requirements are for testing associated with the primary function of the unit – refrigerating the internal storage cabinets.

Display screens and connected functions are secondary features available on consumer refrigeration products.

DOE requests information on the prevalence of models with display screens and connected functions, so that DOE can determine whether measurement of the energy use of these connected features would contribute to a test procedure that is reasonably designed to measure energy use or energy efficiency during a representative average use cycle or period of use, as required by EPCA (42 U.S.C. 6293(b)(3).

DOE again requests information on how consumers typically use exterior display screens and control panels, when available. While any information would be welcome, because DOE is interested in information on energy use ratings that are representative of products in the field, DOE is particularly interested in any data that may yield insight into the manner and frequency with which consumers use these features. Additionally, DOE requests detailed feedback on the appropriate energy-related settings to use for these types of features during testing.

DOE also requests information on whether and how consumers typically use an internet connection, when available, for consumer refrigeration products. DOE also requests information on the potential energy impacts, if any, these available features would have on consumer refrigeration products.

I. Corrections

The July 2016 Final Rule inadvertently omitted from Appendix A an optional method for calculating the average per-cycle energy consumption of refrigerators and refrigerator-freezers, which had been previously included as section 6.2.2.3 in the version of Appendix A established by the July 2014 Final Rule. See, section 6.2.2.3 of Appendix A to subpart B of 10 CFR part 430 (2015); see also, 79 FR 22320, 22330–22332, 22354. That missing provision comprised a method for calculating average per-cycle energy consumption for models with two compartments and user-operable controls when using the optional test control settings and methodology specified for such models in section 3.3 of Appendix A. Specifically, it calculated the average per-cycle energy consumption as the sum of: (1) the energy consumption defined and calculated as described in appendix M, section M4(a) of AS/NZS 4474.1:2007, and (2) "IET", defined as 0.23 kWh per cycle for products with an automatic icemaker and 0 kWh per cycle for products without an automatic icemaker. DOE proposes to reinstate the missing section of Appendix A as established in the July 2014 Final Rule as section 6.2.3.3 to correspond to the revised section numbering established by the July 2016 Final Rule.

DOE is proposing to revise the order of definitions in Appendix A to alphabetize the defined terms.

DOE is also aware that section 6.1 in Appendix B inconsistently refers to adjusted volume using the terms "AV" and "VA." DOE is proposing to amend section 6.1 so that only "AV" is used to refer to adjusted volume, consistent with the usage in Appendix A. DOE is also proposing to revise section 2.2 of Appendix B to include language consistent with Appendix A regarding exceptions and clarifications to cited sections of HRF-1-2016.

In sections 3.2.1.1 of Appendix A and 3.2.1 of Appendix B, DOE is also proposing to modify the instructions to specify that the instructions regarding electronic control settings refer to the appropriate settings for the median test. In addition, DOE proposes to modify the formatting of Table 1 in both Appendix A and Appendix B, which summarizes the appropriate temperature settings, to better show how test settings and results match for each row in the table. Additionally, DOE proposes to amend Table 1 in Appendix A and Appendix B to provide instructions regarding coverage and test procedure waivers rather than the current "No energy use rating" entry.

DOE understands these proposed corrections as improving the readability of the test procedures and expects that, if adopted, these corrections would not impact how refrigeration products are currently tested, or impact the test results as compared to the current test procedures.

J. Compliance Date and Waivers

1. Compliance Date

EPCA prescribes that all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with an amended test procedure, beginning 180 days after publication of such a test procedure final rule in the *Federal Register*. (42 U.S.C. 6293(c)(2)) As noted, should the amendments proposed in this document be made final, the updated test procedure provisions related to the icemaker fixed adder, and the associated amended energy conservation standards, would be required for use one year after publication of such a test procedure final rule in the *Federal Register*.

If DOE were to publish an amended test procedure for consumer refrigeration products, EPCA provides an allowance for individual manufacturers to petition DOE for an extension of the 180-day period if the manufacturer may experience undue hardship in meeting the deadline. (42 U.S.C. 6293(c)(3)) To receive such an extension, petitions must be filed with DOE no later than 60 days before the end of the 180-day period and must detail how the manufacturer will experience undue hardship. *Id.*

2. Waivers

Upon the compliance date of an amended test procedure, should DOE issue such an amendment, any waivers that had been previously issued and are in effect that pertain to issues addressed by the amended test procedure are terminated. 10 CFR 430.27(h)(2). Recipients of any such waivers would be required to test the products subject to the waiver according to the amended test procedure as of the effective date of the amended test procedure.

a. Waivers Relevant to the Proposed Amendments

DOE has granted a test procedure waiver to address testing multiple-compressor products that may not be able to meet all requirements included in Appendix A.[20] That waiver addressed models with non-uniform cycling that makes direct use of the Appendix A requirements for evaluating temperature stability problematic. In its April 2014 final rule, DOE incorporated provisions to address the testing of products with multiple compressors, which were intended to obviate the need for waivers for multiple-compressor products. 79 FR 22320, 22330 (April 21, 2014). However, in its petition for waiver, GE contended that due to certain characteristics of

[20] See case number RF-042.

the basic models listed in the petition, the Appendix A test procedure does not allow for accurately measuring the energy consumption of these basic models. 80 FR 7851, 7852 (Feb. 12, 2015). In the notice granting the waiver, DOE determined that the specified models would not be able to reach the temperature stability conditions specified in Appendix A. *Id*. at 7853. DOE has not received additional petitions for waiver on this issue. As discussed in section III.G.2 of this document, DOE is proposing amendments to Appendix A and Appendix B to address the issue in the GE waiver to limit the potential need for waivers for similar models that are unable to meet the current stability requirements in the test procedures. Should the proposed test procedure in this document be made final, GE's waiver would terminate on the compliance date of such a final rule and GE would be required to test the product that was the subject of its waiver according to the amended test procedure. DOE continues to request comment on potential amendments to Appendix A and Appendix B to address the issue of determining temperature stability for multiple-compressor products or other products with irregular compressor cycles.

DOE has also granted a waiver to allow for testing an all-refrigerator while connected to an upright freezer model that houses the controls for both cabinets.[21] As discussed in section III.F.3 of this document, Liebherr offers a product which relies on a companion upright freezer model for control. DOE granted a waiver for this model that requires the manufacturer to test and rate the all-refrigerator while connected to the upright freezer controls, but with the freezer located away from the refrigerator to avoid interfering with ambient airflow or other test conditions. 79 FR 19886 (April 10, 2014). As discussed in section III.F.3 of this document,

[21] See case number RF-035.

DOE is proposing amendments to Appendix A and Appendix B that would eliminate the need for waivers to test products with separate external controls. Should the proposed test procedure in this document be made final, Liebherr's waiver would terminate on the compliance date of such a final rule and Liebherr would be required to test the product that was the subject of its waiver according to the amended test procedure. DOE continues to request comment on whether such amendments to Appendix A and Appendix B are appropriate.

b. MREF Waivers

At present, DOE has granted multiple waivers from the test procedures for consumer refrigeration products to address testing of products that currently are defined as refrigerators and combination cooler refrigeration products to determine compliance with the current consumer refrigerator, refrigerator-freezer, and freezer energy conservation standards.[22] As explained in the July 2016 Final Rule, prior to the compliance date of the MREF energy conservation standards, combination cooler refrigeration products are subject to the energy conservation standards for refrigerators, refrigerators, and freezers based on testing according to relevant test procedure waivers. *Id.* at 46771. As noted in the waivers,[23] upon the compliance date of the MREF energy conservation standards (October 28, 2019) those waivers will terminate. The issues addressed in these waivers, specifically the alternate correction factor used for testing to determine compliance with existing refrigerator, refrigerator-freezer, and freezer energy conservation standards, would not be affected by the amendments proposed in this NOPR.

[22] See case numbers RF-040, RF-041, RF-044, RF-045, and RF-047.
[23] See, 79 FR 55769 (Sep. 17, 2014); 82 FR 21209 (May 5, 2017); 82 FR 36386 (Aug. 4, 2017); 80 FR 7854 (Feb. 12, 2015); 82 FR 21211 (May 5, 2017); and 83 FR 11743 (March 16, 2018).

K. Test Procedure Impacts and Other Topics

1. Test Procedure Costs and Impacts

EPCA requires that test procedures proposed by DOE not be unduly burdensome to conduct. In this NOPR, DOE proposes to amend the existing test procedures for consumer refrigeration products in Appendix A and Appendix B. In general, the proposed changes would update the referenced industry test procedure; define the term "compartment;" amend the fixed adder that accounts for automatic icemakers to better reflect consumer use; provide additional specificity for a number of test setup and test procedure requirements; combine the stabilization period with the test period for certain products; and add regulatory text inadvertently omitted in the previous test procedure rulemaking. DOE has tentatively determined that these proposed amendments would not be unduly burdensome for manufacturers to conduct and would reduce test burden for manufacturers.

DOE's analysis of this proposal indicates that, if finalized, it would result in net cost savings to manufacturers.

TABLE III.1 Summary of Cost Impacts for Consumer Refrigeration Products

Category	Present Value *(million 2016$)*	Discount Rate *(percent)*
Costs		
One-time re-testing and re-labeling costs	0.7	3
	0.6	7
Cost Savings		
Reduction in future testing costs	35.6	3
	24.3	7
Total Net Cost Impacts		
Total net cost impacts	(34.8)	3
	(23.6)	7

TABLE III.2 Summary of Annualized Cost Impacts for Consumer Refrigeration Products

Category	Annualized Value *(thousand 2016$)*	Discount Rate *(percent)*
Annualized Costs		
One-time re-testing and re-labeling costs	22	3
	44	7
Annualized Cost Savings		
Reduction in Future Testing Costs	1,067	3
	952	7
Total Net Annualized Cost Impact		
Total Net Cost Impact	(1,045)	3
	(907)	7

Further discussion of the cost impacts of the proposed test procedure amendments are presented in the following paragraphs.

a. Proposed amendment regarding the stabilization and test periods

DOE proposes to combine the stabilization period with the test period for certain models of consumer refrigeration products. This proposal would decrease test burden by shortening the test duration for any model with stabilization determined according to sections 2.9(a) of Appendix A or 2.7(A) of Appendix B and with non-automatic defrost, or that would be tested to using the two-part test period. This amendment would apply to consumer refrigerators, refrigerator-freezers, freezers, and MREFs.

Based on review of the Compliance Certification Database in DOE's Compliance Certification Management System (CCMS), DOE has identified 3,641 models of consumer refrigerators, refrigerator-freezers, and freezers, representing 49 manufacturers, and 439 models of MREFs, representing 32 manufacturers, that would be impacted by this proposed amendment.

DOE expects that this proposal would decrease test duration by at least 6 hours for these models (reflecting the 3-hour minimum test period duration at two temperature settings) and up to 48 hours (reflecting 24-hour test periods at each setting). Based on an estimated decreased test duration of at least 6 hours (*i.e.*, a decrease in test time of greater than ten percent), DOE assumed a cost savings of approximately ten percent (*i.e.*, $500 per test).[24] Additionally, based on data from DOE's Compliance Certification Database, DOE anticipates that manufacturers would replace or modify existing models every 3.5 years. Therefore, on average, consumer refrigerator, refrigerator-freezer, and freezer manufacturers would introduce approximately 1,040 new or modified consumer refrigerator, refrigerator-freezer, or freezer models each year that would use these shorter overall testing periods. While, on average, MREF manufacturers would introduce 125 new or modified consumer MREF models each year that would use these shorter overall testing periods. Because DOE requires manufacturers to test at least two units per model, manufacturers would on average conduct 2,330 tests annually using these shorter overall testing periods. Using these estimates, DOE anticipates industry cost savings of approximately $1,040,000 per year for consumer refrigerator, refrigerator-freezer, or freezer manufacturers and approximately $125,000 per year for MREF manufacturers.

DOE has initially determined that this proposed amendment to the test procedures for consumer refrigeration products would not require changes to the designs of these products, and that the proposed amendments would not impact the utility or the availability of consumer refrigeration product options. DOE expects that the proposed amendments would not impact the

[24] DOE expects that costs would decrease by a smaller percentage than the total reduction in test time due to fixed overhead and labor requirements for testing (*i.e.*, test set up and data analysis would be unchanged). The total cost per test is based on FSI's comment stating between $4,500 and $5,000 per refrigerator test conducted at outside laboratories. (FSI, No. 6 at p. 1)

representations of energy efficiency or energy use for consumer refrigeration products currently on the market. Manufacturers would be able to rely on data generated under the current test procedure, should the proposed amendments regarding stabilization and test period be finalized. As such, manufacturers would not be required to retest consumer refrigeration products as a result of DOE's adoption of the proposed amendment to the test procedure stabilization period.

DOE requests comment on its understanding of the impact and associated costs of this proposed stabilization and test period amendment.

b. Proposed amendment regarding products with demand-response capability

DOE proposes to remove the sections addressing products with demand-response capability from Appendix A and Appendix B. Under the proposed approach, the HRF-1-2016 requirement that customer accessible features not required for maintaining temperature be set at their lowest energy usage positions would apply to communication modules in demand-response capable products (with the "off" position as the lowest energy usage position). This proposal could increase test burden by requiring some models to be re-tested with communication modules in the off position and potentially re-labeled if the re-tested energy consumption value changes. This would be a one-time re-testing and re-labeling cost for manufacturers, as models introduced into the market after the test procedure proposal is required would not incur any additional costs.

Based on review of the ENERGY STAR Database, DOE has identified 83 models of refrigerators or refrigerator-freezers, representing 12 manufacturers, and 8 models of freezers, representing two manufacturers, that would be impacted by this proposed amendment.

DOE conservatively estimates that all 91 models would be required to be re-tested with the communications models in the off position. Because DOE requires manufacturers to test at least two units per model, manufacturers would have to re-test 182 units to comply with this proposed test procedure amendment. DOE estimates a re-testing cost to manufacturers of $4,500 for a single unit.[25] Using these estimates, DOE anticipates industry could incur costs up to $819,000 re-testing products in the 180 days after this test procedure is finalized.

Additionally, manufacturers would have to re-label models if the re-tested energy consumption value changes. DOE estimates the average wage rate plus employer provided benefits for an employee to re-label models is $39.35 per hour.[26] DOE estimates that it would take an employee approximately one hour to re-label a single model. Given the conservative estimate of 91 models that could have their measured energy consumption changed after being re-tested with the communications in the off position, DOE estimates industry would incur costs of approximately $3,580 to re-label models in the 180 days after this test procedure is finalized.

[25] Based on the initial $5,000 testing cost estimate and the $500 savings due to the stabilization criteria proposed in this amended test procedure proposal. DOE estimates that the stabilization period time savings would apply to all demand-response capable products.

[26] The Bureau of Labor Statistics mean hourly wage rate for "Mechanical Engineering Technicians" is $28.00. (May 2018; *https://www.bls.gov/oes/current/oes173027.htm*)
Additionally, according to the 2016 Annual Survey of Manufacturers for NAICS code 33522, major appliance manufacturing, wages represent approximately 71 percent of the total cost of employment for an employer. (AMS 2016, NAICS code 33522; *https://www.census.gov/programs-surveys/asm.html*)

DOE requests comment on its understanding of the impact and associated costs of the proposed amendment regarding products with demand-response capability.

c. Proposed amendment regarding energy use associated with automatic icemaking

DOE is proposing to amend the automatic icemaker energy use adder in Appendix A and Appendix B and to amend the corresponding energy conservation standards for consumer refrigeration products with automatic icemakers (both amendments would reflect an energy use reduction of 56 kWh per year). This proposal would increase burden on manufacturers by requiring some models to be re-labeled with the updated annual energy consumption values.

Based on review of the Compliance Certification Database in DOE's Compliance Certification Management System (CCMS), DOE has identified 1,334 models with automatic icemakers, representing 28 manufacturers, that could be impacted by this proposed amendment.

As discussed in the previous section, DOE estimates approximately one hour for an employee to re-label a consumer freezer with automatic icemakers based on the proposed updated energy consumption values. Using the average wage rate plus employer provided benefits for an employee to re-label models of $39.35 per hour, calculated in the previous section, DOE anticipates industry would incur costs of approximately $52,500 one year after this test procedure is finalized.

DOE requests comment on its understanding of the impact and associated costs of the proposed amendment regarding energy use associated with automatic icemaking.

d. Impact of the other proposed amendments

DOE anticipates that the remainder of the amendments proposed in this NOPR would not impact manufacturers' test or certification costs. Most of the proposed amendments would provide additional specificity to the applicability and conduct of the test procedures.

DOE has initially determined that these other proposed amendments would not require changes to the designs of consumer refrigeration products, and that the proposed amendments would not impact the utility or availability of these products. The other proposed amendments would not impact the representations of energy efficiency or energy use of consumer refrigeration products. As a result, manufacturers would be able to rely on data generated under the current test procedure, should the proposed amendments be finalized. Manufacturers would not be required to retest consumer refrigeration products as a result of DOE's adoption of the other proposed amendments to the test procedure.

DOE requests comment on its understanding of the impact and associated potential costs of these proposed amendments.

2. Harmonization with Industry Standards

The test procedures for consumer refrigeration products at Appendix A and Appendix B incorporate by reference the AHAM industry standard HRF-1- 2008. DOE references HRF-1-2008 for definitions, installation and operating conditions, temperature measurements, and volume measurements. In August 2016, AHAM released an updated version of the HRF-1 standard, HRF-1- 2016, which DOE is evaluating as part of this rulemaking. As noted in

comments from interested parties, the updates included in HRF-1-2016 harmonize with the current DOE test procedure. This includes updates to definitions, test requirements, formatting, and organization that are consistent with DOE's requirements.

DOE requests comments on the benefits and burdens of the proposed updates and additions to industry standards referenced in the test procedure for consumer refrigeration products.

DOE also requests comment on the benefits and burdens of adopting any industry/voluntary consensus-based or other appropriate test procedure, without modification.

DOE notes that it is also aware of other international standards for testing consumer refrigeration products. AS/NZS 4474.1:2007 and Standard 62552:2007 (as well as a newer 2015 version) are used as test standards for international efficiency programs. These tests follow a similar methodology to the DOE and AHAM HRF-1 procedures – a closed door test in elevated ambient temperatures. However, the international standards vary from the DOE test by specifying different standardized compartment temperatures, ambient temperatures, and test periods. DOE has carefully considered these requirements when developing its existing test procedures and expects that its procedures, with HRF-1 incorporated by reference, result in energy use ratings that are the most representative of consumer use in the Unites States, while limiting test burden.

3. Other Test Procedure Topics

In addition to the issues identified earlier in this document, DOE welcomes comment on any other aspect of the existing test procedures for consumer refrigeration products not already addressed by the specific areas identified in this document. DOE particularly seeks information that would ensure that the test procedure measures energy efficiency during a representative average use cycle or period of use, as well as information that would help DOE create a procedure that would limit manufacturer test burden. Comments regarding repeatability and reproducibility are also welcome.

In particular, DOE notes that under Executive Order 13771, "Reducing Regulation and Controlling Regulatory Costs," Executive Branch agencies such as DOE must manage the costs associated with the imposition of expenditures required to comply with Federal regulations. See 82 FR 9339 (Feb. 3, 2017). Consistent with that Executive Order, DOE encourages the public to provide input on measures DOE could take to lower the cost of its regulations applicable to consumer refrigeration products consistent with the requirements of EPCA.

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

The Administrator of the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget (OMB) has determined that the proposed regulatory action is a significant regulatory action under section (3)(f) of Executive Order 12866. Accordingly, this action was reviewed by OIRA in the Office of Management and Budget (OMB).

B. Review Under Executive Orders 13771 and 13777

On January 30, 2017, the President issued Executive Order (E.O.) 13771, "Reducing Regulation and Controlling Regulatory Costs." E.O. 13771 stated the policy of the executive branch is to be prudent and financially responsible in the expenditure of funds, from both public and private sources. E.O. 13771 stated it is essential to manage the costs associated with the governmental imposition of private expenditures required to comply with Federal regulations.

Additionally, on February 24, 2017, the President issued E.O. 13777, "Enforcing the Regulatory Reform Agenda." E.O. 13777 required the head of each agency designate an agency official as its Regulatory Reform Officer (RRO). Each RRO oversees the implementation of regulatory reform initiatives and policies to ensure that agencies effectively carry out regulatory reforms, consistent with applicable law. Further, E.O. 13777 requires the establishment of a regulatory task force at each agency. The regulatory task force is required to make recommendations to the agency head regarding the repeal, replacement, or modification of existing regulations, consistent with applicable law. At a minimum, each regulatory reform task force must attempt to identify regulations that:

(i) Eliminate jobs, or inhibit job creation;

(ii) Are outdated, unnecessary, or ineffective;

(iii) Impose costs that exceed benefits;

(iv) Create a serious inconsistency or otherwise interfere with regulatory reform initiatives and policies;

(v) Are inconsistent with the requirements of Information Quality Act, or the guidance issued pursuant to that Act, in particular those regulations that rely in whole or in part on data, information, or methods that are not publicly available or that are insufficiently transparent to meet the standard for reproducibility; or

(vi) Derive from or implement Executive Orders or other Presidential directives that have been subsequently rescinded or substantially modified.

DOE initially concludes that this rulemaking is consistent with the directives set forth in these executive orders. This proposed rule is estimated to result in a cost savings. The proposed rule would yield an annualized cost savings of approximately $907,000 (2016$) using a perpetual time horizon discounted to 2016 at a 7 percent discount rate. Therefore, if finalized as proposed, this rule is expected to be an E.O. 13771 deregulatory action.

C. Review Under the Regulatory Flexibility Act

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

DOE reviewed this proposed rule to amend the test procedures for consumer refrigeration products under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. This NOPR proposes to amend DOE's consumer refrigeration products test procedure to include a compartment definition; incorporate by reference AHAM HRF-1-2016; revise the energy-use adder for automatic icemakers; provide further specification on test setup, conduct, and calculations; require that the stabilization period be used as the test period for certain products; and correct minor issues in Appendix A and Appendix B.

DOE uses the Small Business Administration's ("SBA") small business size standards to determine whether manufacturers qualify as small businesses, which are listed by the North American Industry Classification System ("NAICS").[27] The SBA considers a business entity to be a small business, if, together with its affiliates, it employs less than a threshold number of workers specified in 13 CFR part 121. The 2017 NAICS code for consumer refrigeration products is 335220, major household appliance manufacturing.[28] The threshold number for NAICS code 335220 is 1,500 employees. This employee threshold includes all employees in a business's parent company and any other subsidiaries.

Most of the manufacturers supplying consumer refrigeration products are large multinational corporations. DOE conducted a focused inquiry into small business manufacturers

[27] Available online at: *https://www.sba.gov/document/support--table-size-standards*.
[28] The NAICS Association updated its industry classification codes in early 2017. The previous 2012 NAICS code for consumer refrigerators, refrigerator-freezers, and freezers was 335222, household refrigerator and home freezer manufacturing.

of products covered by this rulemaking. DOE primarily used DOE's Compliance Certification Database[29] for consumer refrigerators, refrigerator-freezers, and freezers to create a list of companies that sell consumer refrigeration products covered by this rulemaking in the United States. DOE identified a total of 67 distinct companies that sell consumer refrigeration products in the United States.

DOE then reviewed these companies to determine whether the entities met the SBA's definition of "small business" and screened out any companies that do not offer products covered by this rulemaking, do not meet the definition of a "small business," or are foreign-owned and operated. Based on this review, DOE has identified eight domestic manufacturers of consumer refrigeration products that are potential small businesses. Through this analysis, DOE has determined the expected effects of this rulemaking on these covered small businesses and whether an IRFA was needed (*i.e.*, whether DOE could certify that this rulemaking would not have a significant impact).

DOE is proposing to combine the stabilization period with the test period for certain products. DOE expects that this proposal would decrease test duration by at least 6 hours for these models (reflecting the 3-hour minimum test period duration at two temperature settings) and up to 48 hours (reflecting 24-hour test periods at each setting). DOE estimates that this would translate to a cost savings of $500 per test for these models (an estimated 10 percent of total testing costs). Based on review of the Compliance Certification Database in DOE's CCMS, DOE has identified 312 models affected by the proposed amendment of the stabilization period,

[29] *www.regulations.doe.gov/certification-data*. Accessed October 5, 2018.

representing seven small domestic manufacturers. Additionally, based on data from DOE's Compliance Certification Database, DOE anticipates that small domestic manufacturers would replace or modify existing models every 3.5 years; therefore, on average, small domestic manufacturers would introduce approximately 89 new or modified models each year that would use these shorter overall testing periods. Because DOE requires manufacturers to test at least two units per model, small manufacturers would on average conduct 178 tests annually using these shorter overall testing periods. Using these estimates, DOE anticipates the proposed stabilization amendment would save small domestic manufacturers approximately $89,000 per year. Therefore, DOE determined that this proposed amendment to the test procedure would lead to cost savings for small domestic manufacturers.

FSI commented in response to the June 2017 RFI that, on average, they pay between $4,500 and $5,000 per refrigerator test conducted at outside laboratories. FSI further stated that test costs can be reduced and procedures simplified by allowing the use of manufacturers' stated volumes (from computer-aided design ("CAD") or other accurate drawings and calculations) instead of requiring a measurement for each test. FSI noted that this approach is likely to be more accurate than manual measurements, referencing a NIST study identifying as high as a 40-percent discrepancy between laboratories measuring volume in compact refrigerators. To minimize test cost and burden, FSI recommended: accepting manufacturer volume calculations, accepting a wider range of temperatures (*e.g.*, 40 or 41 °F in the fresh food compartment for dual zone units), and allowing more simplified and flexible probe locations. (FSI, No. 6 at pp. 1, 3)

DOE is not proposing any amendments to the test procedures for consumer refrigeration products that would increase the cost of these tests at third-party or manufacturer test laboratories. DOE understands that relying on CAD to calculate volumes decreases test burden compared to physically measuring volume on each test unit. Accordingly, DOE already allows manufacturers to use such designs in certifying product volumes. In 10 CFR 429.72, DOE states that total refrigerated volume of a basic model may be determined by performing a calculation of the volume based upon CAD models of the basic model in lieu of physical measurements of a production unit of the basic model, according to the applicable provisions in the test procedures for measuring volume. DOE is not proposing amendments to allow different ranges for standardized compartment temperatures nor to allow for multiple thermocouple locations during testing (except for when the standardized locations cannot be followed). These test requirements ensure that test results are comparable between models and between test facilities. The requirements also limit variability by ensuring that the test is conducted consistently for a given model. Therefore, DOE is proposing to maintain the existing standardized compartment temperatures and thermocouple locations.

FSI further commented that DOE's test procedures impose a significant burden on businesses. For small businesses, FSI stated that staff time for testing is not available for innovating, designing, or researching, and that the complexity of the test procedure makes it unlikely that anyone with less than an engineering degree or equivalent would be able to read, interpret, and implement the testing and reporting. FSI commented that testing to understand uncertainty regarding repeatability and reproducibility is worthwhile to better understand the limitations of the test procedure, but it is unaware of results of any such testing. FSI noted that

the NIST study for volume measurements showed significant differences between laboratories and would argue that the test procedures are too complex. For a small business, FSI commented that the burden is magnified by smaller available resources and a smaller base of sales. (FSI, No. 6 at pp. 2–3)

As stated earlier in this section, DOE is not proposing any amendments to the test procedures for consumer refrigeration products that would increase the cost of these tests at third-party or manufacturer test laboratories. Similarly, none of the proposed amendments would increase the test procedure complexity beyond the current level. DOE requests feedback on how the test procedure may be simplified to further reduce the burden associated with manufacturer testing.

The proposed test procedure amendments could increase burden on small businesses either due to potential re-testing of products with demand response capabilities and/or re-labeling of products with automatic icemakers. DOE was not able to identify any small businesses that manufacture products with demand response capabilities.[30] Based on review of the Compliance Certification Database in DOE's CCMS, DOE has identified 109 models of consumer refrigerators, refrigerator-freezers, and freezers, representing four small businesses, that manufacture products with automatic icemakers. Using these estimates, DOE estimates that the four small businesses manufacturing products with automatic icemakers would incur a one-time re-labeling cost of approximately $4,290, or approximately $1,072 per small business.

[30] Based on DOE's search of the ENERGY STAR database.

As previously discussed, DOE expects that the proposed merging of the stabilization and test periods for certain models would decrease manufacturer test burden for small businesses, by approximately $89,000 per year. Overall, DOE estimates that the proposed amendments for small businesses would translate to a cost savings of approximately $84,700 in the year small businesses must re-label products with automatic icemakers and then cost savings of approximately $89,000 each year after.

Therefore, DOE concludes that the impacts of the proposed test procedure amendments in this NOPR would not have a "significant economic impact on a substantial number of small entities," and that the preparation of an IRFA is not warranted. 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 initial finding that eight small businesses manufacture consumer refrigeration products in the United States with fewer than 1,500 total employees. Additionally, DOE requests comment on its determination that the proposed amendments would not have a significant economic impact on these small businesses.

D. Review Under the Paperwork Reduction Act of 1995

Manufacturers of consumer refrigeration products must certify to DOE that their products comply with any applicable energy conservation standards. To certify compliance, manufacturers must first obtain test data for their products according to the DOE test procedures, including any amendments adopted for those test procedures. DOE has established regulations

for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including consumer refrigeration products. (See generally 10 CFR part 429.) The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act ("PRA"). This requirement has been approved by OMB under OMB control number 1910-1400. Public reporting burden for the certification is estimated to average 35 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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

E. Review Under the National Environmental Policy Act of 1969

DOE is analyzing this proposed regulation in accordance with the National Environmental Policy Act of 1969 (NEPA) and DOE's NEPA implementing regulations (10 CFR part 1021). DOE's regulations include a categorical exclusion for rulemakings interpreting or amending an existing rule or regulation that does not change the environmental effect of the rule or regulation being amended. 10 CFR part 1021, Subpart D, Appendix A5. DOE anticipates that this rulemaking qualifies for categorical exclusion A5 because it is an interpretive rulemaking that does not change the environmental effect of the rule and otherwise

meets the requirements for application of a categorical exclusion. See 10 CFR 1021.410. DOE will complete its NEPA review before issuing the final rule.

F. Review Under Executive Order 13132

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

G. 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.

H. 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 No. 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 this proposed rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of $100 million or more in any year, so these requirements do not apply.

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

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

J. Review Under Executive Order 12630

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

K. 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 this proposed rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

L. Review Under Executive Order 13211

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

Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

The proposed regulatory action 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.

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

Under section 301 of the Department of Energy Organization Act (Public Law No. 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 amendments to the test procedures for consumer refrigeration products incorporate testing methods contained in certain sections of the following commercial standard:

AHAM Standard HRF-1-2016, "Energy and Internal Volume of Refrigerating Appliances," including Errata to Energy and Internal Volume of Refrigerating Appliances, Correction Sheet issued August 3, 2016. DOE has evaluated this standard and is unable to conclude whether it fully complies 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 this test procedure on competition, prior to prescribing a final rule.

N. Description of Materials Incorporated by Reference

In this NOPR, DOE proposes to incorporate by reference the test standard published by AHAM, titled "Energy and Internal Volume of Refrigerating Appliances," HRF-1-2016, including Errata to Energy and Internal Volume of Refrigerating Appliances, Correction Sheet issued August 3, 2016. HRF-1-2016 is an industry standard used to evaluate energy use and refrigerated volume for consumer refrigeration products. Specifically, the test procedures proposed in this NOPR would reference various sections of HRF-1-2016 that address definitions, installation and operating conditions, temperature measurements, and volume measurements.

Copies of HRF-1-2016 may be purchased from the Association of Home Appliance Manufacturers at 1111 19th Street, NW., Suite 402, Washington, DC 20036, (202) 872-5955, or by going to *http://www.aham.org/*.

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 the Appliance and Equipment Standards Program staff at (202) 287-1445 or by email: *Appliance_Standards_Public_Meetings@ee.doe.gov*.

Please note that foreign nationals visiting DOE Headquarters are subject to advance security screening procedures which require advance notice prior to attendance at the public meeting. If a foreign national wishes to participate in the public meeting, please inform DOE of this fact as soon as possible by contacting Ms. Regina Washington at (202) 586-1214 or by e-mail: *Regina.Washington@ee.doe.gov* so that the necessary procedures can be completed.

DOE requires visitors to have laptops and other devices, such as tablets, 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. DHS maintains an updated website identifying the State and territory driver's licenses that currently are acceptable for entry into DOE facilities at *https://www.dhs.gov/real-id-enforcement-brief*. Acceptable alternate forms of

Photo-ID include a U.S. Passport or Passport Card; an Enhanced Driver's License or Enhanced ID-Card issued by States and territories identified on the DHS website (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 website: *https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=37&action=viewlive*. 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 document. 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 document. 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 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 proposed rule.

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

However, your contact information will be publicly viewable if you include it in the comment or in any documents attached to your comment. Any information that you do not want

to be publicly viewable should not be included in your comment, nor in any document attached to your comment. Persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

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

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

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

as long as it does not include any comments.

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

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

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

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

DOE will make its own determination about the confidential status of the information and treat it according to its determination.

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

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

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. The proposed definition for "compartment" and whether any further clarifying amendments are needed for the use of the term "compartment." (See section III.B.2 of this document.)

2. The proposal to update the industry standard reference to HRF-1-2016, and whether the updated reference would substantively impact any test requirements. (See section III.C of this document.)

3. The proposal to change the current icemaker fixed adder from 84 kWh per year to 28 kWh per year to better reflect typical residential ice making and consumption, and whether this adder is appropriate for products incorporating multiple icemakers. (See section III.D of this document.)

4. The proposal to amend the energy conservation standards for consumer refrigeration products with automatic icemakers in accordance with 42 U.S.C. 6293(e), including the proposed one-year lead-time period. (See section III.D of this document.)

5. The proposal to maintain the freestanding test approach for built-in products. (See section III.E of this document.)

6. The proposed clarification to the thermocouple configuration for drawer freezer compartments. (See section III.F.1 of this document.)

7. The proposal to clarify that floors with holes or vents for airflow be subject to the existing platform requirements. (See section III.F.2 of this document.)

8. The proposed instructions for testing products with separate external temperature controls. (See section III.F.3 of this document.)

9. The proposed revisions to the vertical gradient and stabilization test conditions, including the proposed requirement that, in certain test situations, the stabilization period serve as the test period. (See section III.G of this document.)

10. Whether additional test procedures amendments are necessary to accurately reflect energy use of products with door-in-door designs, products that incorporate display screens, or products with connected functions. (See section III.H of this document.)

11. Whether additional test procedure amendments may be appropriate to address issues identified in existing test procedure waivers. (See section III.J.2 of this document.)

12. The testing cost impacts and manufacturer burden associated with the test procedure amendments described in this document, including, but not limited to, the proposed stabilization and test period amendment, the proposed amendment regarding products with demand-response capabilities, and the proposed amendment regarding the automatic icemaker energy adder. (See section III.K.1 of this document.)

13. The benefits and burdens of adopting any industry/voluntary consensus-based or other appropriate test procedure, without modification. (See section III.K.2 of this document.)

14. Any other aspect of the existing test procedure for consumer refrigeration products not already addressed by the specific areas identified in this document. DOE particularly seeks information that would improve the representativeness of the test procedure, as well as information that would help DOE create a procedure that would limit manufacturer test burden. Comments regarding repeatability and reproducibility are also welcome. (See section III.K.3 of this document.)

15. Information that would help DOE create procedures that would limit manufacturer test burden through streamlining or simplifying testing requirements. Consistent with Executive Order 13771 "Reducing Regulation and Controlling Regulatory Costs," DOE encourages the public to provide input on measures DOE could take to lower

the cost of its regulations applicable to consumer refrigeration products consistent with the requirements of EPCA. (See section III.K.3 of this document.)

16. The initial finding that there are eight small businesses manufacturing consumer refrigeration products in the United States with fewer than 1,500 total employees and that the proposed amendments would not have a significant economic impact on these small businesses. (See section IV.C of this document.)

VI. Approval of the Office of the Secretary

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

List of Subjects in 10 CFR Part 430

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

Signed in Washington, DC, on November 18, 2019.

Alexander Fitzsimmons
Acting Deputy Assistant Secretary
for Energy Efficiency
Energy Efficiency and Renewable Energy

For the reasons stated in the preamble, DOE is proposing to amend part 430 of Chapter II of Title 10, Code of Federal Regulations as set forth below:

PART 430 -- ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

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

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

2. Section 430.3 is amended by revising paragraph (i)(4) to read as follows:

§ 430.3 Materials incorporated by reference.

* * * * *

(i) * * *

(4) AHAM HRF-1-2016, ("HRF-1-2016"), *Energy and Internal Volume of Refrigerating Appliances* (January 1, 2016), including *Errata to Energy and Internal Volume of Refrigerating Appliances, Correction Sheet* (August 3, 2016), IBR approved for appendices A and B to subpart B of this part.

* * * * *

3. Appendix A to subpart B of part 430 is amended by:

a. Revising the introductory note and sections 1, 2.1.2, 2.1.3, 2.2, 2.6, 2.7, 2.9, 3.2.1.1, 3.2.1.2, 3.2.1.3, 3.2.3, 4.1, 4.2.1, 4.2.1.1, 4.2.3.4.2, 5.1, 5.1.3, 5.1.4, 5.1.5, 5.3, and 6.2.3.1;

b. Removing section 2.10; and

c. Adding new sections 2.10 and 6.2.3.3.

The additions and 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

NOTE: Prior to [DATE 180 DAYS AFTER DATE OF PUBLICATION OF THE FINAL RULE], any representations of energy use of consumer refrigeration products must be based on the results of testing pursuant to either this appendix or the procedures in Appendix A as it appeared at 10 CFR part 430, subpart B, Appendix A, in the 10 CFR parts 200 to 499 edition revised as of January 1, 2019. Any representations of energy use must be in accordance with whichever version is selected. On or after [DATE 180 DAYS AFTER DATE OF PUBLICATION OF THE FINAL RULE], any representations of energy use must be based on the results of testing pursuant to this appendix.

For refrigerators and refrigerator-freezers, manufacturers must use the rounding requirements specified in sections 5.3.e and 6.1 of this appendix for all representations of energy use on or after the compliance date of any amendment of energy conservation standards for these products published after [DATE OF PUBLICATION OF THE FINAL RULE]. For combination cooler refrigeration products, manufacturers must use the test procedures in this appendix for all representations of energy use on or after October 28, 2019.

1. Definitions

Section 3, *Definitions,* of HRF-1-2016 (incorporated by reference; see §430.3) applies to this test procedure, except that the term "wine chiller" means "cooler" as defined in §430.2.

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, with means to automatically interrupt the harvesting operation when the ice storage bin is filled to a pre-determined level.

Compartment means an enclosed space within a consumer refrigeration product that is directly accessible through one or more external doors and may be divided into sub-compartments.

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.

Cooler compartment means a refrigerated compartment designed exclusively for wine or other beverages 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(d)(2) or §429.61(d)(2) of this chapter.

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-1-2016 means AHAM Standard HRF-1-2016, Association of Home Appliance Manufacturers, Energy and Internal Volume of Refrigerating Appliances (2016), including Errata to Energy and Internal Volume of Refrigerating Appliances, Correction Sheet issued August 3, 2016. Only sections of HRF-1-2016 (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-1-2016.

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.

Stable operation means operation after steady-state conditions have been achieved but excluding any events associated with defrost cycles. During stable operation the 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.

Sub-compartment means an enclosed space within a compartment that may have a different operating temperature from the compartment within which it is located.

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 reacts 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

* * * * *

2.1.2 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) during the stabilization period and the test period. 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. The top of the unit under test shall be determined by the refrigerated cabinet height, excluding any special or protruding components on the top of the unit.

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 the front of the unit under test and extend to the wall in the rear. For a test chamber floor that allows for airflow through the floor (*e.g.*, through a vent or holes), any airflow pathways through the floor must be located at least 1 foot away from all sides of the unit.

2.2 Operational Conditions. The unit under test shall be installed and its operating conditions maintained in accordance with sections 5.3.2 through 5.5.6.4 of HRF-1-2016 (incorporated by reference; see §430.3). Exceptions and clarifications to the cited sections of HRF-1-2016 are noted in sections 2.3 through 2.8, 2.10, and 5.1 of this appendix.

* * * * *

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 section 5.5.1 of HRF-1-2016;

(d) Temperature control settings for testing shall be as described in section 3 of this appendix. Settings for temperature-controllable sub-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 cooler) shall be operated in the highest energy use position. A compartment may be considered to be convertible to a cooler 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. Sub-compartments with a temperature control shall be tested with controls set to provide the coldest temperature. However, for sub-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 sub-compartments at their coldest settings, and the second set of tests shall be conducted with such sub-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. Movable subdividing barriers that separate compartments 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.

* * * * *

2.9 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 paragraph (a) or (b) of this section.

(a) The average temperature 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 at least 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 External Temperature Controls. If a product's controls are external to the cabinet assembly, the product shall be connected to the controls as needed for normal operation. Any additional equipment needed to ensure that the controls function properly shall not interfere with ambient airflow around the product or any other test conditions. If the controls provide temperature settings for additional separate products, the controls for those products shall be set to the "off" position during testing.

3. Test Control Settings

* * * * *

3.2.1.1 Setting Temperature Controls. For mechanical control systems, knob detents shall be mechanically defeated if necessary to attain a median setting, and 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 median setting 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 coldest setting (not electrically or mechanically bypassed). For units with a single standardized temperature (*e.g.*, all-refrigerator or cooler), 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 Temperature Setting Table. See Table 1 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: General Chart for All Products

First test		Second test		
Setting	**Results**	**Setting**	**Results**	**Energy calculation based on:**
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	Model may not be certified as compliant with energy conservation standards based on testing of this unit. Confirm that unit meets product definition. If so, see section 7 of this appendix.

* * * * *

3.2.3 Temperature Settings for Convertible Compartments. For 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 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 convertible compartments tested as cooler 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.

* * * * *

4. Test Period

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4.1 Non-automatic Defrost. If the model being tested has no automatic defrost system, the test period shall be the stabilization period specified in section 2.9(a) of this appendix.

* * * * *

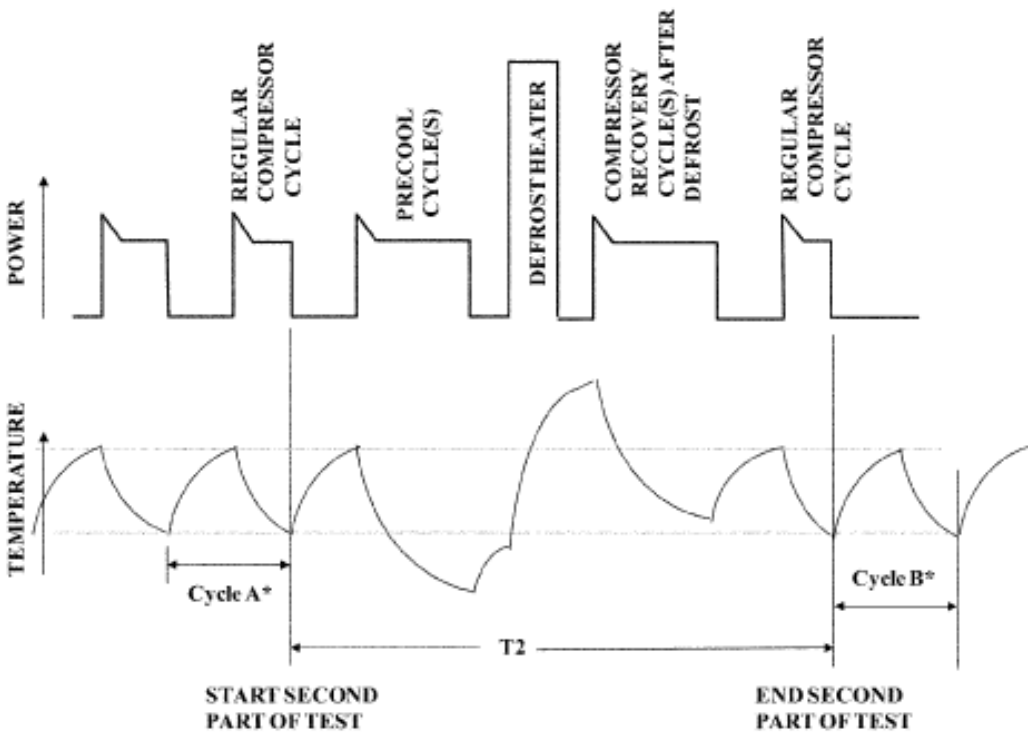
4.2.1 Long-time Automatic Defrost. If the model being tested has a long-time automatic defrost system, the two-part test described in this section may be used. If steady-state conditions are determined according to section 2.9(a) of this appendix, the first part is a stable period of compressor operation that includes no portions of the defrost cycle, such as precooling or recovery, that is otherwise the same as the test for a unit having no defrost provisions (section 4.1 of this appendix). If steady-state conditions are determined according to section 2.9(b) of this appendix, the first part of the test shall start after steady-state conditions have been achieved and be no less than three 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 occurs, the test period shall be three hours. If fewer than two compressor cycles occur during a 24-hour period, then a single complete compressor cycle may be used. The second part is designed to capture the energy consumed during all of the events occurring with the defrost control sequence that are outside of stable operation.

4.2.1.1 Cycling Compressor System. For a system with a cycling compressor, the second part of the test starts at the termination of the last regular compressor "on" cycle. The average compartment temperatures measured from the termination of the previous compressor "on" cycle to the termination of the last regular compressor "on" cycle must be within 0.5 °F (0.3 °C) of their average temperatures measured for the first part of the test. If any compressor cycles occur prior to the defrost heater being energized that cause the average temperature in any compartment to deviate from its average temperature for the first part of the test by more than 0.5 °F (0.3 °C), these compressor cycles are not considered regular compressor cycles and must be included in the second part of the test. As an example, a "precooling" cycle, which is an

extended compressor cycle that lowers the temperature(s) of one or more compartments prior to energizing the defrost heater, must be included in the second part of the test. The test period for the second part of the test ends at the termination of the first regular compressor "on" cycle after compartment temperatures have fully recovered to their stable conditions. The average temperatures of the compartments measured from this termination of the first regular compressor "on" cycle until the termination of the next regular compressor "on" cycle must be within 0.5 °F (0.3 °C) of the average temperatures measured for the first part of the test. See Figure 1 of this section. Note that Figure 1 illustrates the concepts of precooling and recovery but does not represent all possible defrost cycles. If average compartment temperatures measured over individual compressor cycles are never within 0.5 °F (0.3 °C) of the average temperatures measured for the first part of the test (for example, in products with irregular compressor cycling), the start of the second part of the test shall be at the beginning of a period of multiple complete compressor cycles prior to the defrost over which average temperatures are within 0.5 °F (0.3 °C) of the average temperatures measured for the first part of the test. Similarly, the end of the second part of the test shall be at the end of a period of multiple complete compressor cycles after the defrost over which average compartment temperatures are within 0.5 °F (0.3 °C) of the average measured for the first part of the test.

Figure 1

Long-time Automatic Defrost Diagram for Cycling Compressors



*Average compartment temperature during cycles A & B must be within 0.5 °F of the average temperature for the first part of the test.

* * * * *

4.2.3.4.2 Second Part of Test. (a) If at least one compressor cycles, the test period for the second part of the test starts during stable operation before all portions of the defrost cycle, at the beginning of a complete primary compressor cycle. The test period for the second part of the test ends during stable operation after all portions of the defrost cycle, including recovery, at the termination of a complete primary compressor cycle. The start and stop for the test period shall both occur either when the primary compressor starts or when the primary compressor stops. For each compressor system, the compartment temperature averages for the first and last complete compressor cycles that lie completely within the second part of the test must be within 0.5 °F

(0.3 °C) of the average compartment temperature measured for the first part of the test. If any one of the compressor systems is non-cycling, its compartment temperature averages during the first and last complete primary compressor cycles of the second part of the test must be within 0.5 °F (0.3 °C) of the average compartment temperature measured for the first part of the test.

(1) If average compartment temperatures measured over individual compressor cycles are never within 0.5 °F (0.3 °C) of the average temperatures measured for the first part of the test (for example, in products with irregular compressor cycling), the start of the second part of the test shall be at the beginning of a period of multiple complete compressor cycles prior to the defrost over which average temperatures are within 0.5 °F (0.3 °C) of the average temperatures measured for the first part of the test. Similarly, the end of the second part of the test shall be at the end of a period of multiple complete compressor cycles after the defrost over which average temperatures are within 0.5 °F (0.3 °C) of the average temperatures measured for the first part of the test.

(2) If these criteria cannot be met, the test period shall comprise at least 24 hours, unless a second defrost occurs prior to completion of 24 hours, in which case the test shall comprise at least 18 hours. The test period shall start at the end of a regular freezer compressor on-cycle after the previous defrost occurrence (refrigerator or freezer). The test period also includes the target defrost and following freezer compressor cycles, ending at the end of a freezer compressor on-cycle before the next defrost occurrence (refrigerator or freezer).

(b) If no compressor cycles, the test period for the second part of the test starts during stable operation before all portions of the defrost cycle, when the compartment temperatures of all compressor systems are within 0.5 °F (0.3 °C) of their average temperatures measured for the first part of the test. The test period for the second part ends during stable operation after all

portions of the defrost cycle, including recovery, when the compartment temperatures of all compressor systems are within 0.5 °F (0.3 °C) of their average temperatures measured for the first part of the test.

* * * * *

5. Test Measurements

5.1 Temperature Measurements. (a) Temperature measurements shall be made at the locations prescribed in HRF-1-2016 (incorporated by reference; see §430.3) Figure 5-1 for cooler and fresh food compartments and Figure 5-2 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 or cooler-all-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-1-2016, 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- 2016 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 T3 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 in this paragraph (b).

(c) Freezer compartments that are accessed via a drawer shall be tested according to the Type 6 thermocouple configuration in Figure 5-2 of HRF-1-2016.

* * * * *

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;

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;

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 Cooler Compartment Temperature. The cooler compartment temperature shall be calculated as:

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

Where:

C is the total number of applicable cooler compartments;

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

VC_i is the volume of cooler compartment "i."

* * * * *

5.3 Volume Measurements. (a) The unit's total refrigerated volume, VT, shall be measured in accordance with sections 3.34, 4.2 through 4.3 of HRF-1-201. 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-1-2016, 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 = cooler 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-1-2016). 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-1-2016).

(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 movable subdividing barrier, it must be placed as described in section 2.7 of this appendix.

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

* * * * *

6. Calculation of Derived Results From Test Measurements

* * * * *

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 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;

For representations of energy use before [DATE ONE YEAR AFTER DATE OF PUBLICATION OF THE FINAL RULE], IET, expressed in kilowatt-hours per cycle, equals 0.23 for a product with one or more automatic icemakers and otherwise equals 0 (zero);

For representations of energy use on or after [DATE ONE YEAR AFTER DATE OF PUBLICATION OF THE FINAL RULE], IET, expressed in kilowatt-hours per cycle, equals 0.0767 for a product with one or more automatic icemakers and otherwise equals 0 (zero); and

The number 1 indicates the test during which the highest freezer compartment temperature was measured.

* * * * *

6.2.3.3 Optional Test for Models with Two Compartments and User-Operable Controls. If the procedure of section 3.3 of this appendix is used for setting temperature controls, the average per-cycle energy consumption shall be defined as follows:

$E = E_x + IET$

Where:

E is defined in 6.2.1.1 of this appendix;

IET is defined in 6.2.3.1 of this appendix; and

E_x is defined and calculated as described in appendix M, section M4(a) of AS/NZS 4474.1:2007 (incorporated by reference; see §430.3). The target temperatures t_{xA} and t_{xB} defined

in section M4(a)(i) of AS/NZS 4474.1:2007 shall be the standardized temperatures defined in section 3.2 of this appendix.

* * * * *

4. Appendix B to subpart B of part 430 is amended by:

a. Revising the introductory note and sections 1, 2.1.2, 2.1.3, 2.2, 2.4, 2.5, 2.7, 2.8, 3.1, 3.2, 3.2.1, 4.1, 4.2.1, 4.2.1.1, 5.1, 5.1.3, 5.3, 6.1, and 6.2.1; and

b. Removing section 2.8;

c. Redesignating section 2.9 as 2.8;

d. Adding new section 2.9.

The additions and revisions read as follows:

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

NOTE: Prior to [DATE 180 DAYS AFTER DATE OF PUBLICATION OF THE FINAL RULE]**,** any representations of energy use of freezers must be based on the results of testing pursuant to either this appendix or the procedures in Appendix B as it appeared at 10 CFR part 430, subpart B, Appendix B, in the 10 CFR parts 200 to 499 edition revised as of January 1, 2019. Any representations of energy use must be in accordance with whichever version is selected. On or after [DATE 180 DAYS AFTER DATE OF PUBLICATION OF THE FINAL RULE]**,** any representations of energy use must be based on the results of testing pursuant to this appendix.

For freezers, manufacturers must use the rounding requirements specified in sections 5.3.e and 6.1 of this appendix for all representations of energy use on or after the compliance date of any amendment of energy conservation standards for these products published after [DATE OF PUBLICATION OF THE FINAL RULE].

* * * * *

1. Definitions

Section 3, *Definitions*, of HRF-1-2016 (incorporated by reference; see §430.3) applies to this test procedure.

Adjusted total volume means the product of the freezer volume as defined in HRF-1-2016 in cubic feet multiplied by an adjustment factor.

Anti-sweat heater means a device incorporated into the design of a freezer to prevent the accumulation of moisture on 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 defrost operation. The system automatically prevents the permanent formation of frost on all refrigerated surfaces. Nominal refrigerated food temperatures are maintained during the operation of the automatic defrost system.

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 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.

Compartment means an enclosed space within a consumer refrigeration product that is directly accessible through one or more external doors and may be divided into sub-compartments.

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 end 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 the period of 24 hours for which the energy use of a freezer is calculated as though the consumer-activated compartment temperature controls were set to maintain the standardized temperature (see section 3.2 of this appendix).

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 the compartment temperature control set to establish various operating characteristics.

HRF-1-2016 means AHAM Standard HRF-1-2016, Association of Home Appliance Manufacturers, Energy and Internal Volume of Refrigerating Appliances (2016), including Errata to Energy and Internal Volume of Refrigerating Appliances, Correction Sheet issued August 3, 2016. Only sections of HRF-1-2016 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-1-2016.

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

Long-time automatic defrost means an automatic defrost system where 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.

Quick freeze means an optional feature on freezers that is initiated manually. It bypasses the thermostat control and operates continually until the feature is terminated either manually or automatically.

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.

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

Stable operation means operation after steady-state conditions have been achieved but excluding any events associated with defrost cycles. During stable operation the rate of change of compartment temperatures must not exceed 0.042 °F (0.023 °C) per hour. 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, or heater), the relevant calculation shall be the difference between compartment temperature averages evaluated for 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.

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

Sub-compartment means an enclosed space within a compartment that may have a different operating temperature from the compartment within which it is located.

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 should predict 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 lengths of time between defrosts as inputs vary.

2. Test Conditions

* * * * *

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) during the stabilization period and the test period. 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. The top of the unit under test shall be determined by the refrigerated cabinet height, excluding any special or protruding components on the top of the unit.

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. For a test chamber floor that allows for airflow through the floor (*e.g.*, through a vent or holes), any airflow pathways through the floor must be located at least 1 foot away from all sides of the unit.

2.2 Operational Conditions. The freezer shall be installed and its operating conditions maintained in accordance with sections 5.3.2 through 5.5.6.4 of HRF-1-2016 (incorporated by reference; see §430.3), (but excluding sections 5.5.6.1 and 5.5.6.3). The quick freeze option shall be switched off except as specified in section 3.1 of this appendix. Exceptions and clarifications

to the cited sections of HRF-1-2016 are noted in sections 2.3 through 2.9 and 5.1 of this appendix.

* * * * *

2.4 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 freezer 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 2.6;

(c) The electric power supply shall be as described in section 5.5.1 of HRF-1-2016 (incorporated by reference; see §430.3);

(d) Temperature control settings for testing shall be as described in section 3 of this appendix. Settings for sub-compartments shall be as described in section 2.5 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).

2.5 Sub-compartments with a temperature control shall be tested with controls set to provide the coldest temperature. However, for sub-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 compartments at their coldest settings, and the second set of tests shall be conducted with such 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 control (such as quick freeze) that are initiated manually and terminated automatically within 168 hours. Movable subdividing barriers that separate compartments 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.

* * * * *

2.7 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 paragraph (a) or (b) of this section.

(a) The average temperature 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 at least 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.

2.8 For products that require the freezer compartment to be loaded with packages in accordance with section 5.5.6.2 of HRF-1-2016, the number of packages comprising the 75% load shall be determined by filling the compartment completely with the packages that are to be used for the test, such that the packages fill as much of the usable refrigerated space within the compartment as is physically possible, and then removing from the compartment a number of packages so that the compartment contains 75% of the packages that were placed in the compartment to completely fill it. If multiplying the total number of packages by 0.75 results in a fraction, the number of packages used shall be rounded to the nearest whole number, rounding up if the result ends in 0.5. For multi-shelf units, this method shall be applied to each shelf. For both single- and multi-shelf units, the remaining packages shall be arranged as necessary to provide the required air gap and thermocouple placement. The number of packages comprising the 100% and 75% loading conditions shall be recorded in the test data maintained in accordance with 10 CFR 429.71.

2.9 Products with External Temperature Controls. If a product's controls are external to the cabinet assembly, the product shall be connected to the controls as needed for normal operation. Any additional equipment needed to ensure that the controls function properly shall not interfere with ambient airflow around the product or any other test conditions. If the controls

provide temperature settings for additional separate products, the controls for those products shall be set to the "off" position during testing.

3. Test Control Settings

3.1 Model with No User-Operable Temperature Control. A test shall be performed during which the compartment temperature and energy use shall be measured. A second test shall be performed with the temperature control electrically short circuited to cause the compressor to run continuously. If the model has the quick freeze option, this option must be used to bypass the temperature control.

3.2 Model with User-Operable Temperature Control. Testing shall be performed in accordance with one of the following sections using the standardized temperature of 0.0 °F (−17.8 °C). 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 5.1.3 of this appendix.

3.2.1 A first test shall be performed with all temperature controls set at their median position midway between their warmest and coldest settings. For mechanical control systems, knob detents shall be mechanically defeated if necessary to attain a median setting, and 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 median setting 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. 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. 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 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**		
Settings	**Results**	**Settings**	**Results**	**Energy calculation based on:**
Mid	Low	Warm	Low	Second Test Only.
			High	First and Second Tests.
	High	Cold	Low	First and Second Tests.
			High	Model may not be certified as compliant with energy conservation standards based on testing of this unit. Confirm that unit meets product definition. If so, see section 7 of this appendix.

* * * * *

4. Test Period

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4.1 Non-automatic Defrost. If the model being tested has no automatic defrost system, the test period shall be the same as the stabilization period specified in section 2.7(a) of this appendix.

* * * * *

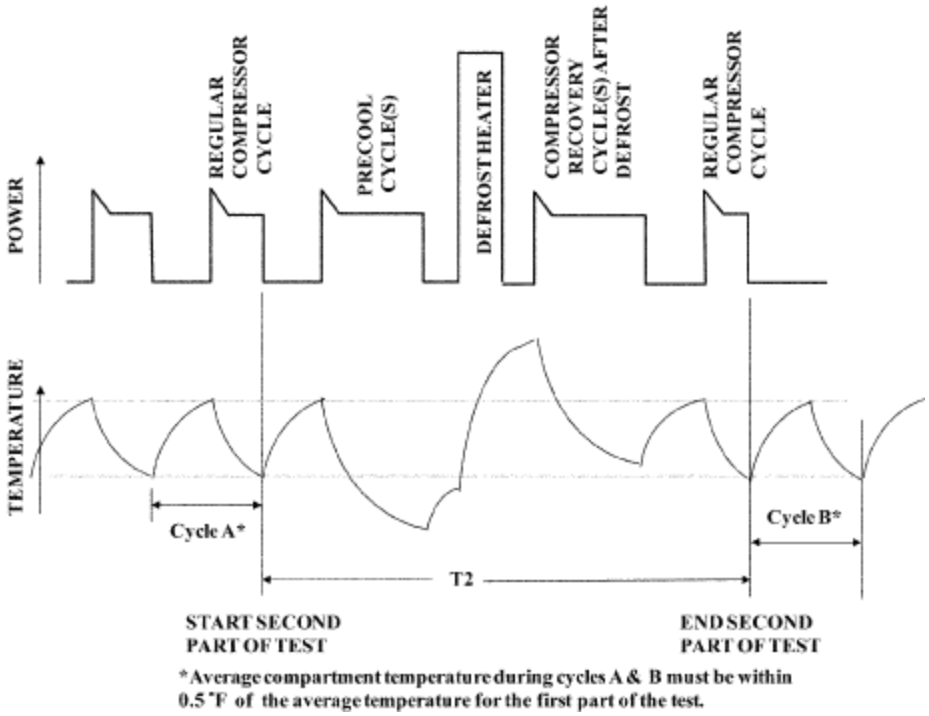
4.2.1 Long-time Automatic Defrost. If the model being tested has a long-time automatic defrost system, the two-part test described in this section may be used. If steady-state conditions are determined according to section 2.7(a) of this appendix, the first part is a stable period of compressor operation that includes no portions of the defrost cycle, such as precooling or recovery, that is otherwise the same as the test for a unit having no defrost provisions (section 4.1 of this appendix). If steady-state conditions are determined according to section 2.7(b) of this appendix, the first part of the test shall start after steady-state conditions have been achieved and be no less than three 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 occurs, the test period shall be three hours. If fewer than two compressor cycles occur during a 24-hour period, then a single complete compressor cycle may be used. The second part is designed to capture the energy consumed during all of the events occurring with the defrost control sequence that are outside of stable operation.

4.2.1.1 Cycling Compressor System. For a system with a cycling compressor, the second part of the test starts at the termination of the last regular compressor "on" cycle. The average temperature of the compartment measured from the termination of the previous compressor "on" cycle to the termination of the last regular compressor "on" cycle must be within 0.5 °F (0.3 °C) of the average temperature of the compartment measured for the first part

of the test. If any compressor cycles occur prior to the defrost heater being energized that cause the average temperature in the compartment to deviate from the average temperature for the first part of the test by more than 0.5 °F (0.3 °C), these compressor cycles are not considered regular compressor cycles and must be included in the second part of the test. As an example, a "precooling" cycle, which is an extended compressor cycle that lowers the compartment temperature prior to energizing the defrost heater, must be included in the second part of the test. The test period for the second part of the test ends at the termination of the first regular compressor "on" cycle after the compartment temperatures have fully recovered to their stable conditions. The average temperature of the compartment measured from this termination of the first regular compressor "on" cycle until the termination of the next regular compressor "on" cycle must be within 0.5 °F (0.3 °C) of the average temperature of the compartment measured for the first part of the test. See Figure 1. Note that Figure 1 illustrates the concepts of precooling and recovery but does not represent all possible defrost cycles. If average compartment temperatures measured over individual compressor cycles are never within 0.5 °F (0.3 °C) of the average temperature of the compartment measured for the first part of the test (for example, in products with irregular compressor cycling), the start of the second part of the test shall be at the beginning of a period of multiple complete compressor cycles prior to the defrost over which average temperatures are within 0.5 °F (0.3 °C) of the average temperature of the compartment measured for the first part of the test. Similarly, the end of the second part of the test shall be at the end of a period of multiple complete compressor cycles after the defrost over which average compartment temperatures are within 0.5 °F (0.3 °C) of the average measured for the first part of the test.

Figure 1

Long-time Automatic Defrost Diagram for Cycling Compressors



*Average compartment temperature during cycles A & B must be within 0.5 °F of the average temperature for the first part of the test.

* * * * *

5. Test Measurements

5.1 Temperature Measurements. (a) Temperature measurements shall be made at the locations prescribed in Figure 5-2 of HRF-1-2016 (incorporated by reference; see §430.3) and shall be accurate to within ± 0.5 °F (0.3 °C).

(b) If the interior arrangements of the unit under test do not conform with those shown in Figure 5-2 of HRF-1-2016, 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-1-2016 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 Figure prescribe a temperature sensor location within 1 inch of a shelf or similar feature, this constitutes a relocation of temperature sensors that must be recorded in the test data and reported in the certification report as described above.

(c) Freezer compartments that are accessed via a drawer shall be tested according to the Type 6 thermocouple configuration in Figure 5-2 of HRF-1-2016.

* * * * *

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;

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 sections 3.34, 4.2 through 4.3 of HRF-1-2016. 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-1-2016, as provided in paragraph (b) of this section.

(b) The following component volumes shall not be included in the compartment volume measurements: Icemaker compartment insulation, fountain recess, dispenser insulation, and ice chute (if there is a plug, cover, or cap over the chute per Figure 4-2 of HRF-1-2016). 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-1-2016).

(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 movable subdividing barrier, it must be placed as described in section 2.5 of this appendix.

(e) Freezer 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 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 foot. The adjusted total volume, AV, for freezers under test shall be defined as:

$$AV = VT \times CF$$

Where:

AV = adjusted total volume in cubic feet;

VT = total refrigerated volume in cubic feet; and

CF = dimensionless correction factor of 1.76.

* * * * *

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 section 5.2.1 of this appendix;

The number 1 indicates the test during which the highest compartment temperature is measured; and

For representations of energy use before [DATE ONE YEAR AFTER DATE OF PUBLICATION OF THE FINAL RULE], IET, expressed in kilowatt-hours per cycle, equals 0.23 for a product with one or more automatic icemakers and otherwise equals 0 (zero);

For representations of energy use on or after [DATE ONE YEAR AFTER DATE OF PUBLICATION OF THE FINAL RULE], IET, expressed in kilowatt-hours per cycle, equals 0.0767 for a product with one or more automatic icemakers and otherwise equals 0 (zero).

* * * * *

5. Section 430.32 is amended by revising paragraphs (a) and (aa)(2) 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 (1104 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 until [DATE ONE YEAR AFTER PUBLICATION OF A FINAL RULE]:

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, as determined in appendices A and B of subpart B of this part.

av = Total adjusted volume, expressed in Liters.

The following standards apply to products manufactured starting on [DATE ONE YEAR AFTER PUBLICATION OF A FINAL RULE]:

	Equations for maximum energy use (kWh/yr)	
Product class	**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 + 208.9	0.323av + 208.9
3I. Refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker without through-the-door ice service	8.07AV + 261.7	0.285av + 261.7
3I-BI. Built-in refrigerator-freezers—automatic defrost with top-mounted freezer with an automatic icemaker without through-the-door ice service	9.15AV + 292.9	0.323av + 292.9
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 + 325.8	0.301av + 325.8
4I-BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer with an automatic icemaker without through-the-door ice service	10.22AV + 385.4	0.361av + 385.4
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 + 345.0	0.312av + 345.0
5I-BI. Built-In Refrigerator-freezers—automatic defrost with bottom-mounted freezer with an automatic icemaker without through-the-door ice service	9.40AV + 364.9	0.332av + 364.9

5A. Refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service	9.25AV + 419.4	0.327av + 419.4
5A-BI. Built-in refrigerator-freezer—automatic defrost with bottom-mounted freezer with through-the-door ice service	9.83AV + 443.9	0.347av + 443.9
6. Refrigerator-freezers—automatic defrost with top-mounted freezer with through-the-door ice service	8.40AV + 329.4	0.297av + 329.4
7. Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service	8.54AV + 376.8	0.302av + 376.8
7-BI. Built-In Refrigerator-freezers—automatic defrost with side-mounted freezer with through-the-door ice service	10.25AV + 446.6	0.362av + 446.6
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 + 256.3	0.305av + 256.3
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 + 288.9	0.348av + 288.9
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 + 376.2	0.417av + 376.2
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 + 484.9	0.241av + 484.9
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 + 367.2	0.417av + 367.2
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, as determined in appendices A and B of subpart B of this part.

av = Total adjusted volume, expressed in Liters.

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(aa) * * *

(2) Combination cooler refrigeration products manufactured starting on October 28, 2019 until [DATE ONE YEAR AFTER PUBLICATION OF A FINAL RULE] shall have Annual Energy Use (AEU) no more than:

Product class	**AEU (kWh/yr)**
C-3A. Cooler with all-refrigerator—automatic defrost	4.57AV + 130.4
C-3A-BI. Built-in cooler with all-refrigerator—automatic defrost	5.19AV + 147.8
C-9. Cooler with upright freezers with automatic defrost without an automatic icemaker	5.58AV + 147.7

C-9-BI. Built-in cooler with upright freezer with automatic defrost without an automatic icemaker	6.38AV + 168.8
C-9I. Cooler with upright freezer with automatic defrost with an automatic icemaker	5.58AV + 231.7
C-9I-BI. Built-in cooler with upright freezer with automatic defrost with an automatic icemaker	6.38AV + 252.8
C-13A. Compact cooler with all-refrigerator—automatic defrost	5.93AV + 193.7
C-13A-BI. Built-in compact cooler with all-refrigerator—automatic defrost	6.52AV + 213.1

AV = Total adjusted volume, expressed in ft^3, as calculated according to appendix A of subpart B of this part.

Combination cooler refrigeration products manufactured starting on [DATE ONE YEAR AFTER PUBLICATION OF A FINAL RULE] shall have Annual Energy Use (AEU) no more than:

Product class	**AEU (kWh/yr)**
C-3A. Cooler with all-refrigerator—automatic defrost	4.57AV + 130.4
C-3A-BI. Built-in cooler with all-refrigerator—automatic defrost	5.19AV + 147.8
C-9. Cooler with upright freezers with automatic defrost without an automatic icemaker	5.58AV + 147.7
C-9-BI. Built-in cooler with upright freezer with automatic defrost without an automatic icemaker	6.38AV + 168.8
C-9I. Cooler with upright freezer with automatic defrost with an automatic icemaker	5.58AV + 175.7
C-9I-BI. Built-in cooler with upright freezer with automatic defrost with an automatic icemaker	6.38AV + 196.8
C-13A. Compact cooler with all-refrigerator—automatic defrost	5.93AV + 193.7

C-13A-BI. Built-in compact cooler with all-refrigerator—automatic defrost	6.52AV + 213.1

AV = Total adjusted volume, expressed in ft^3, as calculated according to appendix A of subpart B of this part.

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