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[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Parts 429 and 431

[Docket Number EERE-2011-BT-TP-0024]

RIN: 1904-AC46

Energy Conservation for Certain Industrial Equipment: Alternative Efficiency Determination Methods and Test Procedures for Walk-In Coolers and Walk-In Freezers

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

ACTION: Supplemental notice of proposed rulemaking.

SUMMARY: The U.S. Department of Energy (DOE) proposes to revise its existing regulations for walk-in coolers and walk-in freezers regarding the use of methods other than testing for certifying compliance and reporting ratings in accordance with energy conservation standards. DOE also proposes clarifications its test procedures for this equipment.

DATES: Comments: DOE will accept comments, data, and information regarding this supplemental notice of proposed rulemaking (SNOPR) no later than **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. See section V, "Public Participation," for details.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at www.regulations.gov. Alternatively, interested persons may submit comments, identified by docket number EERE-2011-BT-TP-0024 and/or RIN 1904-AC46, by any of the following methods:

- E-mail: AED-ARM-2011-TP-0024@ee.doe.gov. Include EERE-2011-BT-TP-0024 and/or RIN 1904-AC46in the subject line of the message. Submit electronic comments in WordPerfect, Microsoft Word, PDF, or ASCII file format, and avoid the use of special characters or any form of encryption.
- Postal Mail: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Office, Mailstop EE–5B, 1000 Independence Avenue, SW., Washington, DC 20585–0121. If possible, please submit all items on a compact disc (CD), in which case it is not necessary to include printed copies.
- Hand Delivery/Courier: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza, SW., 6^{th} Floor, Washington, DC 20024. Telephone: (202) 586–2945. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

For detailed instructions on submitting comments and additional information on the rulemaking process, see section V of this document (Public Participation).

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

However, not all documents listed in the index may be publicly available, such as information that is exempt from public disclosure.

A link to the docket web page can be found at: http://www.regulations.gov/#!docketDetail;D=EERE-2011-BT-TP-0024. This web page contains a link to the docket for this notice on the www.regulations.gov site. The www.regulations.gov web page contains simple instructions on how to access all documents, including public comments, in the docket. See section V, “Public Participation,” for information on how to submit comments through www.regulations.gov.

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

FOR FURTHER INFORMATION CONTACT: Ms. Ashley Armstrong, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-5B, 1000 Independence Avenue, SW., Washington, DC 20585-0121. Telephone: (202) 586-6590. E-mail: Ashley.Armstrong@ee.doe.gov.

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I. Authority and Background

A. Authority

Title III, Part C of the Energy Policy and Conservation Act of 1975 ("EPCA" or "the Act", Public Law 94-163) sets forth a variety of provisions designed to improve energy efficiency. The National Energy Conservation Policy Act ("NECPA", Public Law 95-619) amended EPCA and established the energy conservation program for certain industrial equipment. (42 U.S.C. 6311-6317) The Energy Independence and Security Act of 2007 ("EISA 2007") further amended EPCA to include, among others, two types of industrial equipment that are the subject of today's notice: walk-in coolers and walk-in freezers (collectively, "walk-ins" or "WICFs"). (42 U.S.C. 6311(1)(G)) Walk-ins are enclosed storage spaces of less than 3,000 square feet that can be walked into and are refrigerated to temperatures above and at or below 32 degrees Fahrenheit, respectively. (42 U.S.C. 6311(20)(A)) This term, by statute, excludes equipment designed for medical, scientific, or research purposes. (42 U.S.C. 6311(20)(B))

Under EPCA, the energy conservation program generally consists of four parts: (1) testing; (2) labeling; (3) establishing Federal energy conservation standards; and (4) certification and enforcement procedures. The testing requirements consist of test procedures that manufacturers of covered equipment must use as the basis for making representations about the efficiency of that equipment (42 U.S.C. 6314(d)), including those representations made to DOE that the covered equipment complies with the applicable energy conservation standards adopted pursuant to EPCA. (42 U.S.C. 6316(h)) Similarly, DOE must use these test requirements to determine whether the products comply with the relevant energy conservation standards. (42 U.S.C. 6316(h)) For certain consumer products and commercial and industrial equipment, DOE's testing regulations currently allow manufacturers to use an alternative efficiency determination method (AEDM), in lieu of actual testing, to simulate the energy consumption or efficiency of certain basic models of covered products and equipment under DOE's test procedure conditions. As explained in further detail below, an AEDM is a computer model or mathematical tool used to help determine the energy efficiency of a particular basic model.

Under 42 U.S.C. 6314, EPCA sets forth the criteria and procedures that DOE must follow when prescribing or amending test procedures for covered products. EPCA provides, in relevant part, that any test procedures prescribed or amended under this section must be reasonably designed to produce test results that 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 must not be unduly burdensome to conduct. (42 U.S.C. 6314(a)(2))

In addition, if DOE determines that a test procedure amendment is warranted, it must publish proposed test procedures and offer the public an opportunity to present oral and written comments on them. (42 U.S.C. 6314(b)(2)) Finally, in any rulemaking to amend a test procedure, DOE must determine the extent to which the proposed procedure would alter the equipment’s measured energy efficiency. If DOE determines that the amended procedure would alter that equipment's measured energy efficiency, DOE must amend the applicable energy conservation standard accordingly. (42 U.S.C. 6314(a)(6)(D).

B. Background

1. Alternative Efficiency Determination Method

As briefly noted above, AEDMs are computer modeling or mathematical tools that predict the performance of non-tested basic models. They are derived from mathematical models and engineering principles that govern the energy efficiency and energy consumption characteristics of a type of covered equipment. These computer modeling and mathematical tools, when properly developed, can provide a relatively straightforward and reasonably accurate means to predict the energy usage or efficiency characteristics of a basic model of a given covered equipment type. These tools can be useful in reducing a manufacturer's testing burden.

Where authorized by regulation, AEDMs enable manufacturers to rate and certify their basic models by using the projected energy use or energy efficiency results derived from these simulation models. DOE currently permits manufacturers of certain expensive or highly customized equipment to use AEDMs when rating and certifying their equipment.

DOE believes other similar equipment that must currently be rated and certified through testing, such as walk-in refrigeration systems, could also be rated and certified through the use of computer or mathematical modeling. Consequently, to examine whether AEDM usage would be appropriate for walk-in refrigeration systems, DOE sought comment on this topic and other related issues in a Request for Information (RFI), which was published in the Federal Register on April 18, 2011. 76 FR 21673.

DOE subsequently issued a Notice of Proposed Rulemaking (NOPR), which was published in the Federal Register on May 31, 2012 (May 2012 NOPR), that proposed to expand and revise DOE's existing AEDM requirements for certain commercial equipment covered under EPCA. 77 FR 32038. Specifically, the May 2012 NOPR proposed to allow manufacturers of walk-in refrigeration systems to use AEDMs when certifying the energy use or energy efficiency of basic models of equipment in lieu of testing. Id.

Subsequent to the May 2012 NOPR's publication, the Appliance Standards and Rulemaking Federal Advisory Committee (ASRAC) unanimously decided to form a working group to engage in a negotiated rulemaking effort on the certification of commercial HVAC, WH, and refrigeration equipment. During the Working Group's first meeting on April 30, 2013, Working Group members voted to expand the scope of the negotiated rulemaking efforts to include developing methods of estimating equipment performance based on AEDM simulations for commercial HVAC, WH, and refrigeration equipment. The issues discussed by the various participants during the negotiations with DOE were similar to those raised by the commenters in response to the May 2012 NOPR, which included AEDM validation and DOE verification of ratings derived using an AEDM. DOE adopted the Working Group's AEDM recommendation for commercial HVAC, WH, and refrigeration equipment in a Final Rule published in the **Federal Register** on December 31, 2013. 78 FR 79579. DOE notes that neither the Working

Group nor the December 2013 final rule addressed the use of AEDMs for WICF refrigeration systems.

This supplemental notice of proposed rulemaking (SNOPR) proposes to align DOE's AEDM regulations by allowing the use of AEDMs when certifying the energy efficiency performance of walk-in refrigeration equipment in a manner similar to that which was recently established for commercial HVAC, refrigeration, and WH equipment. This approach, which was recommended by the Working Group, would help DOE establish a uniform, systematic, and fair approach to the use of these types of modeling techniques that will enable DOE to ensure that products in the marketplace are correctly rated—irrespective of whether they are subject to actual physical testing or are rated using modeling—without unnecessarily burdening regulated entities.

2. Test Procedures for WICF Refrigeration Equipment

The refrigeration system performs the mechanical work necessary to cool the interior space of a walk-in. The system typically comprises two separate primary components, a condenser/compressor ("condensing unit") and an expansion valve/evaporator ("unit cooler"). DOE's regulations at 10 CFR 431.304, Uniform test method for the measurement of energy consumption of walk-in coolers and walk-in freezers, incorporate by reference AHRI Standard 1250-2009, "2009 Standard for Performance Rating of Walk-in Coolers and Freezers" (AHRI 1250) as the testing method for walk-in refrigeration systems. 10 CFR 431.304(b)(9). AHRI 1250 establishes methods to follow when testing a complete refrigeration system (the "matched system" test), as well as separate methods to use for testing the unit cooler and condensing unit of a refrigeration system individually and then calculating a combined system rating (the “mix-match” test). AHRI 1250 also contains standard rating conditions for cooler and freezer systems; systems where the condenser is located either indoors or outdoors; and systems with single-speed, two-speed, or variable-speed compressors. AHRI 1250 also establishes a method for testing and rating unit coolers that are connected to a multiplex condensing system such as may be found in a supermarket. The rating produced by the AHRI 1250 test procedure is an annual walk-in energy factor (AWEF), defined as “a ratio of the total heat, not including the heat generated by the operation of refrigeration systems, removed, in Btu [British thermal units], from a walk-in box during one year period of usage for refrigeration to the total energy input of refrigeration systems, in watt-hours, during the same period.” AHRI 1250, at sec. 3.1.

In addition to these activities, DOE recently proposed energy conservation standards for walk-ins. See 78 FR 55782 (Sept. 11, 2013) (September 2013 standards NOPR). In that notice, DOE proposed standards for complete walk-in refrigeration systems that would require the ratings for the refrigeration system be derived using either the matched system or mix-match tests described above. DOE also proposed standards for unit coolers connected to a multiplex system, based on the unit cooler rating method described above. Responding to the NOPR, several interested parties discussed the concept of establishing separate standards for the unit cooler and condensing unit of a walk-in. In light of that discussion, and of the fact that the unit coolers and condensing units are often sold separately and in many cases are produced by different manufacturers, and that AHRI 1250 includes individual test methods for both components (i.e. the mix-match test method), DOE is proposing in this SNOPR to adopt a methodology that would require the manufacturer of either the unit cooler or condensing unit, if sold separately, to test and certify compliance with DOE's standards and when making representations of the WICF refrigeration system. Manufacturers of a complete WICF refrigeration system may continue to develop a system rating for the purposes of certifying compliance with DOE's standards and making representations of the WICF refrigeration system.

Furthermore, in reviewing AHRI 1250 and conducting limited testing on a WICF refrigeration system at a third-party laboratory to investigate the AEDM validation approach, DOE discovered several issues in the refrigeration test procedures that would require clarification and/or create unnecessary test burden. To simplify the procedure and to clarify certain aspects, DOE is also proposing to provide alternate language to certain requirements contained in AHRI 1250 that DOE's test procedure currently incorporates by reference

3. Sampling Plan

In order to determine a certified rating for certifying compliance or making energy use representations, DOE requires manufacturers to test each basic model in accordance with the applicable DOE test procedure and apply the sampling plan. In today's notice, DOE is proposing a sampling plan for walk-ins consistent with other commercial equipment regulated under EPCA.

4. Test Procedures and Prescriptive Requirements for WICF Foam Panel R-value

EPCA mandates prescriptive requirements for the thermal resistance of walk-in panels; wall, ceiling, and doors must have an insulation value of at least R-25 for coolers and R-32 for freezers. (42 U.S.C. 6313(f)(1)(C)) EPCA also requires the use of ASTM C518-04, Standard

Test Method for Thermal Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus ("ASTM C518-04") to measure the insulation thermal resistance. (42 U.S.C 6314(a)(9)(A)) The walk-in test procedure at 10 CFR 431.304 incorporates ASTM C518-04 by reference. This reference standard is the method by which the thermal conductivity (the "K factor") of a walk-in panel is measured; the R-value of the panel is then determined by multiplying 1/K (the reciprocal of K) by the thickness of the panel. The R-value of a freezer panel is determined at a mean insulation foam temperature of 20 degrees Fahrenheit and the R-value of a cooler panel is determined at a mean insulation foam temperature of 55 degrees Fahrenheit. (42 U.S.C. 6314 (a)(9)(A)(iii) and (iv)) Manufacturers must currently use the test procedure detailed in 10 CFR 431.304(b) when certifying compliance with the panel energy conservation standards until January 1, 2015. Manufacturers must use the procedure in 10 CFR 431.304(c) when making representations of energy efficiency both currently and when certifying compliance starting on January 1, 2015. DOE is proposing to modify the test sample preparation procedures incorporated from ASTM C518-04 in both procedures to improve measurement accuracy.

5. Performance-based Test Procedures for Energy Consumption of Envelope Components

In 10 CFR Part 431, Subpart R, Appendix A, DOE lays out a method for measuring performance-based efficiency metrics for certain WICF envelope components. This method draws from several existing industry test methods by incorporating by reference ASTM C1363-05 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus and Annex C Determination of the aged values of thermal resistance and thermal conductivity from both DIN EN 13164 and DIN EN 13165 (two

European Union-developed testing protocols) for measuring the energy consumption of WICF floor and non-floor panels. Appendix A also incorporates NFRC 100-2010[E0A1] Procedure for Determining Fenestration Product U-factors for determining the energy use of walk-in display and non-display doors. In today's notice, DOE is proposing to modify (1) the test procedures for WICF floor and non-floor panels to address comments received from stakeholders during the standards rulemaking and (2) the WICF display and non-display door test procedure to improve the clarity of the test method.

II. Summary of the Notice of Proposed Rulemaking

Today's proposal comprises five key elements.

First, the Department proposes to allow WICF refrigeration system manufacturers to use AEDMs to rate and certify their basic models by using the projected energy efficiency derived from these simulation models in lieu of testing. DOE is proposing to align the validation requirements proposed for WICF refrigeration AEDMs with those that have already been adopted for commercial HVAC, refrigeration, and WH equipment. DOE is considering this approach because the cooling and refrigeration systems used by these equipment types operate under similar principles as the refrigeration systems used in walk-ins. This similarity, along with the practical considerations discussed elsewhere in this notice, lend support for applying similar or identical validation requirements for walk-ins as well. Also as part of this approach, the Department is addressing comments received in response to the May 2012 NOPR, which originally proposed to expand AEDMs to WICF refrigeration systems and proposed validation and verification requirements.

Second, today's SNOPR puts forth an alternative method for testing and rating the WICF refrigeration system for unit coolers and condensing units that are sold separately. Specifically, unit cooler manufacturers who distribute a unit cooler for use in a WICF refrigeration system must rate that cooler as though it were to be connected to a multiplex system, and must comply with the standard for a unit cooler connected to a multiplex system. Similarly, manufacturers who distribute a condensing unit for use in a WICF refrigeration system must determine the appropriate rating by using the nominal values for unit coolers proposed in this notice, in lieu of actual unit cooler test data, when calculating AWEF using the mix-match rating method in AHRI 1250. Consistent with this methodology and pending the outcome of the standards rulemaking, DOE is considering modifications to the certification requirements based on the following scheme: (1) a manufacturer that only produces unit coolers for use in a WICF refrigeration system would use the test method described above to establish the WICF refrigeration system rating for each unit cooler (system performance would be established by testing the unit cooler as though it is to be connected to a multiplex system (i.e., using the "Walk-in Unit Cooler Match to Parallel Rack System" test method in AHRI 1250, section 7.9)) – then, the unit cooler manufacturer would certify the compliance of those basic models with the WICF refrigeration system standard; (2) a manufacturer that only produces condensing units would use the test method described above to establish the WICF refrigeration system rating for each condensing unit (system performance would be established by testing each condensing unit and combining it with the unit cooler nominal values (as proposed in this SNOPR)) – then, the condensing unit manufacturer would certify compliance of those basic models with the WICF refrigeration system standard; or (3) a manufacturer that produces both unit cooler basic models and condensing unit basic models that are marketed and sold as a matched system would use the test method in AHRI 1250 to test the unit cooler and the condensing unit as a matched system to get a WICF refrigeration system rating for each matched system it produces and then certify compliance.

Third, DOE proposes the following modifications to the test procedure for WICF refrigeration components:

- Clarifications to the defrost test procedure;
- An alternative method for calculating the defrost energy and heat load of a system with electric defrost in lieu of a frosted coil test;
- A method for calculating defrost energy and heat load of a system with hot gas defrost;
- Change to the minimum fan speed and duty cycle during the off-cycle evaporator fan test;
- Removal of the refrigerant oil and refrigerant composition analysis testing requirements;
- Clarifications and changes to the temperature measurement requirements, intended to reduce testing burden;
- Addition of a test condition tolerance for electrical power frequency and removal the test condition tolerance for temperature of air leaving the unit;
- Quantification of the requirements for insulating refrigerant lines;
- Clarification of piping length requirement;

- Changes to the list of tests for unit coolers in table 15 to achieve consistency with another similar test method; and
- Clarification of voltage imbalance for three-phase power.

Fourth, DOE proposes to modify the current test procedure for measuring the insulation R-value of WICF panels. (10 CFR 431.304) The current DOE test procedure allows, but does not require, panels to be tested with non-foam facers or protective skins attached. (10 CFR 431.304 (b)(5),(6) and (c)(5),(6)) Also, the current DOE test procedure allows panel test samples to be up to 4 inches in thickness. (10 CFR 431.304(b)(5) and (c)(5)) The test procedure requires that the R-value be measured at a mean temperature of 20 degrees Fahrenheit for freezer panels (10 CFR 431.304(b)(3) and (c)(3)) and 55 degrees Fahrenheit for cooler panels (10 CFR 431.304(b)(4) and (c)(4)); however no tolerance is currently specified for these temperatures. In light of recent concerns regarding the accuracy of ASTM C518-04 testing of which DOE had not previously been aware, DOE is proposing to require test samples be 1 inch in thickness and without non-foam facers, protective skins, internal non-foam members or edge regions. DOE is proposing to add flatness and parallelism constraints on the test sample surfaces that contact the hot and cold plates in the heat flow meter apparatus. DOE also proposes to add a tolerance of ±1 degree Fahrenheit for the mean temperature during panel R-value testing because DOE believes this will help ensure that the panel testing is conducted in a repeatable and reproducible manner at different laboratories.

Fifth, to all walk-in manufacturers to make energy use representations DOE is proposing a sampling plan for walk-ins consistent with other commercial equipment regulated under EPCA.

Sixth and finally, in response to manufacturer comments on the September 2013 standards NOPR, DOE is proposing to remove the existing performance-based test procedures for WICF floor and non-floor panels (10 CFR Part 431, Subpart R, Appendix A, sections 4.2, 4.3, 5.1, and 5.2). DOE recognizes that these performance-based procedures for WICF floor and non-floor panels are in addition to the prescriptive requirements established in EPCA for panel insulation R-values and, therefore, may increase the test burden to manufacturers.

All of the changes noted above, along with the appropriate sections of the CFR where these changes will appear, are detailed in the summary table below.

Table II.1 Summary of CFR Changes

Change	10 CFR Section
Allowing manufacturers to use AEDMs to rate WICF refrigeration systems	429.53
Specific instructions for applying AEDMs to WICF refrigeration systems	429.70(f)
Changes to test procedures and prescriptive requirements for WICF foam panel R-value	431.304(b)(3)-(6) and 431.304(c)(3)-(6)
Amendments to AHRI 1250 refrigeration system test method, and the panel and door test methods	431.304(c)(8)
Methods for rating refrigeration components sold separately	431.304(c)(11)
Amendments to performance-based test procedures for energy consumption of envelope components	431 Subpart R, Appendix A

In any rulemaking to amend a test procedure, DOE generally determines to what extent, if any, the proposed test procedure would alter the measured energy efficiency of any covered product as determined under the existing test procedure. (42 U.S.C. 6293(e)(1)) If DOE determines that the amended test procedure would alter the measured efficiency of a covered product, DOE must amend the applicable energy conservation standard accordingly. (42 U.S.C. 6293(e)(2)) DOE has tentatively determined that there are no energy conservation standards in effect that would be significantly impacted by the proposed test procedure amendments. A full discussion follows in section III.E below.

III. Discussion

In response to the May 2012 NOPR, DOE received written comments from 28 interested parties, including manufacturers, trade associations and advocacy groups. Seven additional interested parties commented during the May 2012 NOPR Public Meeting on June 5, 2012. Table II.1 lists the entities that commented on the NOPR and their affiliation. These comments are discussed in more detail below, and the full set of comments, including the public meeting transcript, can be found at:

http://www.regulations.gov/#!docketDetail;dct=FR%252BPR%252BN%252BO%252BSR%252BPS;rpp=25;po=0;D=EERE-2011-BT-TP-0024.

Table III.1: Interested Parties that Commented on the May 2012 NOPR

Name	Acronym	Organization Type
AAON, Inc.	AAON	Manufacturer
The ABB Group	ABB	Manufacturer
Air-Conditioning, Heating, and Refrigeration Institute	AHRI	Industry Trade Group
Appliance Standards Awareness Project & American Council for an Energy-Efficient Economy	Joint Comment	Advocacy Group
Baldor Electric	Baldor Electric	Manufacturer
Bradford White Corporation	Bradford White	Manufacturer
Burnham Commercial	Burnham	Manufacturer
Cooper Power Systems	Cooper	Manufacturer
Crown Boiler Company	Crown Boiler	Manufacturer
CrownTonka / ThermalRite / International Cold Storage	CT/TR/ICS	Manufacturer
Danfoss	Danfoss	Manufacturer
First Co.	First Co.	Manufacturer
Goodman Global, Inc.	Goodman	Manufacturer
Heatcraft Refrigeration Products LLC	Heatcraft Refrigeration	Manufacturer
Hillphoenix, Inc.	Hillphoenix	Manufacturer
Hussmann Corporation	Hussmann	Manufacturer
Ingersoll Rand	Ingersoll Rand	Manufacturer
Johnson Controls, Inc.	JCI	Manufacturer
Lennox International, Inc.	Lennox	Manufacturer
Lochinvar, LLC	Lochinvar	Manufacturer
Mitsubishi Electric	Mitsubishi Electric	Manufacturer
Modine Manufacturing Company	Modine	Manufacturer
Mortex Products, Inc.	Mortex	Manufacturer
National Electrical Manufacturers Association	NEMA	Industry Trade Group
Nidec Motor Corporation	Nidec	Manufacturer
Nordyne, LLC	Nordyne	Manufacturer
Rheem Manufacturing Company	Rheem	Manufacturer
Schneider Electric	SE	Manufacturer
Southern Store Fixtures, Inc.	Southern Store Fixtures	Manufacturer
Trane	Trane	Manufacturer
True Manufacturing Co. Inc.	True Manufacturing	Manufacturer
Unico, Inc.	Unico	Manufacturer
United Cool Air	United Cool Air	Manufacturer
United Technologies Climate, Controls & Security and ITS Carrier	UTC/Carrier	Manufacturer
Zero Zone, Inc.	Zero Zone	Manufacturer

In response to the SNOPR on AEDMs for commercial HVAC, refrigeration and WH equipment, which was published in the **Federal Register** on October 22, 2013, 78 FR 62472, DOE received a comment relevant to this rulemaking from Lennox International, Inc., a manufacturer of HVAC and commercial refrigeration equipment.

The Department also received relevant comments from 23 interested parties in response to the September 2013 Standards NOPR and related NOPR Public Meeting held on October 9, 2013. Table III.2 lists the entities that commented on that NOPR and their affiliation. These comments are discussed in more detail below, and the full set of comments, including the public meeting transcript, can be found at:

http://www.regulations.gov/#!docketDetail;D=EERE-2008-BT-STD-0015

Table III.2 Interested Parties that Commented on the September 2013 Standards NOPR

Name	Acronym	Organization Type
Air Conditioning Contractors of America	ACCA	Industry Trade Group
Air-conditioning, Heating, and Refrigeration Institute	AHRI	Industry Trade Group
American Council for an Energy Efficient Economy	ACEEE	Advocacy Group
American Panel Corp.	American Panel	Manufacturer
Appliance Standards Awareness Project	ASAP	Advocacy Group
Architectural Testing Inc.	AT	
Bally Refrigerated Boxes, Inc.	Bally	Manufacturer
CrownTonka Walk-Ins, ThermalRite & International Cold Storage	CT/TR/ICS	Manufacturer
Danfoss Group North America	Danfoss	Manufacturer
Heatcraft Refrigeration Products LLC	Heatcraft	Manufacturer
Hillphoenix	Hillphoenix	Manufacturer
HussmanCorporation	HussmanCorp	Manufacturer
Imperial Brown	IB	Manufacturer
KysorWarren	Kysor	Manufacturer
Lennox International Inc.	Lennox	Manufacturer
Louisville Cooler Mfg	Louisville Cooler	Manufacturer
Manitowoc	Manitowoc	Manufacturer
National Coil Company	NCC	Manufacturer
Nor-Lake, Inc.	Nor-Lake	Manufacturer
Northwest Energy Efficiency Alliance & The Northwest Power and Conservation Council	NEEA, et al.	Advocacy Group
Pacific Gas & Electric, Southern California Gas, Southern California Edison, San Diego Gas & Electric (Ca. State Independently Owned Utilities)	CA IOU's	Utility
Thermo-Kool	Thermo-Kool	Manufacturer
US Cooler Co.	US Cooler	Manufacturer

A. Alternative Efficiency Determination Method

In the May 2012 NOPR, in which DOE proposed to expand and revise existing AEDM requirements for commercial equipment covered under EPCA, DOE proposed, among other things, to allow the use of AEDMs for WICFs and to establish specific requirements for AEDM validation[1]—i.e., a process in which manufacturers demonstrate the accuracy of an AEDM model—and DOE verification[2]—i.e., a process followed by DOE when verifying the accuracy of an AEDM model—that would apply to this equipment.

Following the publication of the May 2012 NOPR, the Commercial Certification Working Group was formed in April 2013 to discuss and negotiate certification provisions for commercial heating, ventilation, and air conditioner (HVAC), refrigeration, and water heater (WH) equipment. The Working Group expanded the scope of coverage to include AEDMs. As part of its negotiations, the Working Group also developed AEDM validation and verification requirements. These negotiations led to the publication of an SNOPR on October 22, 2013, hereafter referred to as the October 2013 SNOPR, in which DOE proposed for adoption the Working Group's recommendation on AEDMs, basic model definitions, and compliance requirements for commercial HVAC, refrigeration, and water heating equipment. (78 FR 62472) On December 31, 2013, DOE issued a final rule for AEDM usage by manufacturers of these products. See 78 FR 79579. Today's SNOPR proposes to require that the AEDM validation regulations similar to those that apply to commercial HVAC, refrigeration, and WH equipment would also apply to WICF refrigeration systems. DOE is also addressing comments in response to the May 2012 NOPR.

[1] In the May 2012 NOPR, DOE used the term substantiation to refer to the process manufacturers used to prove that their modeling tool, or AEDM, produced accurate results. The Working Group elected to use the term validation, instead of substantiation, for this process. DOE clarifies that substantiation and validation are synonymous and the Department will use the term validation henceforth.

[2] In the May 2012 NOPR, DOE used the term DOE validation to refer to the process DOE used to check that the modeling tool, or AEDM, produced accurate results. The Working Group elected to use the verification, instead of DOE validation, for this process. DOE clarifies that DOE validation and verification are synonymous and the Department will use the term verification henceforth.

1. Applicable Equipment

In the May 2012 NOPR, DOE proposed to allow the use of AEDMs for WICFs, but limited the proposal to apply only to WICF refrigeration systems. DOE explained that WICF refrigeration systems are low-volume and custom-made for the specific installation and could be accurately rated using a computer simulation to predict their behavior under DOE test conditions. DOE did not propose to permit a similar option when rating other WICF components. WICF panels are relatively simple pieces of equipment and the test results from a basic model of a given panel can be extrapolated to many other panel basic models under the provisions of the test procedure. As for WICF doors, the DOE test procedure already specifies the use of certain modeling techniques that are approved by the National Fenestration Rating Council (NFRC), which, in DOE's view, makes a parallel AEDM provision for these components unnecessary. 77 FR at 32041.

Heatcraft and CT/TR/ICS supported this aspect of the proposal. (Heatcraft, No. 0049 at p. 2; CT/TR/ICS, No.0035 at p. 1) In addition, in response to the October 2013 SNOPR, DOE received a comment from Lennox recommending that DOE allow walk-in manufacturers to use AEDMs when rating their equipment. (Lennox, No. 0080 at p.4) DOE also received AEDM-related comments in response to the September 2013 standards NOPR. 78 FR 55781. AHRI, Bally, and ACEEE generally recommended that DOE include AEDM provisions for WICFs. ([Docket No. EERE-2008-BT-STD-0015]; AHRI, No. 114 at p. 4; AHRI, Public Meeting Transcript, No. 88 at p. 58; Bally, No. 102 at p. 3; ACEEE, Public Meeting Transcript, No. 88 at p. 87) In addition to its comment from the commercial HVAC, refrigeration and WH rulemaking, Lennox commented in the standards rulemaking that permitting walk-in refrigeration system manufacturers to use AEDMs would reduce the test burden faced by these manufacturers, particularly given the number of possible unit cooler and condenser combinations. ([Docket No. EERE-2008-BT-STD-0015], Lennox, No. 109 at p. 4) During the same rulemaking, Hillphoenix, KeepRite, and NEEA, et al. commented that permitting panel manufacturers to use AEDMs for panel certification would reduce their test burden as well. ([Docket No. EERE-2008-BT-STD-0015]; Hillphoenix, No. 107 at p.3; KeepRite, No. 105 at p. 2; NEEA et al, No. 101 at p. 2)

In today's notice, DOE proposes as a modification of its earlier May 2012 NOPR to allow WICF refrigeration system manufacturers to use AEDMs when rating the performance of this equipment. DOE is not extending this allowance to WICF panel manufacturers for the reasons described above, but is, instead, proposing other modifications to the walk-in panel test procedure to reduce the burden faced by panel manufacturers while ensuring the overall accuracy of the efficiency ratings. The proposed modifications to the WICF panel test procedure are outlined in section III. C.

2. Validation

a. Number of Tested Units Required for Validation

In the May 2012 NOPR, DOE proposed a number of validation requirements that would apply to walk-in refrigeration systems. DOE proposed that validating an AEDM would require a manufacturer to test a minimum of five basic models, including at least one basic model from each product class to which the AEDM will be applied. As part of these tests, the manufacturer would be required to test the smallest and largest capacity basic models from the product class with the highest sales volume. Additionally, the manufacturer would also need to test the basic model with the highest sales volume from the previous year or, for newly introduced basic models, the basic model which is expected to have the highest sales volume. Finally, all validation test data would need to meet the applicable Federal energy conservation standards and applicable DOE testing procedures. 77 FR 32044-32045.

Commenters responding to that proposal provided general comments, with none specifically relating to walk-ins. AHRI commented that it was unrealistic for a manufacturer who produces fewer than five models to be required to validate an AEDM based on a minimum sample of five units. (AHRI, Public Meeting Transcript, No. 69 at p. 154) Furthermore, AHRI stated that it is disproportionately burdensome to require testing at least five basic models for small manufacturers who manufacture or plan to use an AEDM for only a few basic models compared to manufacturers who offer many basic models and many product classes. AHRI recommended that DOE require testing of only three basic models if the AEDM applies only to 15 or fewer basic models. (AHRI No. 61 at p. 3)

Acknowledging how much work and testing validation of an AEDM requires, Zero Zone noted that it would be difficult for small manufacturers to comply with the proposed requirements and would represent a large amount of work since testing is so complex. Zero Zone recommended that small manufacturers either be exempt from the proposed requirements or have a different sample size requirement to meet. (Zero Zone, Public Meeting Transcript, No. 69 at p. 65) Zero Zone and Hillphoenix agreed with DOE's proposal to require testing of at least one unit from each applicable product class and did not offer comment regarding the assigned product classes. (Zero Zone, No. 64 at p. 1; Hillphoenix, No. 48 at p. 1)

Hillphoenix supported DOE's proposals for the selection requirements of basic models used to validate an AEDM. (Hillphoenix, No. 48 at p. 2) Heatcraft disagreed with DOE's proposed approach, stating that the requirement to test the smallest and largest capacity basic models from the highest sales volume product class is overly burdensome due to the wide range of equipment capacity. (Heatcraft, No. 49 at p. 3) Heatcraft also disagreed with DOE's proposal to require manufacturers to test the highest sales volume basic model because it will not improve the accuracy of the AEDM and because the low-volume, built-to-order nature of WICF equipment will cause sales volumes to constantly shift. (Heatcraft, No. 49 at p. 4)

The Working Group recommended, and DOE adopted, an AEDM validation method for commercial HVAC, refrigeration, and WH equipment that differed from the Department's May 2012 validation proposal. The Working Group proposed to validate an AEDM for commercial HVAC, refrigeration, and WH equipment, a manufacturer must select a minimum number of models from each validation class to which the AEDM is going to apply. (Validation classes are groupings of products based on equipment classes but used for AEDM validation). The Department proposes to extend this concept to WICF refrigeration systems and proposes the validation classes listed in Table III.3. A unit of each basic model selected must undergo a single test conducted in accordance with the DOE test procedure (or, if applicable, a test procedure waiver issued by DOE) at a manufacturer's testing facility or a third-party testing facility. The test result must be directly compared to the result from the AEDM to determine the

AEDM's validity. A manufacturer may develop multiple AEDMs per validation class and each AEDM may span multiple validation classes; however, the minimum number of tests must be maintained per validation class for every AEDM a manufacturer chooses to develop. An AEDM may be applied to any model within the applicable validation classes at the manufacturer's discretion. All documentation of test results for these models, the AEDM results, and subsequent comparisons to the AEDM would be maintained as part of both the test data underlying the certified rating and the AEDM validation package pursuant to 10 CFR 429.71.

Table III.3 Validation Classes

Validation Class	**Minimum Number of Distinct Models that Must be Tested**
Dedicated Condensing, Medium Temperature, Indoor System	2 Basic Models
Dedicated Condensing, Medium Temperature, Outdoor System	2 Basic Models
Dedicated Condensing, Low Temperature, Indoor System	2 Basic Models
Dedicated Condensing, Low Temperature, Outdoor System	2 Basic Models
Unit Cooler connected to a Multiplex Condensing Unit, Medium Temperature	2 Basic Models
Unit Cooler connected to a Multiplex Condensing Unit, Low Temperature	2 Basic Models
Medium Temperature, Indoor Condensing Unit	2 Basic Models
Medium Temperature, Outdoor Condensing Unit	2 Basic Models
Low Temperature, Indoor Condensing Unit	2 Basic Models
Low Temperature, Outdoor Condensing Unit	2 Basic Models

In order to align with the validation requirements for commercial HVAC, refrigeration, and WH equipment, DOE proposes to adopt the validation approach shown above, which mirrors the approach recommended by the Working Group. In DOE's view, the Working Group's method addresses AHRI's concerns regarding manufacturers that produce a limited number of equipment models. This proposal, if adopted, will also reduce the amount of testing burden noted by Zero Zone. Additionally, today's proposal would not require that a manufacturer test the highest sales volume product, a concern raised by Heatcraft. DOE requests comment on the proposed AEDM validation approach as applied to walk-in refrigeration systems.

b. Tolerances for Validation

In the May 2012 NOPR, DOE proposed to adopt two tolerances that would be applied when validating a WICF refrigeration AEDM. One tolerance would be between the results from a test of a single basic model and the AEDM output for that basic model (i.e., an individual tolerance). A second tolerance would be applied between the average of the test results from all tested basic models and the average of the AEDM outputs for those tested basic models (i.e., an overall average tolerance). 77 FR at 32055-32056. DOE received one comment on this aspect of its proposal. Heatcraft commented that the average tolerance provides no added benefit because it does not necessarily encourage smaller product variation. (Heatcraft, No. 49 at p. 3)

DOE also proposed that both tolerances would apply on both sides of the AEDM output. 77 FR at 32055-32056. That is, a tolerance would be applied regardless of whether the test result indicated that the equipment was more efficient or more consumptive than the AEDM output for the purposes of validation. DOE received a number of comments regarding two-sided tolerances, but none specific to AEDMs for WICFs. Rheem and Hussmann stated that DOE's tolerances should be one-sided, with Hussmann recommending that DOE allow manufacturers to rate equipment conservatively using an AEDM. (Rheem, No. 59 at p. 3; Hussmann, No. 57 at p. 2) JCI also stated that tolerances should be one-sided, and there should be no requirement for re-validation if a manufacturer has conservative ratings. (JCI, No. 66 at p. 6) AAON, Trane, and ACEEE also supported one-sided tolerances and an approach that would allow manufacturers to rate conservatively. (AAON, Public Meeting Transcript, No. 69 at pp. 88 and 212; Trane, Public Meeting Transcript, No. 69 at p. 90; ACEEE, Public Meeting Transcript, No. 69 at p. 90) AAON urged DOE to eliminate one side of the 5 percent tolerance and not penalize manufacturers whose basic models, when tested, achieve a higher rating than that predicted by an AEDM because allowing manufacturers to conservatively predict a basic model's performance would simplify the process and give manufacturers incentives to improve AEDMs and manufacturing processes over time so that they could rate their equipment as efficiently as possible. In AAON's view, this approach would not prevent a manufacturer who might be inclined to calibrate their models more conservatively from using its AEDM. (AAON, No. 40 at p. 5)

Not all manufacturers, however, recommended that DOE remove the conservative tolerance. Instead of completely removing it, AHRI suggested that the conservative tolerance should be increased to 10 percent so that manufacturers can design AEDMs that provide conservative ratings. (AHRI, No. 61 at p. 5) Cooper, on the other hand, stated that tolerances should be two-sided because manufacturers must demonstrate that an AEDM's output is accurate and repeatable. (Cooper, No. 43 at p. 3)

In the NOPR, DOE proposed to set consistent tolerance levels for all products covered under AEDM requirements, except for motors and small electric motors. 77 FR at 32055-32056. DOE proposed a ±5% tolerance on the individual AEDM results as compared to the tested results and a ±3% tolerance on the average of the AEDM outputs as compared to the average tested results. Regarding WICF refrigeration equipment, commenters generally agreed there will be variation in the results from testing, but commenters differed in their suggested tolerance levels. Heatcraft, Zero Zone, Hussmann, and True Manufacturing all commented that the proposed 5 percent tolerance was too tight. (Heatcraft, No. 49 at p. 3; Zero Zone, No. 64 at p. 2;

Hussmann, No. 57 at p. 2; True, Public Meeting Transcript, No. 69 at p. 86) Zero Zone recommended a tolerance of 8 percent. (Zero Zone, No. 64 at p. 2) Heatcraft, Hussmann and True Manufacturing identified expected test variations of 10 percent, 11 percent, and 8 percent respectively but did not suggest a tolerance for AEDM validation. (Heatcraft, No. 49 at p. 3; Hussmann, No. 57 at p. 2; True, Public Meeting Transcript, No. 69 at p. 86) Heatcraft suggested that DOE should work with manufacturers to determine the appropriate tolerance based on the expected variations. (Heatcraft, No. 49 at p. 3) CT/TR/ICS disagreed with these parties, stating that the 5 percent tolerance was acceptable so long as testing was conducted with the typical electric utility tolerance of 10 percent. (CT/TR/ICS, No. 35 at p. 1)

The Working Group recommended that for energy efficiency metrics, the AEDM results for a model must be less than or equal to 105 percent of the tested results for that same model. DOE adopted this approach for commercial HVAC, refrigeration, and WH equipment in the December 31, 2013 Final Rule and proposes to use it for WICF refrigeration systems in today's notice to align DOE's AEDM validation requirements for walk-ins with these other types of commercial equipment that are refrigerant-based systems. This approach would eliminate both the tolerance on the average of the AEDM results and two-sided tolerances. DOE requests comments on the proposed tolerances on the AEDM results as compared to the tested results for a given basic model.

3. Certified Rating

For each basic model of commercial HVAC, WH, and refrigeration equipment distributed in U.S. commerce, manufacturers must determine the certified rating based on testing or use of a validated AEDM. DOE's current regulations provide manufacturers with some flexibility in rating each basic model by allowing the manufacturer the discretion to rate conservatively. For energy efficiency metrics, each model's certified rating must be less than or equal to the model's AEDM result and greater than or equal to the applicable Federal standard. DOE proposes to adopt these requirements for WICF refrigeration equipment rated with AEDMs.

4. Verification

DOE may randomly select and test a single unit of a basic model pursuant to 10 CFR 429.104, which extends to all DOE covered products, including those certified using an AEDM. In the May 2012 NOPR, DOE proposed a method for determining whether those products certified using an AEDM fail to meet federal energy conservation standards and/or fail to meet their certified rating, as well as actions that DOE would take in response to either outcome. 77 FR at 32056.

a. Failure to meet a certified rating

In the May 2012 NOPR, DOE proposed to require that the assessment test result would be compared to the certified rating for a model to determine if a model met its certified rating. If the test result fell outside of the proposed tolerance, the model would not meet its certified rating. In this case, DOE proposed to require that manufacturers re-validate the AEDM that was used to certify the product within 30 days of receiving the test report from DOE. Furthermore, DOE also proposed to require that manufacturers incorporate the test data obtained by the Department for that model into the re-validation of the AEDM. If, after inclusion of DOE's test data and re-validation, the AEDM-certified ratings change for any models, the manufacturer would be required to re-rate and re-certify those models. The manufacturer would not be required to perform additional testing in this re-validation process unless the manufacturer finds it necessary in order to meet the requirements enumerated in the proposed 10 CFR 429.70 (e.g., number of tested units; proposed tolerances; etc.). 77 FR 32056.

A few stakeholders commented on these proposals. Zero Zone commented that the failure of one unit to meet its certified rating should not automatically necessitate re-validation. It suggested that the manufacturer should decide on the appropriate course of action. (Zero Zone, No. 64 at p.3) Lennox further noted that although DOE should use independent, third-party labs for testing, using these entities does not ensure accuracy because third-party labs may not be as familiar with specialized commercial equipment. (Lennox, No. 47 at p. 3)

DOE acknowledges these comments regarding how potential AEDM mis-rating situations should be addressed. First, DOE proposes to assess a unit's performance through third party testing. Under this approach, DOE would begin the verification process by selecting a single unit of a given basic model for testing either from retail or by obtaining a sample from the manufacturer. DOE will select a third-party testing laboratory at its discretion to test the unit selected unless there are cases where there is not a third-party laboratory capable of testing the equipment, in which case DOE may request testing at a manufacturer's facility. The Department will be responsible for the logistics of arranging the testing, and the laboratory is not allowed to communicate directly with the manufacturer. At no time may the test facility discuss DOE verification testing with the manufacturer without the Department present.

If a unit is tested and determined to be outside the rating tolerances described in section I.C.4, DOE will notify the manufacturer. The manufacturer will receive all documentation related to the test set up, test conditions, and test results for the unit if the unit falls outside the rating tolerances. At that time, a manufacturer may present all claims regarding any issues directly with the Department. DOE requests comment on this proposal. The Department notes that 10 CFR 429.13(b) applies to equipment certified using an AEDM, and DOE may require a manufacturer to conduct additional testing if the manufacturer has been found to be in violation of an applicable standard or certification requirement.

b. Action Following Enforcement Testing: Determination of Noncompliance

In the May 2012 NOPR, DOE explained that if a model failed to meet the applicable federal energy conservation standard during assessment testing, DOE may pursue enforcement testing pursuant to 10 CFR 429.110. DOE also stated that, after enforcement testing, if a model were determined to be noncompliant, then all other models within that basic model would be considered noncompliant. This is consistent with DOE's approach for all covered products. All other basic models rated with the AEDM would be considered compliant pending additional investigation. Furthermore, DOE proposed that in a case where the noncompliant model was used for validation of an AEDM, then the AEDM must be re-validated within 30 days of notification, pursuant to the proposed requirements described in section III. A. 2. DOE did not propose requiring a manufacturer re-test basic models that were tested previously for validation if DOE has not determined those models to be noncompliant. 77 FR at 32056. DOE received a general comment related to this proposal, but no comments specific to noncompliance determinations for WICF refrigeration equipment. JCI agreed that all AEDM-rated models should not be disqualified if one model is found out of compliance. (JCI, No. 66 at p. 9) Furthermore, JCI stated that without additional information as to why a particular product failed a test, it is not reasonable to arbitrarily assume that all models rated with the AEDM must be re-rated. (JCI, No. 66 at p. 9, 10)

After considering the comment received regarding DOE's proposed response to a finding of noncompliance, DOE has decided to eliminate the proposal to require re-validation of the AEDM if the noncompliant model was used to validate the AEDM. Instead, the Department proposes that the underlying principle that each AEDM must be supported by test data obtained from physical tests of current models will control. Because a noncompliant model may not be distributed in commerce, the manufacturer will need to ensure that the AEDM continues to satisfy the proposed validation requirements described in section III. A. 2. Additional testing would not be necessary unless the noncompliant product was used to satisfy those AEDM validation requirements. Pursuant to this requirement, should the re-validation result in a change in the ratings of products certified using the AEDM, those products must be re-rated and re-certified. DOE is not proposing to require re-testing of products that were not determined noncompliant by DOE.

5. Re-validation

a. Change in Standards or Test Procedures

DOE proposed in the May 2012 NOPR to require that manufacturers who use an AEDM to certify their products re-validate the AEDM upon publication of an amended test procedure or standard for the AEDM-rated product. 77 FR at 32056. DOE proposed this requirement to account for potential changes to the AEDM as well as to ensure that the AEDM continues to be based upon test data derived from the applicable DOE test procedure and models that meet the current standards. DOE identified the issuance of a new test procedure or a standard as likely to necessitate changes to the AEDM, either because a change in a test procedure may affect the tested values of the products used to validate the AEDM or because a change in a standard may require additional testing using models that meet the new standard or may force manufacturers to implement new technologies that are not covered by their current AEDM. DOE did not propose a periodic re-validation requirement in light of the potential testing burden involved.

Among the comments received, a large majority of stakeholders suggested that a change in standards or test procedures should not automatically trigger AEDM re-validation, emphasizing that it may only be necessary in the case of a significant change in the regulations. (UTC/Carrier, No. 56 at p. 3; JCI, No. 66 at p. 10; NEMA, No. 44 at p. 5, 18, 19; Lennox, No. 46 at p. 6; AHRI, No. 61 at p. 7) Baldor Electric, Zero Zone, ABB, First Co., Goodman, Heatcraft Refrigeration, and Schneider Electric all argued that re-validation would not be necessary in a case of a change in a test procedure. (Baldor Electric, Public Meeting Transcript, No. 69 at p. 132-34; Zero Zone, No. 64 at p. 4; ABB, No. 39 at p. 3; First Co., No. 45 at p. 3; Goodman, No. 53 at p. 3; Heatcraft Refrigeration, No. 49 at p. 5; SE, No. 41 at p. 12) According to Goodman, AAON, Zero Zone, Ingersoll Rand, and Baldor Electric, re-validation would also not be necessary if there is a change in a prescribed minimum energy efficiency standard. (Goodman, No. 53 at p. 3; Zero Zone, No. 64 at p. 4; Ingersoll Rand, Public Meeting Transcript, No. 69 at p. 134; AAON, No. 40 at p. 7; Baldor Electric, Public Meeting Transcript, No. 69 at p. 132-34)

NEMA echoed this view and explained that when an efficiency standard changes, it is possible that the determined energy consumption of basic models might still be higher than the new standard, and more testing would not be necessary. (NEMA, No. 44 at p.5, 18, 19)

Several stakeholders outlined specific circumstances that would necessitate re-validation due to a change in a standard or test procedure. AHRI and Hillphoenix stated that re-validation should only be required when a change in a test procedure is significant enough to result in a product having a different rated energy consumption or efficiency. (AHRI, Public Meeting Transcript, No. 69 at p. 238-39; Hillphoenix, No. 48 at p. 2) Nordyne, Rheem, Lennox, and CT/TR/ICS added that re-validation should be required if a change in a DOE test procedure has an effect on simulated ratings of an AEDM. (Nordyne, No. 55 at p. 3; Rheem, No. 59 at p. 5; Lennox, No. 46 at p. 6; CT/TR/ICS, No. 35 at p. 2) ABB and Unico commented that re-validation may be necessary when a new federal standard is high enough that the basic models used for validation can no longer meet the minimum standard. (ABB, No. 39 at p. 3; Unico, No. 54 at p. 5) Baldor Electric agreed, stating that unless there is a significant change in technology or a test standard, a manufacturer should not have to re-validate its AEDM. (Baldor Electric, Public Meeting Transcript, No. 69 at pp.132-34) NEMA suggested that DOE consider the necessity for re-validation on a case-by-case basis, and specifically address and solicit public comment on whether re-validation of an AEDM is needed as a result of changes in a test procedure at the time when DOE proposes to adopt the change in the test procedure. (NEMA, No. 44 at p. 20)

Many manufacturers advocated that re-validation should instead depend on significant changes to the technology of basic models, including changes to the components. (Goodman, No. 53 at p. 3; First Co., No. 45 at p. 3; Rheem, No. 59 at p. 5; Nordyne, No. 55 at p. 3; Unico, No. 54 at p. 3; SE, No. 41 at p. 12) Additionally, Baldor Electric and Ingersoll Rand pointed out during the public meeting that a change in technology should be an important factor in evaluating when re-validation may be necessary, with Ingersoll Rand adding that if there were no change in technology it is unclear why a change in standards would disqualify an AEDM. (Baldor Electric, Public Meeting Transcript, No. 69 at pp.132-134; Ingersoll Rand, Public Meeting Transcript, No. 69 at p. 137) Schneider Electric specified that manufacturers should revise and re-validate their AEDMs whenever they introduce new products, processes or materials, and that any changes to the AEDM itself should necessitate re-validation. (Schneider Electric, No. 41 at pp. 10 and 12)

DOE agrees with manufacturers' assertions that re-validation should depend on the nature of the regulatory change involved because not every change to the standard or test procedure would necessarily affect a product's energy consumption and/or efficiency or an AEDM's output. DOE also agrees with NEMA that the requirement to re-validate should be determined on a case-by-case basis. Therefore, DOE is not proposing to require re-validation every time the test procedure or standard changes.

However, should DOE believe that re-validation is necessary pursuant to a final rule standard or test procedure, DOE will propose this step in the NOPR for that standard or test procedure rulemaking to allow stakeholders to provide comment.

b. Re-validation Using Active Models

DOE is concerned that an AEDM's accuracy may be compromised if the models that are used to validate it become obsolete. To address this issue, DOE proposed to require manufacturers to re-validate their AEDMs if one of the basic models used for validation is no longer in production or if it becomes obsolete. 77 FR at 32056. DOE requested comment on this proposed approach.

The majority of commenters on this topic disagreed with DOE's proposal, stating that once an AEDM is validated, it is valid regardless of whether one of the basic models used for its validation is discontinued. Stakeholders further asserted that discontinuance of a basic model does not necessarily indicate a change in technology; therefore, it should not automatically invalidate the AEDM, and re-validation of the AEDM should not be required. (United Cool Air, No. 51 at p. 10; First Co., No. 45 at p. 3; Lennox, No. 46 at p. 6; Unico, No. 54 at p. 3; Ingersoll Rand, Public Meeting Transcript, No. 69 at p. 134; JCI, No. 66 at p. 10) UTC/Carrier recommended that inactive models should be allowed for re-validation as long as they use the same technology as the products currently in production and meet the minimum energy efficiency standards. (UTC/Carrier, No. 56 at p. 3) AAON further added that if the product was current at the time the test was performed, test data should remain valid for re-validation for at least five years after a unit becomes obsolete. (AAON, No. 40 at p. 7) JCI pointed out that continuous re-validation due to elimination of some models would create an unstable environment for new product development. (JCI, No. 66 at p. 10) According to Rheem, AHRI and Zero Zone, the decision regarding when re-validation is necessary should be left to the manufacturer. (Rheem, No. 59 at p. 5; AHRI, No. 61 at p. 9; Zero Zone, No. 64 at p. 4) Only Schneider Electric agreed with DOE's proposal that AEDMs must be re-validated only with active models. (SE, No. 41 at p. 12)

While DOE appreciates manufacturers' concerns regarding the additional testing burden and possible turnover of AEDM models imposed by this requirement, DOE continues to have concerns regarding the accuracy of an AEDM based on data from obsolete models. Thus, DOE is retaining the proposal to require re-validation of an AEDM if a basic model used for its validation is discontinued or becomes obsolete. DOE believes that this requirement will ensure that AEDMs continue to produce accurate ratings, without imposing a significant testing burden on manufacturers.

DOE notes that under its proposal, manufacturers may continue to test their models beyond the minimum validation requirements as a means to affirm an AEDM's validity. As long as the manufacturer has sufficient test data underlying the AEDM to meet the validation requirements at all times, additional testing for re-validation would not be required by DOE. In other words, a manufacturer may continue to use data from an obsolete or discontinued model to internally validate an AEDM or as an input to its algorithms. However, the manufacturer must meet the minimum validation requirements with test data from active models.

c. Time Allowed for Re-validation

In the NOPR, DOE proposed that, should a manufacturer be required to re-validate an AEDM for any reason, it must complete the re-validation process and re-rate and re-certify basic models as necessary within 30 days. The requirement to re-validate may be a result of a change in federal standards, a change in the applicable test procedure, the basic model used to validate the AEDM becoming inactive or found to be noncompliant with standards, or the failure of a basic model to meet its certified rating during assessment or enforcement testing. DOE proposed that if a manufacturer failed to re-validate the AEDM and to re-rate and re-certify any models as necessary within 30 days, then the AEDM and all certifications made using the AEDM would be considered invalid. 77 FR at 32056.

A large majority of interested parties stated that 30 days is insufficient to perform the additional testing required for re-validation of an AEDM and suggested extending the proposed time limit. Sixty days was proposed as a more appropriate timeframe by Goodman and Schneider Electric; 180 days by AAON and UTC/Carrier; and 90 to 120 days by the remaining twelve stakeholders. (Bradford White, No. 38 at p. 1; ABB, No. 39 at p. 3; AAON, No. 40 at p. 6; Modine, No. 42 at p. 4; Lennox, No. 47 at p. 3; Heatcraft Refrigeration, No. 49 at p.4; Zero Zone, No. 64 at p. 3; Goodman, No. 53 at p. 3; SE, No. 41 at p.11; UTC/Carrier, No. 56 at p.3; NEMA, No. 44 at p. 18; Hillphoenix, No. 48 at p. 2; Unico, No. 54 at p. 4; Rheem, No. 59 at p. 4; AHRI, No. 61 at pp. 6-7) Zero Zone suggested that a time limit of 18 to 36 months would be an appropriate time to update an AEDM in case of a change in a standard or a test procedure. (Zero Zone, No. 64 at p. 4) Schneider Electric stated that 30 days after an AEDM’s revision would be sufficient to re-evaluate and re-certify products in distribution. However, it added that if a manufacturer’s products are not in distribution at the time, the manufacturer should be allowed 180 days to re-evaluate and re-certify them. (Schneider Electric, No. 41 at p. 11)

After considering these suggestions, DOE is declining to propose a time limit to re-validate an AEDM. The AEDM must satisfy the fundamental requirement for validating an AEDM at all times.

B. Refrigeration Test Procedure

During DOE's rulemaking to establish test procedures for WICF equipment, which resulted in a final rule published on April 15, 2011 ("April 2011 test procedure final rule;" 76 FR 21580), interested parties supported DOE's approach to use AHRI 1250 (I–P)-2009, ''2009 Standard for Performance Rating of Walk-In Coolers and Freezers'' ("AHRI 1250"), for WICF refrigeration testing. AHRI 1250 is an industry-developed testing protocol used to measure walk-in efficiency. However, DOE is proposing to add certain modifications to AHRI 1250. These modifications are designed to either clarify certain steps in AHRI 1250 or reduce the testing burden of manufacturers while ensuring that accurate measurements are obtained.

1. Rating of Refrigeration Components

The AHRI 1250 test procedure incorporated into DOE's regulations applies to unit coolers and condensing units tested and sold together as a matched system, "mix-matched" unit coolers and condensing units (i.e., unit coolers and condensing units tested separately, with a system rating determined using a calculation methodology), and unit coolers connected to compressor racks or multiplex condensing systems. It also describes the methods for measuring the refrigeration capacity, on-cycle electrical energy consumption, off-cycle fan energy, and defrost energy. Standard test conditions, which differ for indoor and outdoor locations and for coolers and freezers, are also specified. The test procedure includes a calculation methodology to compute an annual walk-in energy factor (AWEF), which is the ratio of heat removed from the envelope to the total energy input of the refrigeration system over a year. AWEF is measured in Btu/W-h and measures the efficiency of a refrigeration system, meaning the unit cooler and condenser combination.

In response to the September 2013 standards NOPR, the Department received a number of comments regarding the potential certification problems related to establishing an efficiency metric for WICF refrigeration systems. Some stakeholders commented that a single metric would be difficult to enforce given the walk-in market structure, and observed that creating separate metrics for each component of the refrigeration system (i.e. the unit cooler and condenser unit) would allow manufacturers to certify equipment performance. ASAP expressed concern that treating the complete refrigeration system as a "component" could lead to a standard with a high rate of non-compliance. ASAP also commented that separate standards for unit coolers and remote condensing units would be more practical [than a single standard], since the proposed standard resulted in a lack of clarity for manufacturers producing only unit coolers, only condensing units, or mix-match systems; however, such an approach could allow manufacturers of components to circumvent the standard by claiming their product was not designed for use in walk-ins, and that DOE should ensure the definition of “covered equipment” does not create this loophole. ([Docket No. EERE-2008-BT-STD-0015]; ASAP, No. 113 at p. 1-3) NCC stated that standards based on the combined refrigeration system would rely on the contractors or designers to comply with the standard and would make DOE enforcement difficult. ([Docket No. EERE-2008-BT-STD-0015]; NCC, No. 96 at p. 2) NCC commented that original equipment manufacturers of unit coolers and condensing units who sell these components separately do not have control over how their components are matched with others to form a mix-match refrigeration system. As a result, in its view, design consultants and contractors would have to be relied upon for certifying the AWEF of a system comprised of components from two different manufacturers, making this proposed approach unenforceable due to the large number of design consultants and contractors as compared to the relatively small number of refrigeration manufacturers. In light of these concerns, NCC recommended DOE set energy efficiency standards for condensing units and unit coolers separately. ([Docket No. EERE-2008-BT-STD-0015]; NCC, No 96 at p. 2) CA IOUs also suggested that DOE enforce separate standards for unit coolers and condensing units. ([Docket No. EERE-2008-BT-STD-0015]; CA IOUs, Public Meeting Transcript, No. 88 at p. 385) Bally agreed that separate standards for condensers and evaporators were more practical than a combined standard for the refrigeration system. ([Docket No. EERE-2008-BT-STD-0015]; Bally, No. 102 at p. 3) AHRI stated that often, the unit cooler and condensing unit are purchased independently and was concerned about treating the refrigeration system as a single component. ([Docket No. EERE-2008-BT-STD-0015]; AHRI, Public Meeting Transcript, No. 88 at p. 42)) Keeprite agreed that that since evaporators and condensing units are often sold or distributed independently of each other, and with no knowledge of how the consumer would pair them, separate standards for each component would be more practical than a system standard. ([Docket No. EERE-2008-BT-STD-0015]; Keeprite, No. 105 at p. 1)

Other manufacturers described the potential burden created by having a single metric. AHRI commented that since walk-ins are often custom-designed, it would be impossible for manufacturers to accurately estimate the number of possible refrigeration system configurations that could potentially include any given combination of condensing unit/unit cooler options. ([Docket No. EERE-2008-BT-STD-0015]; AHRI, No. 114 at p.3) Heatcraft also remarked that unit coolers and condensing units should be treated separately because of the infinite number of possible combinations. ([Docket No. EERE-2008-BT-STD-0015]; Heatcraft, Public Meeting Transcript, No. 88 at p. 41) American Panel noted that manufacturers can easily determine the efficiency of a paired condenser and evaporator if the two components were made by the same company and sold together, but given the number of different combinations of condensers and evaporators sold by a manufacturer, that manufacturer could be required to test or rate a thousand different systems to be able to certify all their possible combinations. ([Docket No. EERE-2008-BT-STD-0015]; American Panel, Public Meeting Transcript, No. 88 at pp. 48 and 105) Manitowoc commented that requiring that manufacturers test matched refrigeration systems was not feasible because manufacturers of condensing units did not manufacture evaporators and vice versa; additionally, this approach would result in an infinite number of combinations. Manitowoc supported the idea of setting separate standards for condensing units and unit coolers, but noted that without an AEDM in place, these component level standards would still result in undue financial burden for manufacturers. ([Docket No. EERE-2008-BT-STD-0015]; Manitowoc, No. 108 at pp. 1 and 2)

Commenters also noted that separate metrics for the unit cooler and condenser unit would simplify the testing and certification process. Lennox commented that regulating the condensing unit and unit cooler at the component, rather than system, level would greatly simplify manufacturer testing. ([Docket No. EERE-2008-BT-STD-0015]; Lennox, No. 109 at p.6) CA IOUs stated that DOE should consider splitting the refrigeration standard into condensing unit and unit cooler standards to simplify the certification process for assemblers and suggested that DOE provide a voluntary mix/match standard level. ([Docket No. EERE-2008-BT-STD-0015]; CA IOUs, Public Meeting Transcript, No. 88 at p. 56) The CA IOUs also suggested that the test procedure be modified to require the testing of matching systems only for "self-contained" units. ([Docket No. EERE-2008-BT-STD-0015]; CA IOUs, No. 110 at p. 2) ASAP supported the component level approach because a refrigeration system is not necessarily sold by a single manufacturer. ([Docket No. EERE-2008-BT-STD-0015]; ASAP, Public Meeting Transcript, No. 88 at p. 46) US Cooler supported a component level approach for refrigeration equipment because, in its view, the approach would give manufacturers more flexibility to meet the requirements since components would be certified individually and could be put together to determine the system's energy consumption. ([Docket No. EERE-2008-BT-STD-0015]; US Cooler, Public Meeting Transcript, No. 88 at p. 51) NEEA et al. also recommended that individual refrigeration system components, including all unit coolers and dedicated condensing units, should be rated and certified. ([Docket No. EERE-2008-BT-STD-0015]; NEEA et al., No. 101 at p.3)

Not all commenters, however, supported the refrigeration system component level approach. ACCA noted that it would be easier to enforce a standard for a matched system. ([Docket No. EERE-2008-BT-STD-0015]; ACCA, Public Meeting Transcript, No. 88 at p. 47) Louisville Cooler commented that certifying at a component level would discourage manufacturers from making system improvements in order to avoid repeating the certification process. ([Docket No. EERE-2008-BT-STD-0015]; Louisville Cooler, Public Meeting Transcript, No. 88 at p. 50) Danfoss mentioned that refrigeration components are themselves composites of other components and sub-components such as compressors, valves, controls, etc. Danfoss commented that requiring separate certification of condensing units, unit coolers, and other sub-components such as valves was a logical step, but was concerned that pushing the regulation down to the component level would be difficult to manage and DOE would lose the opportunity to pursue system level performance improvements. Danfoss suggested a non-regulatory approach to raise system level efficiency. Danfoss further pointed out that certified condensing units and evaporators must still be properly matched and, currently, no particular entity controls is responsible for this task. ([Docket No. EERE-2008-BT-STD-0015]; Danfoss, Public Meeting Transcript, No. 88 at pp. 32, 45 and 57)

Commenters offered suggestions as to how the Department could regulate refrigeration components separately. Hussmann supported separate standards for WICF refrigeration condensing units and unit coolers and stated that AHRI should update the WICF refrigeration test procedure, AHRI 1250, to include a methodology to obtain separate AWEFs. ([Docket No. EERE-2008-BT-STD-0015]; Hussmann, No. 93 at pp. 1 and 3) NEEA, et al. commented that if unit coolers and condensing units were rated and certified separately, walk-in providers would have more flexibility to select components that best meet customer needs. The group also suggested that DOE utilize the mix-match testing option in AHRI 1250 to facilitate component-level standards ([Docket No. EERE-2008-BT-STD-0015]; NEEA, No. 101 at p. 3) ACEEE suggested DOE use an AEDM approach for separate certification of condensers and unit coolers. ACEEE suggested that a simple software tool could provide allowable versus forbidden matches with respect to size matching and other characteristics but did not suggest any specific software tools currently on the market. ([Docket No. EERE-2008-BT-STD-0015]; ACEEE, Public

Meeting Transcript, No. 88 at p. 43) Louisville Cooler suggested that given an evaporator rating, DOE could establish a plus-or-minus [capacity] range to match it with a particular compressor. ([Docket No. EERE-2008-BT-STD-0015]; Louisville Cooler, Public Meeting Transcript, No. 88 at p. 50) American Panel stated that the performance curves for unit coolers and condensing units should meet around a 10 degree temperature difference [between the internal dry-bulb temperature and the saturated evaporator temperature]. (([Docket No. EERE-2008-BT-STD-0015]; American Panel, Public Meeting Transcript, No. 88 at p. 59)

Based on these comments noting the difficult nature of testing and rating walk-in refrigeration systems, particularly with respect to the large number of possible combinations of unit coolers and condensing units that can make up the WICF refrigeration system, the Department is proposing the following approach to allow manufacturers to test a condenser or unit cooler separately, but rate that component with an AWEF metric consistent with DOE's proposed energy standard. Under this approach, a manufacturer who sells a unit without a matched condensing unit must rate and certify a refrigeration system containing that unit cooler by testing according to the methodology in AHRI 1250 for unit coolers matched to a parallel rack system (see AHRI 1250, section 7.9). The manufacturer would use the calculation method in this section to determine the system AWEF and certify this AWEF to DOE. Additionally, all unit coolers tested and rated as part of a system unit this method must comply with the standards in the multiplex equipment classes.

A manufacturer who sells a condensing unit separately must rate and certify that a refrigeration system containing that condensing unit by conducting the condensing unit portion of the AHRI 1250 mix/match test method. The results from the mix/match test would be combined with a nominal unit cooler capacity and power, based on nominal values for saturated suction temperature and unit cooler fan and electric defrost energy use factors, in order to calculate an AWEF for the refrigeration system basic model containing that condensing unit. (Condensing units built to utilize hot gas defrost must use the method for estimating hot gas defrost heat load and energy use outlined in the following section.) These nominal values are listed in Table III.6. (These values will be incorporated into 10 CFR 431.304.)

DOE developed the nominal values from DOE testing and modeling of WICF refrigeration systems. DOE observed the following test and model results for on-cycle fan power and used the average value for its nominal factor:

Table III.4 Evaporator Fan Power Test and Model Results

Unit Tested or Modeled	On-Cycle Fan Power (W)	Gross Capacity at Highest Ambient Rating Condition (Btu/h)	On-cycle evaporator fan power, per Btu/h of gross capacity at highest ambient condition (W-h/Btu)
Test: Cooler System – Unit 1	320	23727	0.013
Test: Cooler System – Unit 2	208	15377	0.014
Test: Freezer System – Unit 3	119	7325	0.016
Test: Freezer System – Unit 4	113	7804	0.014
Model: Cooler System – Unit 5	265	12831	0.021
Model: Cooler System – Unit 6	252	14975	0.017
Model: Freezer System – Unit 7	133	6998	0.019
Model: Freezer System – Unit 8	126	8039	0.016
Average			**0.016**

Off-cycle unit cooler fan power is expressed in terms of the on-cycle fan power and would represent performance consistent with a unit cooler meeting the energy conservation standard. The energy conservation standard assumes that manufacturers would implement variable speed fan controls in order to meet the standard, which reduces the fan speed by 50 percent when the compressor is off. According to the fan laws[3], this would reduce power to 12.5 percent of full-speed power, or 0.5^(1/3). However, due to fan efficiency losses at lower speed, DOE is assuming that the power would be 20 percent of full speed power.

For electric defrost energy, DOE also used test results from low temperature systems in developing the nominal factors. The results are as follows:

Table III.5 Defrost Energy Test Results

Unit Tested	Average Defrost Energy per Cycle (Wh/cycle)	Gross Capacity at Highest Ambient Rating Condition (Btu/h)	On-cycle evaporator fan power, per Btu/h of gross capacity at highest ambient condition (W-h/Btu)
Test: Freezer System– Unit 3	880	7325	0.12
Test: Freezer System – Unit 4	928	7804	0.12
Average			**0.12**

Electric defrost heat contribution would be expressed in terms of the electric defrost power. In the AHRI 1250 calculations, the electric defrost heat contribution is equivalent to the power contribution converted from Watts to Btu/h, less the heat embodied in the defrost meltwater which is drained from the unit. In testing, DOE observed that defrost meltwater heat accounted for approximately 5 percent of the heat input. Therefore, DOE is assuming that electric defrost heat contribution to the interior of the box is 95 percent of the electric defrost power, converted from Watts to Btu/h.

The standards for the relevant equipment class of dedicated condensing refrigeration systems would apply to condensing unit basic models that were rated without a matched unit

[3] Fan laws are theoretical principles that express the relationship between variables that impact fan performance. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, *ASHRAE Handbook—HVAC Systems and Equipment*, Section 20.4. 2008.

cooler. DOE requests comment on its proposal to allow unit coolers and condensing units to be rated separately, and particularly the nominal values described in Table III.6.

Table III.6 Nominal Values for Unit Cooler Saturated Suction Temperature and Energy Use Factors

	Coolers	Freezers
Saturated Suction Temperature (°F)	25	-20
On-cycle evaporator fan power, per Btu/h of gross capacity at highest ambient condition (W-h/Btu)	0.016	0.016
Off-cycle evaporator fan power (W)	0.2 × on-cycle evaporator fan power	
Electric defrost energy per cycle, per Btu/h of gross capacity (W-h/cycle per Btu/h)	0	0.12
Number of cycles per day	As specified in installation instructions or, if no instructions, 4	
Daily electric defrost heat contribution (Btu)	0.95 × daily electric defrost energy use × 3.412	

2. Defrost Test

The existing test procedure incorporates a mandatory defrost test for freezer systems with electric defrost (AHRI 1250, Section C11). This test is designed to calculate electric defrost power consumption based on the (1) amount of energy consumption per defrost under both dry and frosted coil conditions, (2) number of defrosts per day, and (3) temperature and weight of the melt-water exiting the unit through the defrost drain pipe. DOE testing has shown that the test may be overly burdensome for manufacturers to conduct due to the difficulty of maintaining the moist air infiltration conditions for the frosted coil test in a repeatable manner. To minimize this burden while ensuring that the test sufficiently measures the energy consumption of walk-in freezer systems, DOE proposes to make the full defrost test optional, allowing manufacturers to choose between performing the full test and using a shorter and less burdensome methodology described as follows. DOE requests comment on the following calculation methodology and nominal values for electric defrost.

- First, the energy input for the dry coil condition shall be measured as specified in AHRI 1250, section C11.1 to obtain DF_d in W-h.
- In lieu of testing in the frost load conditions, the frosted coil energy use (DF_f) shall be the product of 1.05 multiplied by DF_d. (This value was developed from DOE test results.)
- For systems without adaptive defrost, the number of defrosts per day (N_{DF}) shall be based on the defrost frequency recommended in the installation instructions for the unit; if no defrost frequency is specified, the number of defrosts per day shall be set to 4.
- For systems with adaptive defrost, the optional test in section C11.2 may be performed to establish the time between dry coil defrosts. The number of defrosts per day calculated by this optional test shall be averaged with the number of defrosts per day that would occur under frosted conditions (as calculated in the previous paragraph). Otherwise, for systems with adaptive defrost, if the optional test is not performed, the number of defrosts per day (N_{DF}) shall be set to the average of 1 and the number of defrosts per day that would occur under frosted load conditions.
- The daily contribution of the load attributed to defrost, Q_{df} (Btu) shall be 95 percent of the daily defrost energy use in watt-hours, multiplied by 3.412 Btu/W-h. (This percentage is based on DOE test data, which showed that water thermal load is approximately 5 percent of the electric input (see discussion in previous section III. B. 1. This thermal load is deducted from the defrost heat load calculation, consistent with AHRI 1250 equation C14.)

The existing test is designed to measure the power consumption for electrical defrost and does not provide a method to measure the energy use associated with hot-gas defrost systems. DOE is tentatively proposing correction factors for calculating the heat contribution and energy use for hot gas defrost systems. The correction factors and calculations would apply to equipment tested as a matched pair system, to unit coolers, and to condensing units tested and rated individually.

The correction factor for heat contribution is based on DOE's assumption that the heat contribution from hot gas defrost is approximately half that of an equivalent electric defrost. This estimate is based on the fact that electric defrost heat is supplied through separate heater rods which radiate more heat to the surrounding environment, while for hot gas defrost, the hot gas is circulated through, and the heat is applied directly onto, the refrigerant tubes, increasing the amount of the coil in contact with the heat source and reducing the amount of heat lost. DOE is proposing to use a heat contribution factor of 0.18 Btu per defrost cycle per Btu/h of capacity at the highest ambient test condition—that is, heat contribution equal to half of the nominal factor for defrost watt-hours per cycle per Btu/h of gross capacity proposed in Table III.6, multiplied by a conversion factor of 3.412 Btu/W-h, and reduced by 10 percent due to meltwater drainage. The correction factor shall be applied to the AHRI 1250 calculation for daily contribution of the load attributed to defrost, as follows:

$$Q_{DF} = 0.18 \text{ Btu/defrost per Btu/h capacity} \times Q_{ref} \times N_{DF}$$

Where:

Q_{ref} = Gross refrigeration capacity in Btu/h as measured at the high ambient condition (90 °F for indoor systems and 95 °F for outdoor systems)

N_{DF} = Number of defrosts per day; shall be set to the number recommended in the installation instructions for the unit (or if no instructions, shall be set to 4) for units without adaptive defrost and 2.5 for units with adaptive defrost to be consistent with the nominal values determined previously for rating systems without performing the frosted-coil or optional dry coil defrost test

The daily average defrost energy required for the refrigeration system (DF) shall be zero for a unit cooler connected to a multiplex condensing system because the evaporator would be acting as a condenser extension when taking hot gas from a compressor rack during defrost operation, and thus would not be expected to add to the rack's energy use. For a dedicated condensing system, the daily defrost energy shall be equivalent to half of the calculated daily defrost heat (Q_{DF}) converted from Btu to W-h. This is based on the assumption that during a hot gas defrost cycle, part of the defrost heat would be supplied by compressor heat generated during normal cooling operation, and the refrigeration system would be acting as a heat pump (i.e., it would be operating in reverse) with a COP of approximately 2. DOE requests comment on this approach, particularly with respect to the proposed correction factors. DOE notes that should a hot gas defrost test be developed, DOE will consider adopting such a test in a future test procedure rulemaking.

3. Off-Cycle Evaporator Fan Test

AHRI 1250, section C10 contains a method for determining the off-cycle power of evaporator fans that are controlled by a "qualifying control," which may include adjustable fan speed control or periodic "stir cycles" which turn the fans on and off according to a certain duty cycle. AHRI 1250, section C10 specifies that “stir cycle” controls shall be adjusted so that the greater of a 25 percent duty cycle or the manufacturer default is used for measuring off-cycle fan energy; and that variable speed controls shall be adjusted so that the greater of 25 percent fan speed or the manufacturer’s default fan speed shall be used for measuring off-cycle fan energy. In comments on the WICF Standards preliminary analysis, which were discussed in the September 2013 NOPR, interested parties mentioned that a 75 percent reduction in duty cycle or fan speed could cause temperature stratification in the interior of the walk-in, which would impact food safety. DOE proposed in the NOPR to change the fan speed control characteristics to be equivalent to a 50 percent reduction in duty cycle or fan speed. (See 78 FR 55818.) Accordingly, DOE is proposing in this SNOPR to amend the test procedure such that “stir cycle” controls shall be adjusted so that the greater of a 50 percent duty cycle or the manufacturer default is used for measuring off-cycle fan energy; and that variable speed controls shall be adjusted so that the greater of 50 percent fan speed or the manufacturer’s default fan speed shall be used for measuring off-cycle fan energy. DOE requests comment on this proposal.

4. Refrigerant Oil Testing

Most refrigeration systems use oil-lubricated compressors. A small amount of oil generally escapes the compressor through the discharge connection and circulates through the system, continually returning to the compressor in the suction line in a properly-designed and installed system. Under AHRI 1250, a measurement of the ratio of oil to refrigerant in the liquid refrigerant passing from the condenser to the unit cooler is required per ANSI/ASHRAE Standard 41.4. This information is used to adjust the capacity measurement, since a portion of the liquid mass flow would be oil that does not contribute to refrigeration capacity (see AHRI 1250, section C3.4.6). DOE recognizes that this test requires additional test apparatus and may prove burdensome. Furthermore, DOE testing has shown that in equipment with integrated oil-separators, the ratio of oil to refrigerant tends to be lower than the maximum of 1 percent mandated in AHRI 1250, section C3.4.6. Therefore, in light of the negligible amount of oil present in the refrigerant lines in these types of units and thus the very low likelihood of excess oil being present in the system, DOE is proposing that condensing units with on-board oil-filters would not be required to perform this test.

5. Temperature Measurement

The AHRI 1250 procedure specifies a tolerance of ±0.2 °F for all refrigerant temperature measurements and that temperature measuring instruments must be placed in thermometer wells (small devices that extend into the refrigerant tube that contact the refrigerant and provide a more accurate temperature measurement). DOE notes that measurements to a ±0.2 ˚F accuracy cannot be obtained by thermocouples and require use of resistance temperature detectors (RTDs). DOE also notes that thermometer wells are generally large enough to require large fittings with diameters significantly larger than those of most refrigerant tubes used for unit coolers. DOE further notes that thermocouples are available with accuracy close to the ±0.2 ˚F requirement in sheathed arrangements, which can more easily achieve the goal of immersing the temperature sensor into the refrigerant flow. Further, DOE notes that (a) the impact of the uncertainty of temperature measurements of refrigerant entering and leaving the unit cooler on the potential capacity measurement is small enough to be acceptable for an accuracy requirement of ±0.5 ˚F, and (b) the accuracy requirement for all other refrigerant temperature measurements could be relaxed further, since these other measurements have much less effect on overall test accuracy. In order to address these concerns and provide more flexibility for testing, DOE is proposing that the required tolerance for test temperature measurement be maintained at ±0.5 °F for measurements at the inlet and outlet of the unit cooler, but be altered to ±1.0 °F for all other temperature measurements, allowing for the use of smaller temperature measurement probes which can more easily be placed in contact with the refrigerant while not impeding its flow. Additionally, DOE is proposing to allow the test to be conducted using sheathed sensors immersed in the flowing refrigerant for refrigerant temperature measurements upstream and downstream of the unit cooler, in order to reduce test burden. No refrigerant temperature measurements other than those upstream and downstream of the unit cooler would require a thermometer well or sheathed sensor immersion. DOE requests comment on these proposed changes to the temperature measurement approach.

6. Test Condition Tolerances

AHRI 1250 specifies the operating test condition tolerances for the steady-state test (AHRI 1250, Table 2), including tolerances for electrical voltage. DOE recognizes the importance of also establishing a test condition tolerance of 1 percent for electrical power frequency, and proposes to modify the existing test procedure to set a test condition tolerance for the frequency of electrical power, in keeping with most other industry-accepted test procedures for refrigeration systems and similar equipment.

Additionally, since temperature measurements of air leaving the unit are not used in the calculation of AWEF and do not contribute to the test results, DOE is proposing to delete the requirements related to the condition tolerances or measurements of air leaving the unit. DOE also proposes to remove the tolerances for wet bulb temperature on the outdoor system conditions, except for units with evaporative cooling, as wet bulb temperature (which is an indicator of humidity) is not expected to impact the performance of air-cooled condensing units. DOE is proposing to retain all other measurements of air entering the heat exchangers, including dry bulb outdoor conditions and dry bulb and wet bulb indoor conditions (wet bulb temperature or humidity levels greater than the required test conditions could cause excessive frosting of the coil and affect its rated capacity).

7. Insulation

The existing test procedure specifies that in the test setup, the pipe lines between the unit cooler and condensing unit "shall be well insulated" – a description that lacks specificity. In recognition of this shortcoming, DOE proposes to modify the setup by requiring a minimum thermal resistance (R-Value). Based on the most commonly found insulation materials in field conditions, DOE is proposing that the insulation be set up as recommended by the manufacturer in installation literature or, if there is no recommendation, insulation shall be equivalent to a half-inch thick insulation with a material having an R-Value of at least 3.7 per inch. Adding this condition should not pose a significant test burden since insulation material with the specified resistivity is commonly used and readily available. Under the proposal, flow meters would not need to be insulated but must not contact the floor. DOE requests comment on this approach.

8. Composition Analysis

The AHRI 1250 test procedure requires that for systems using zeotropic refrigerant mixtures (that is, those that have "glide" – i.e. refrigerant mixtures that change temperature during a phase change at constant pressure), a composition analysis of the refrigerant mixture shall be conducted in order to ensure compliance with AHRI Standard 520. This test requires that a sample of the superheated vapor refrigerant be extracted while the system is still running. DOE recognizes that this procedure can represent substantial test burden, with comparably insignificant improvements to the accuracy of the final AWEF measured, and is proposing to delete this requirement from DOE's test procedure. DOE requests comment on this amendment, given the limited effect on AWEF if refrigerants with glide are properly liquid-charged and there are no test system leaks.

9. Piping Length

While DOE's test procedure currently requires that the length of piping between the condenser and unit cooler be 25 feet, DOE proposes to clarify that this length does not include the length of any flow meters that the refrigerant might flow through. Furthermore, in order to ensure an accurate replication of field conditions, and to prevent erroneous efficiency measurements due to excessive refrigerant pre-cooling, DOE proposes to specify that the length of piping allowed within the cooled space shall be a maximum of 15 feet. In cases where there are multiple unit coolers and, therefore, multiple branches of piping, the 15 feet limit would apply to each branch individually as opposed to the total length of the piping.

10. Other Clarifications and Modifications

DOE is also proposing to clarify the language of the test procedure in order to address potential areas of confusion. Specifically, DOE is proposing changes to the list of tests for unit coolers (Table 15: Refrigerator Unit Cooler and Table 16: Freezer Unit Cooler), in order to display additional data that are currently included only by reference to AHRI 420. (Testing standard AHRI 420, Performance Rating of Forced-Circulation Free-Delivery Unit Coolers for Refrigeration, establishes definitions and various requirements regarding testing, data collection marking/name plate information, and conformance conditions with respect to unit coolers.) Specifically, Tables 15 and 16 are modified to include the liquid inlet saturation temperature and outlet superheat conditions required in AHRI 420 for testing these types of unit coolers. DOE is clarifying these values because they can significantly affect the rated capacity. Also, while the existing test procedure sets a maximum allowable voltage imbalance for three-phase power supply, DOE proposes to add a clarification that the stated maximum imbalance of 2 percent refers to the maximum imbalance for voltages measured between phases (rather than phase-to-neutral).

C. Test Procedure for WICF Panel R-value (ASTM C518-04)

Currently, 10 CFR 431.304 *Uniform test method for the measurement of energy consumption of walk-in coolers and walk-in freezers* incorporates by reference ASTM C518-04, a standard method for determining the thermal transmission properties (i.e. the thermal conductance or conductivity) of a material using the heat flow meter apparatus. The heat flow meter apparatus determines the thermal conductivity of a material by inducing one-dimensional heat flow across a test specimen and measuring the heat flux and temperature difference across the specimen. The heat flux measurement is accomplished using a heat flux transducer, or thermopile. A thermopile consists of multiple thermocouples and produces an electrical voltage proportional to an applied thermal gradient. To ascertain the heat flux based on this electrical voltage, the thermopile must first be calibrated using a material having a known thermal conductivity. ASTM C518-04 recommends using a standard material that is traceable to a national standards laboratory (Section 6.4.2).See ASTM C518-04.

Walk-in wall panels are typically made of rigid foam insulation, either board-stock type or "foam-in-place" type foam, with thin "facers" made of metal or other suitable material on either side of the foam. In order to meet the efficiency standards set by EPCA (42 U.S.C. 6313 (f)(1)(C)), the foam core is typically 3.5 to 6 inches thick, with the thin facers making an insignificant contribution to the overall R-value of the panel.

Currently, the DOE test procedure requires that "foam produced inside of a panel ("i.e. foam-in-place") must be tested in its final foamed state." See 10 CFR 431.304(b)(5). Additionally, panels may be tested using ASTM C518-04 with non-foam protective skins or facers still attached, but must not include structural members or other non-foam materials. The procedure does not require manufacturers to consider non-foam member and/or edge regions when testing to ASTM C518-04. (10 CFR 431.304 (b)(5)-(6) and (c)(5)-(6)). Regarding these provisions, DOE clarified in a final rule issued on October 21, 2011,that non-foam members and edge regions are only to be considered in U-factor testing using ASTM C1363. See 76 FR at 65364.DOE further stated that the measurement of the R-value of the foam with facers should be equal to a measurement of the R-value of the foam without the facers. See id. Metal facers make a negligible contribution to the overall R-value of the panel because of the high thermal conductivity of metals typically used as facer material and their small thickness. For example, for an R-25 foam walk-in cooler panel (4 inches thick) with two 0.04-inch thick steel facers (each with a thermal conductivity of 21 Btu/h/ft/°F), the steel facers represent 0.001 percent of the panel's overall thermal resistance.

DOE now recognizes that in practice, the inclusion of facers, non-foam internal members, or edge regions in testing using ASTM C518-04 may produce unreliable results. ASTM C518-04 states that "special care shall be taken in the measurement procedure for specimens exhibiting appreciable inhomogeneities, anisotropies, rigidity, or especially high or low resistance to heat flow. The use of a heat flow meter apparatus when there are thermal bridges present in the specimen may yield very unreliable results." (ASTM C518-04 (4.4)) DOE recognizes that ASTM C518-04's heat flow apparatus testing is intended to measure the thermal conductivity of a single homogenous material, and that the industry's standard practice is to remove facers prior to testing WICF panels. Additionally, DOE testing has shown a minimum of 31 percent and maximum of 62 percent difference in R-value per inch (R/in) in testing panels at freezer conditions (20 °F) with and without facers.

DOE is also aware that the removal of facers will accelerate the aging process for polyurethane foams. Over time, the thermal conductivity of polyurethane foams used for insulation will increase (resulting in a decreased R-value) due to the diffusion of air into the foam. The rate at which the thermal conductivity increases depends on the blowing agent used, thickness of the foam, the permeability of a facing material, if present, and the temperature at which the foam is aged. The thermal conductivity of a 0.4 inch-thick foam core without facers can increase by as much as 20% when aged at 90°F for 8 days. However, a 1.5 inch-thick foam core without facers may show a negligible difference in thermal conductivity when aged at the same conditions[4]. Additionally, ASTM C518-04, Section 7.3 states that materials must be conditioned according to their specifications where applicable, typically for a period of 24 hours. For the reasons cited above, DOE proposes a requirement that samples be tested without non-foam facers, protective skins, non-foam internal members, or edge regions. DOE also proposes that tests be completed within 48 hours of being cut to minimize the impact of the accelerated aging process on the test results.

DOE further clarifies that edge regions should make up a small portion of the area of a full panel assembly and their exclusion should not have an impact when measuring panel R-value. If DOE later determines that edge regions comprise a large enough area to warrant their inclusion when measuring a panel's R-value, DOE will revisit its regulations in order to ensure the test procedure still results in an R-value that accurately represents the panel.

Currently, the DOE test procedure allows test samples for foam-in-place panels to be as thick as 4 inches. If the foam-in-place panel is thicker than 4 inches, a sample less than or equal to 4 inches thick would be taken from the center of the foam-in-place panel. If a panel incorporates foam produced as board stock, the board stock can be tested as-is before assembly into a panel. (10 CFR 431.304 (b)(5) and (c)(5)) In order to meet the minimum R-value requirements established in EPCA of R-25 (coolers) or R-32 (freezers) (42 U.S.C. 6313(f)(1)(C)), walk-in cooler and freezer panels found on the market are often 4 inches in thickness although DOE does not require a specific thickness to meet the current standards.

[4] See "Aging of Polyurethane Foam Insulation in Simulated Refrigerator Panels – Initial Results with Third-Generation Blowing Agents" by Kenneth E. Wilkes et al., published by Oak Ridge National Laboratory for presentation at The Earth Technologies Forum, October 26-28, 1998, Figures 2 and 4(b)

ASTM C518-04 makes several recommendations with regard to test specimen thickness. The measurements obtained using the heat flow meter apparatus (as in ASTM C518-04) are relative to a calibration standard with known thermal conductivity. Section 4.5.1.1 requires that this standard material be measured by a recognized national standards laboratory. Section 6.1 of ASTM C518-04 states "the apparatus [heat flow meter] shall be calibrated with materials having similar thermal characteristics and thicknesses as the materials to be evaluated." Section 6.5.4 states "if tests are to be conducted at thicknesses other than the calibrated thickness, make a thorough study of the error of the heat flow meter apparatus at other thicknesses." Furthermore, ASTM C518-04 states "the combined thickness of the specimen or specimens, the heat flux transducer and any damping material, which in total equals the distance between the cold and hot plates, must be restricted in order to limit the effect of edge losses on the measurements." (ASTM C518-04 (7.6.1))

DOE recognizes that the most appropriate standard reference material (SRM) for calibration currently offered by the National Institute of Standards and Technology (NIST) is 1450d (previously 1450c, fibrous glass board material) which has a thickness of 1 inch. NIST SRM 1453 (polystyrene board) has similar thermal conductivity but a thickness of 0.5 inches. A 4- inch thick, R-32 test specimen is, therefore, 4 times thicker than the 1450c/d SRM and has approximately 8 times the thermal resistance.

In light of recommendations in ASTM C518-04 cited above, DOE believes the current discrepancies between a test sample thickness and calibration standard thickness and between a test sample thermal resistance and calibration standard thermal resistance could contribute to error in measuring the thermal resistance of the test sample. Therefore, DOE proposes to reduce the allowable thickness of the sample from no more than 4 inches to no more than 1 inch. This thickness is the same as the NIST SRM 1450c/d calibration standard and DOE believes that this modification to the test procedure will reduce the error associated with the discrepancies listed above. DOE is also proposing that this 1 inch thickness test sample be taken from the center of a panel (meaning centered on a plane half the distance between the surfaces on which facers were attached), as the foam aging process previously described occurs at a faster rate closer to exposed surfaces. Material at the center of the panel will have experienced the smallest effect of foam aging.

The DOE test procedure at 10 CFR 431.304 does not currently place any restriction on the uniformity of the shape of the test specimen surfaces that contact the hot and cold plates of the heat flow meter. However, accurate and reliable measurements of the heat flux and surface temperatures depend on uniform contact between the hot and cold plates and the specimen surfaces. Section 7.4.3 of ASTM C518-04 states that rigid or high conductance specimen surfaces "should be made flat and parallel to the same degree as the heat-flow-meter." Furthermore, any cutting operation used to remove the facers and/or reduce the thickness of the foam test specimen may leave undesirable surface incongruities or voids, resulting in poor contact between the plate and specimen and yielding unreliable test results.

With regard to panel testing using ASTM C518-04, and in light of the evidence cited above, DOE is proposing that test specimens be 1 inch in thickness and cut from the center of a

WICF panel (thus removing the facer material). This thickness is in keeping with currently available SRMs from NIST and would result in test specimens with the same thickness as the 1450c/d SRM and approximately 2 times the thermal resistance. DOE also proposes tolerances of ±0.03 inches on the flatness of both test specimen surfaces and a tolerance of ±0.03 inches on the parallelism between the test specimen surfaces to ensure uniform contact between theses surfaces and the hot and cold plates of the heat flow meter. DOE proposes that testing be completed within 48 hours of sample cutting in order to mitigate the effects of foam aging on the test results.

DOE also proposes the addition of a tolerance of ±1 degree Fahrenheit on the mean temperature at which panels are tested. This is proposed to ensure repeatability of, and comparability between, tests. Currently, the test procedure does not specify a tolerance for these temperatures (20 degrees Fahrenheit for freezers and 55 degrees Fahrenheit for coolers). (10 CFR 431.304 (b)(3), (b)(4), (c)(3) and (c)(4)) DOE believes that with the reduction in test sample thickness and removal of facers or other non-foam elements, heat gain from the surrounding environment into the test apparatus and sample should be reduced. DOE testing showed that at freezer conditions 4 inch thick samples with facers maintained an average mean temperature of 22.8°F while a 1 inch thick sample without facers maintained a mean temperature of 19.5°F (as compared to mean temperature 20°F as required by the DOE test procedure). (10 CRF 431.304(b)(3) and(c)(3)) Based on research and test data described, DOE is proposing that the mean temperatures prescribed in the test procedure should be more precisely maintained and ±1 degree Fahrenheit tolerance can be achieved.

DOE clarifies the phrase "final chemical form" in 10 CFR 431.304(b)(5) and (c)(5). For "foam-in-place" or "blown" foams (typically polyurethane), "final chemical form" means the foam is cured as intended and ready for use as a finished panel. For foam produced as board stock (typically polystyrene), "final chemical form" means after extrusion and ready for assembly into a panel or after assembly into a panel. DOE recognizes that air continuously diffuses into the foam as part of the aging process, and so "final chemical form" is ambiguous in this regard. As proposed, testing would be completed within 48 hours of samples being cut for testing to minimize the effect of accelerated aging on the thermal conductivity when the foam is directly exposed to air. Furthermore, DOE is proposing to remove language from paragraphs (b)(5) and (c)(5) that is believed to be redundant. Specifically, the requirement that "foam produced inside of a panel ("foam-in-place") must be tested in its final foamed state" would be removed, as the requirement that foam be in it final chemical form as described above is sufficient.

DOE recognizes that some panels contain two or more different layers of insulating material. To accommodate these types of panels, DOE is proposing that for panels that have more than one type of insulating material, a sample of each material shall be tested as specified in 10 CFR 431.304 and the R-value of the panel shall be calculated according to the proportion the materials occur in the panel. Therefore, for a panel with *i* types of insulating material, the R-Value shall be calculated as follows:

$$R_{panel} = \sum_{1}^{i} \frac{t_i}{k_i}$$

Where:

k_i is the k factor of type *i* material as measured by ASTM C518, and

t_i is the thickness of type *i* material that appears in the panel.

DOE requests comment on this formula.

In paragraphs (b), (b)(6), (c) and (c)(6) of 10 CFR 431.304, DOE is proposing to remove references to manufacturers. The requirements of these paragraphs are not limited to testing performed by manufacturers. Independent testing laboratories or other entities would be responsible for meeting these requirements for any testing that has its purpose as described in paragraphs (b) and (c), namely for certifying compliance with applicable energy conservation standards and, since October 12, 2011, for representations of energy efficiency or energy use.

D. Performance-based Test Procedures for Walk-In Coolers and Freezers

As described above, WICF panels must meet prescriptive requirements for foam insulation R-values based on ASTM C518-04 testing incorporated in 10 CFR 431.304. Additionally, the test procedure at Appendix A to Subpart R of Part 431 *(Uniform Test Method for the Measurement of Energy Consumption of the Components of Envelopes of Walk-In Coolers and Walk-In Freezers)* establishes the method and metrics by which the energy consumption (envelope components) or efficiency (refrigeration components) may be measured; this includes floor and non-floor panels. Sections 4.2 and 4.3 establish the calculation procedures that result in a thermal conductivity, U-value, metric for floor and non-floor panels, and sections 5.1 and 5.2 establish the methods by which the required measurements are taken. Section 5.1

incorporates by reference ASTM C1363-05 *Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus*; section 5.2 incorporates by reference Annex C *Determination of the aged values of thermal resistance and thermal conductivity* of DIN EN 13164 and DIN EN 13165.

While ASTM C518-04 testing is intended to establish the thermal resistance of the center of a WICF panel, the required testing to ASTM C1363-05 is intended to capture the overall thermal transmittance of a WICF panel, including thermal bridges and edge effects (note: thermal transmittance is the reciprocal of thermal resistance). Similar to ASTM C518-04, DIN EN 13164/13165 testing is intended to measure the thermal resistance of the center of a WICF panel; however, DIN EN 13164/13165 also captures the effects of foam aging on the thermal resistance.

In response the September 2013 standards NOPR, the Department received a number of comments regarding the WICF panel test procedure. Some stakeholders supported the use of the U-value metric. Nor-Lake commented that U-factor was an acceptable metric for panels. ([Docket No. EERE-2008-BT-STD-0015]; Nor-Lake, No 115 at p. 2) NEEA supported the use of a basic model U-value for specifying the panel efficiency. NEEA added that the current metric set by Congress – the R-value from ASTM C518 – does not adequately measure the broad range of panel types and configurations available. In NEEA's view, a panel U-value, as defined in the proposed standard, would be far more accurate in assessing panel efficiency. ([Docket No. EERE-2008-BT-STD-0015]; NEEA et al, No. 101 at p.2)

DOE also received a number of comments expressing concern over the availability and capability of laboratories to conduct the DOE test procedure for determining panel U-value, specifically ASTM C1363-10, EN 13164:2009-02, and EN 13165:2009-02. Thermo-Kool, Kysor, Imperial-Brown, and Hillphoenix each stated that they have not identified any laboratories capable of conducting the long-term thermal aging test methods required under EN 13164:2009-02 and EN 13165:2009-02. ([Docket No. EERE-2008-BT-STD-0015]; Thermo-Kool, No. 97 at p. 1; Kysor, No. 88 at p. 67; Imperial-Brown, No. 98 at p. 1; Hillphoenix, No. 107 at p. 2) Bally recommended that long-term thermal aging be dropped from the proposed standard until more resources, which DOE infers to mean test labs, are available in the United States. ([Docket No. EERE-2008-BT-STD-0015]; Bally, No. 102 at p. 2) Thermo-Kool, Kysor, Manitowoc, Imperial-Brown, and Hillphoenix commented that only two laboratories in the United States are capable of conducting ASTM C1363-10. ([Docket No. EERE-2008-BT-STD-0015]; Thermo-Kool, No. 97 at p. 1; Kysor, No. 88 at p. 67; Manitowoc, No. 108 at p. 1; Imperial-Brown, No. 98 at p. 1; Hillphoenix, No. 107 at p. 2)

AHRI noted that American laboratories were largely unfamiliar with ASTM C1363-05, DIN EN 13164:2009-02, and DIN EN 13165:2009-02. Further, AHRI commented that the limited supply of testing capacity and the increased demand for testing as a result of the proposed rule could raise the cost of testing. ([Docket No. EERE-2008-BT-STD-0015]; AHRI, No. 114 at p.4) Manufacturers reiterated that the limited number of test facilities available would increase testing costs. Hillphoenix and Imperial-Brown commented that the insufficient number of third-party test facilities in the United

States would significantly increase testing costs, which would heavily impact small manufacturers. ([Docket No. EERE-2008-BT-STD-0015]; Hillphoenix, No. 107 at pp. 2 and 6) Hillphoenix estimated that testing panels would result in testing costs higher than $500,000 per manufacturer. Hillphoenix recommended DOE allow AEDMs for walk-in panel certification to reduce this financial burden. ([Docket No. EERE-2008-BT-STD-0015]; Hillphoenix, No. 107 at p.6) Louisville Cooler also commented that the cost of testing panels was prohibitive, especially for small manufacturers, and stated that there was not a test facility or certification body that could perform the test. Louisville cooler suggested DOE determine if at least three test facilities are capable of performing the DOE test procedure for walk-in panels. ([Docket No. EERE-2008-BT-STD-0015]; Louisville Cooler, No. 81 at p.1 and Public Meeting Transcript, No. 88 at pp. 83-84)

Other manufacturers commented that the current cost of testing at a third-party facility is too high. American Panel commented that the ASTM C1363-10 test has a cost-burden of around $4000 for each test (a cost it considers excessive) and that ATSM C518 is more practical for measuring the heat gain through insulation panels. ([Docket No. EERE-2008-BT-STD-0015]; American Panel, No. 99 at p. 1) American Panel further remarked that small manufacturers could not absorb this testing cost. ([Docket No. EERE-2008-BT-STD-0015]; American Panel, No. 99 at p. 2) Manitowoc, US Cooler, and Nor-Lake also commented that the testing requirements would cause a significant financial burden to small manufacturers ([Docket No. EERE-2008-BT-STD-0015]; Manitowoc, No. 108 at p. 4; US Cooler, No. 75 at p. 1; Nor-Lake, No. 115 at p.3) Imperial Brown estimated that the total cost of testing would be in the range of $2.5 million per manufacturer, which is prohibitive particularly for small businesses.([Docket No. EERE-2008-

BT-STD-0015]; Imperial Brown, No. 98 at pp. 2 and 4) Imperial Brown did not clarify if the $2.5 million test cost was solely for certification of walk-in panels. ICS, et al. stated that the high cost of testing to ASTM C1363-10 will create a significant burden on all manufacturers and recommended that DOE use ASTM C518. ([Docket No. EERE-2008-BT-STD-0015]; CT/TR/ICS, No. 100 at p. 5)

Two manufacturers noted that laboratory availability would impact manufacturers' ability to meet the test procedure effective date. Manitowoc commented that the limited number of laboratories makes it difficult for manufacturers to meet the test procedure effective date. ([Docket No. EERE-2008-BT-STD-0015]; Manitowoc, No. 108 at p.1) Kysor also recommended that DOE extend the test procedure effective date until more labs are qualified to perform the walk-in panel tests. ([Docket No. EERE-2008-BT-STD-0015]; Kysor, No. 88 at p. 67; Kyson, No. 88 at p. 35)

DOE also received comments opposing the long-term thermal aging test methods. Bally expressed confusion as to how the long-term thermal aging tests were incorporated into the proposed standard. ([Docket No. EERE-2008-BT-STD-0015]; Bally, No. 102 at p. 2) Imperial-Brown noted that EN 13165:2009-02 requires panels to be [aged] for 6 months, which creates additional burden for manufacturers. ([Docket No. EERE-2008-BT-STD-0015]; Imperial-Brown, No. 98 at p. 1) CT/TR/ICS commented that the thermal [aging] testing is unnecessary because the time frame required for a significant reduction in panel R-value is likely beyond the panel's useable lifetime. ([Docket No. EERE-2008-BT-STD-0015]; CT/TR/ICS, No. 100 at p. 1)

Interested parties also opposed using the U-value as the efficiency metric for walk-in panels. Bally did not support using the U-value as a metric for panels because of what it viewed as the lack of laboratories that are capable of performing ASTM C1363, the unknown cost of testing, and the variability in construction methods – all of which make it difficult to ascertain a U-value for a panel. In its view, ASTM C1363-05 is a cumbersome test method with little added value. Bally recommended DOE continue to use R-value as the metric because panel manufacturers are already accustomed to the DOE test procedure for determining R-value (10 CFR 431.304(a)). ([Docket No. EERE-2008-BT-STD-0015]; Bally, No. 102 at p. 1-2)

Thermo-Kool commented that the U-factor test alone does not determine the overall energy use of the envelope because there are other factors that play a larger role in the envelope's energy use such as the refrigeration system, lighting, and infiltration. Thermo-Kool asserted that R-value as measured by ASTM C518 was a sufficient metric for measuring panel performance and the R-value could be used to calculate U-value. ([Docket No. EERE-2008-BT-STD-0015]; Thermo-Kool, No. 97 at pp.1-2)

Imperial-Brown, Kysor, and Hillphoenix recommended using the R-value calculated from ASTM C518 in order to reduce the burdensome test requirements. ([Docket No. EERE-2008-BT-STD-0015]; Imperial-Brown, No. 98 at p. 1-2; Kysor, No. 88 at p. 35; Hillphoenix, No. 107 at p. 2) AHRI recommended that DOE translate the proposed standard to prescriptive requirements to eliminate testing requirements or increase the current R-value standards. ([Docket No. EERE-2008-BT-STD-0015]; AHRI, No. 114 at p. 2)

Several manufacturers suggested alternative methods of determining a walk-in panel's overall thermal conductivity or resistance. Hillphoenix suggested DOE use a calculation methodology with thermal resistance values from the ASHRAE Fundamentals Handbook for components like the perimeter frame, additional blocking, metal layers and large metal lock housings to determine the panel's overall U-value. ([Docket No. EERE-2008-BT-STD-0015]; Hillphoenix, No. 107 at p. 2) CA IOU recommended reducing testing burden by using a calculation approach for U-factor based on measured U-factor of foam and framing components. ([Docket No. EERE-2008-BT-STD-0015]; CA IOU, No. 88 at p. 86) Kysor agreed with CA IOU's proposal because it is less costly to manufacturers. ([Docket No. EERE-2008-BT-STD-0015]; Kysor, No. 88 at p.86) ICS commented that thermal transmission properties of all panel components are available and can be used to calculate overall R-value. ([Docket No. EERE-2008-BT-STD-0015]; CT/TR/ICS, No. 100 at pp. 5-6) Bally recommended that a panel's U-value be calculated using a ratio of the edge area to total area. ([Docket No. EERE-2008-BT-STD-0015]; Bally, No. 88, at p. 367 and Bally, No. 102 at p. 5) American Panel commented that the ratio of frame to perimeter widely varied with panel size and its use was not sufficiently penalizing manufacturers of large panels using wooden frames or other inefficient designs. Further, American Panel suggested that the R-value of panels be calculated using a weighted average of the R-values of the frame and the core. ([Docket No. EERE-2008-BT-STD-0015]; American Panel, No. 88 at p. 369)

Architectural Testing, an independent test facility, suggested specific changes. It noted that 10 CFR 431.304 appendix A, section 5.1 describes a test sequence that is not efficient or cost effective. They recommended performing the ASTM C1363 on two assembled panels, after which a core sample from one of the panels tested with ASTM C1363 could then be tested according to ASTM C518 at the same surface temperatures as the ASTM C1363 test. Architectural Testing also recommended that DOE align the test conditions described in 10 CFR 431.304 appendix A, section 5.3 for ASTM C1363 to the conditions required for testing display and non-display doors with NFRC 100. Architectural Testing further stated that the long-term thermal aging tests, EN 13164 and EN 13165, reference other European standards, like EN 12667 or EN 12939, which are similar to ASTM C518. Architectural Testing recommended that DOE modify the test procedure so that the intent of EN 13165 and 13165 is still followed, but that the thermal measurements would be conducted according to ASTM C518. Finally, Architectural Testing recommended that DOE remove the sample size limitations from 10 CFR 431.304 appendix A, section 5.2 because these sample sizes are uncommon and cause increased testing costs. ([Docket No. EERE-2008-BT-STD-0015]; Architectural Testing, No. 111 at pp.1-3)

In response to the extensive number of comments DOE received regarding test burden and lab availability, DOE is proposing to remove the test procedures in 10 CFR 431, Appendix A to Subpart R that reference ASTM C1363-05 and DIN EN 13164/13165 and their accompanying calculation procedures, leaving only ASTM C518-04 testing in 10 CFR 431.304 for establishing the thermal resistance of WICF panels. This would remove in their entirety sections 4.2, 4.3, 5.1 and 5.2 from 10 CFR 431, Appendix A of Subpart R.

DOE is also proposing several minor changes to section 5.3 for clarification purposes only. Specifically, DOE is proposing that section 5.3(a)(2)'s title change from "Internal conditions" to "Cold-side conditions" and section 5.3(a)(3)'s title change from "External conditions" to "Warm-side conditions." The terms "internal" and "external" are irrelevant in the context of the testing apparatus described in NFRC 100[E0A1] (incorporated by reference). DOE also proposes to specify the surface convective heat transfer coefficients referred to in paragraph (a)(1); these values are 30 Watts per meter-Kelvin (W/m-K) for the cold side of the hot box apparatus and 7.7 W/m-K for the warm side. This proposed change would only clarify these terms. These values are specified in ASTM C1199-09 *Standard Test Method for Measuring the Steady-State Thermal Transmittance of Fenestration Systems Using Hot Box Methods* which is referred to by NFRC 100[E0A1].

E. <u>Sampling Plan</u>

In order to determine a certified rating for certifying compliance or making energy use representations, DOE requires manufacturers to test each basic model in accordance with the applicable DOE test procedure and apply the sampling plan. In today's notice, DOE is proposing a sampling plan for walk-ins consistent with other commercial equipment regulated under EPCA. The sampling requirements are included in the proposed section 429.53 of Subpart B of 10 CFR Part 429. For consistency with other commercial equipment regulated under EPCA, DOE is proposing that a minimum of two units of a WICF component basic model be tested to develop a representative rating, as prescribed in 10 CFR 429.11. However, manufacturers may test more units of a basic model, if desired. DOE is proposing that any represented energy consumption values of a walk-in basic model shall be lower than or equal to the higher of the mean of the sample or the 95 percent lower confidence limit (UCL) of the true mean divided by 1.05. Additionally, DOE is proposing that any represented energy efficiency values of a walk-in basic model shall be greater than or equal to the lower of the mean of the sample or the 95 percent lower confidence limit (LCL) of the true mean divided by 0.95.

F. Compliance with Other EPCA Requirements

In amending a test procedure, EPCA generally directs DOE to determine to what extent, if any, the proposed amendments would alter the measured energy efficiency or measured energy use of a covered product. (42 U.S.C. 6293(e)(1)) If the amended test procedure alters the measured energy efficiency or measured energy use, the Secretary must amend the applicable energy conservation standard accordingly. (42 U.S.C. 6293(e)(2))

With regard to the AEDMs for WICF refrigeration systems, energy conservation standards for refrigeration systems have not been established. Therefore, this aspect of DOE's proposal (i.e. permitting the use of separate AEDMs when rating the unit cooler and condenser unit) would not implicate this particular provision. DOE will, of course, consider any impacts from the adopted approach it finalizes as part of its standards analysis.

DOE tentatively concludes the amendments to the test procedure for walk-in cooler and freezer panels at 10 CFR 431.304 described in section III.B above will not have an impact on the measurement of energy consumption. With regards to the removal of facers as described above in section III.B, the thin metal facers that are adjoined to the foam WICF panel would ensure accurate and reliable test results and to better align the DOE test procedure with the requirements of ASTM C518-04.

With regard to the proposed requirements for the thickness of the WICF panel test specimen in section III.B, the thermal conductivity that is measured during ASTM C518-04 is an intrinsic property of the material itself and this requirement is proposed to ensure reliable measurement of this property. The nominal thickness of the original WICF panel assembly would still be divided by this thermal conductivity (1/K multiplied by panel thickness) to arrive at the panel R-value. Therefore, the R-value obtained is still comparable to the currently prescribed energy conservation standards.

The proposed requirements of section III.B concerning the flatness and parallelism of the test specimen surfaces are intended to ensure accurate test results. While the incorporated by reference ASTM C518-04 makes recommendations regarding the flatness and parallelism of these surfaces, DOE believes it is necessary to prescribe greater specificity for these parameters to improve consistency and repeatability during testing. Again, this proposed requirement would not alter the end R-value result in such a way as to require amendment of the energy conservation standards.

DOE also tentatively concludes that the addition of tolerances to the mean temperature of the test will have no effect on the measurement of panel R-value. The mean temperatures prescribed for testing (20 degrees Fahrenheit for freezer panels and 55 degrees Fahrenheit for cooler panels) are not being altered from their current values. Rather this tolerance is proposed as a means for ensuring test repeatability and comparability.

Performance-based energy conservation standards that would rely on the test procedures described in 10 CFR 431, Subpart R, Appendix A, as well as the AHRI 1250 test procedure, have not yet been established by DOE. Therefore, the changes proposed in today's notice—i.e., the removal of ASTM C1363, DIN EN 13165, and DIN EN 13164; the amendments to NFRC 100[E0A1]; and the amendments to AHRI 1250—will not affect the measurement of any current energy conservation standards.

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

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

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601, et seq.) requires the preparation of an initial regulatory flexibility analysis (IRFA) for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order

13272, “Proper Consideration of Small Entities in Agency Rulemaking,” 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel’s website: www.gc.doe.gov. DOE reviewed the test procedures considered in today’s SNOPR under the provisions of the Regulatory Flexibility Act (RFA) and the policies and procedures published on February 19, 2003.

DOE reviewed the AEDM requirements and the test procedure modifications being proposed under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. As discussed in more detail below, DOE found that because the provisions of this proposed rule will not result in increased testing and/or reporting burden for manufacturers and would, if adopted, permit additional manufacturers to use an AEDM for the purposes of rating and certifying their equipment, which would reduce manufacturer testing burden. Accordingly, based on DOE’s review, manufacturers are unlikely to experience increased financial burden if the provisions presented in today’s proposal are adopted.

First, DOE is proposing to allow walk-in manufacturers to use an AEDM to certify their products. Previously, no walk-in manufacturers were eligible to use an AEDM. Today’s proposal would adopt voluntary methods for certifying compliance in lieu of conducting actual physical testing – which in turn, would reduce the testing and reporting burden of walk-in manufacturers who elect to use an AEDM to certify their equipment. Furthermore, the proposed validation requirements for an AEDM would not require more testing than that which is currently required under DOE's regulations at 10 CFR 429.12. While the Department believes that permitting greater use of AEDMs will reduce the affected manufacturer's test burden, their use is at the manufacturer's discretion. If, as a result of any of the regulations herein, a manufacturer believes that use of an AEDM would increase rather than decrease their financial burden, the manufacturer may choose not to employ the method. Should a manufacturer choose to abstain from using an AEDM, this provision, if adopted, would not apply and the manufacturer would continue to remain subject to the requirements of the applicable DOE test procedures for walk-ins, which would result in no change in burden from that which is required currently.

DOE is also codifying alternate methods for certifying individual walk-in cooler and freezer components, which should further decrease the burden of existing DOE regulations. DOE is currently undertaking an energy conservation standards rulemaking to set performance standards for walk-in cooler components, including panels, doors, and refrigeration systems. Under the provisions of the March 2011 Final Rule, the "component" manufacturer would be required to certify compliance with these standards once they go into effect—however, there were no provisions for manufacturers of individual refrigeration components (i.e. unit coolers and condensing units) to separately certify their components to an energy conservation standard, since the proposed refrigeration system standard would apply to the whole refrigeration system. These manufacturers could potentially have incurred a large burden by having to test all combinations of the components they wished to certify. Additionally, manufacturers of only one type of component could have been inadvertently prevented from selling their equipment because there would have been no available certification mechanism. This SNOPR proposes an alternate certification methodology by which manufacturers of either component of a walk-in refrigeration system—the condensing unit or the unit cooler—may certify compliance with the applicable standard without having to test every combination of components that they produce. DOE believes this approach will significantly reduce the testing and certification burden for all manufacturers, including small businesses.

Finally, DOE is proposing to adopt several clarifications and modifications to the existing test procedures that are intended to further reduce testing burden. For example, DOE is proposing not to require the use of long-term thermal resistance testing of foam and to allow manufacturers to certify their panels based on testing to ASTM C518, a simpler test method that is already in use in the industry. For a complete list of test procedure modifications, see section III.

For the reasons enumerated above, DOE is certifying that this proposal, if promulgated, would not have a significant impact on a substantial number of small entities.

C. Review Under the Paperwork Reduction Act of 1995

A walk-in manufacturer must certify to DOE that its equipment complies with all applicable energy conservation standards. In certifying compliance, manufacturers must test their products according to the DOE test procedures for walk-in equipment, including any amendments adopted for those test procedures, on the date that compliance is required. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including direct heating equipment and pool heaters. 76 FR 12422 (March 7, 2011). The collection-of-information requirement for 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 20 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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

D. Review Under the National Environmental Policy Act of 1969

DOE is proposing amendments to its test procedures and related provisions for walk-in coolers and walk-in freezers. DOE has determined that this proposal falls into a class of actions that are categorically excluded from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.) and DOE's implementing regulations at 10 CFR part 1021. This proposed rule would amend the existing test procedures without affecting the amount, quality, or distribution of energy usage, and, therefore, would not result in any environmental impacts. Thus, this rulemaking is covered by Categorical Exclusion A5 under 10 CFR part 1021, subpart D, which applies to any rulemaking that interprets or amends an existing rule without changing the environmental effect of that rule. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

Executive Order 13132, "Federalism," 64 FR 43255 (August 10, 1999), imposes certain requirements on Federal 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 tentatively determined that it would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of today's proposed rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

Regarding the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, "Civil Justice Reform," 61 FR 4729 (Feb. 7, 1996), imposes on Federal agencies the general duty to adhere to the following requirements: (1)

eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; (3) provide a clear legal standard for affected conduct rather than a general standard; and (4) promote simplification and burden reduction. Regarding the review required by section 3(a), 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 tentatively determined that, to the extent permitted by law, the proposed rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. (Pub. L. No. 104-4, sec. 201, codified at 2 U.S.C. 1531) For regulatory actions 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)) 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 them. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. (62 FR 12820) (This policy is also available at www.gc.doe.gov/gc/office-general-counsel.) DOE examined today's proposed rule according to UMRA and its statement of policy and has tentatively determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector, of $100 million or more in any year. Accordingly, no further assessment or analysis is required under UMRA.

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

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

I. Review Under Executive Order 12630

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

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

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

K. Review Under Executive Order 13211

Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OIRA at OMB, a Statement of Energy Effects for any significant energy action. A "significant energy action" is defined as any action by an agency that promulgates 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.

DOE has reviewed today's proposal and determined, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects for this rulemaking.

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

Under section 301 of the Department of Energy Organization Act (Pub. L. 95–91; 42 U.S.C. 7101, et seq.), DOE must comply with all laws applicable to the former Federal Energy Administration, including section 32 of the Federal Energy Administration Act of 1974 (Pub. L. 93-275), as amended by the Federal Energy Administration Authorization Act of 1977 (Pub. L. 95-70). (15 U.S.C. 788; FEAA) Section 32 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. Today's proposed rule does not propose to incorporate any commercial standards. The commercial standards discussed in today's rulemaking were already adopted in the Test Procedures for Walk-In Coolers and Walk-In Freezers, which was published in the **Federal Register** on April

15, 2011. 76 FR 21580. DOE conducted a review under Section 32 of the Federal Energy Administration Act of 1974 in the April 2011 test procedure final rule. 76 FR 21580, 21604.

V. Public Participation

A. Submission of Comments

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

All submissions received must include the agency name and docket number and/or RIN for this rulemaking. No telefacsimilies (faxes) will be accepted.

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

However, your contact information will be publicly viewable if you include it in the comment itself 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. Otherwise, persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

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

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

Submitting comments via email, hand delivery/courier, or mail. Comments and documents submitted via email, hand delivery/courier, or mail also will be posted to www.regulations.gov. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information in 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/courier, please provide all items on a CD, if feasible, in which case it is not necessary to submit printed copies. No telefacsimiles (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 are free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

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

Confidential Business Information. Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email, postal mail, or hand delivery/courier 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).

B. Issues on Which DOE Seeks Comment

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

1. DOE requests comment on its proposal to align AEDM validation requirements for WICF refrigeration equipment to the validation requirements for commercial HVAC, refrigeration, and WH equipment.
2. DOE requests comment on the following tolerances for WICF AEDMs. For energy consumption metrics, the AEDM result for a model must be equal to or greater than 95 percent of the tested results for that same model. For energy efficiency metrics, the AEDM results for a model must be less than or equal to 105 percent of the tested results for that same model.
3. DOE seeks comment regarding the proposed requirement imposed on the manufacturer to re-certify any basic model with test data, including test data provided by DOE, in the case of a model failing to meet its AEDM rating.
4. DOE requests comment on its proposal to not require re-validation of an AEDM upon every change in a federal conservation standard or test procedure, but retain discretion to evaluate each case individually and require re-validation on a case-by-case basis in the NOPR upon issuance of a final standard rule or test procedure.
5. DOE requests comment on whether 90 days is an appropriate amount of time to complete the re-validation, re-rating and re-certification steps for cases where they are necessary for AEDMs.
6. DOE requests comment on its proposal to allow unit coolers and condensing units to be rated separately, and particularly the nominal values described in Table III.6.
7. DOE seeks comment on its nominal values for calculating electric defrost power and heat load in the absence of a full defrost test or for an individual condensing unit. DOE also

seeks comment on its nominal values for calculating hot gas defrost power and heat load. The nominal values may be found in sections III. B. 1. and III. B. 2.

8. DOE requests comment on its proposed amendments and clarifications to the test procedure; specifically (but not limited to) its modifications to the off-cycle evaporator fan test (section III. B. 3.), temperature measurement (section III. B. 5.), refrigerant line insulation (section III. B. 7.), and composition analysis (section III. B. 8.).
9. DOE asks whether the proposed requirement to remove facers or protective skins from panels before measuring thermal resistance is appropriate.
10. DOE asks whether the proposed requirement that a test sample for panel thermal resistance measurement be 1 inch in thickness and from the center of a WICF panel is appropriate.
11. DOE asks whether the tolerances specified for flatness (+/-0.03) and parallelism (.030 inches) for WICF panels before measuring thermal resistance are appropriate and sufficient.
12. DOE asks whether a tolerance of ±1 degree Fahrenheit for mean temperature during thermal resistance measurement is appropriate and sufficient.
13. DOE asks whether a 48-hour period after cutting the WICF panel for measuring thermal resistance is appropriate and sufficient,
14. DOE requests comment on its proposal to remove the test procedures in 10 CFR 431, Appendix A to Subpart R that reference ASTM C1363-05 and DIN EN 13164/13165 and their accompanying calculation procedures, leaving only ASTM C518-04 testing in 10 CFR 431.304 for establishing the thermal resistance of WICF panels.

15. DOE asks whether the surface heat transfer coefficients prescribed by NFRC 100[E0A1] are appropriate.

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of today's notice of proposed rulemaking.

List of Subjects

10 CFR Part 429

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

10 CFR Part 431

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

Issued in Washington, DC, on February 7, 2014.

Kathleen B. Hogan
Deputy Assistant Secretary for Energy Efficiency
Energy Efficiency and Renewable Energy

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

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

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

Authority: 42 U.S.C. 6291-6317.

2. Section 429.53 is amended to read as follows:

§429.53 Walk-in coolers and walk-in freezers.

(a) Determination of represented value.

(1) Refrigeration equipment: Manufacturers shall determine the represented value, which includes the certified rating, for each basic model of walk-in cooler or freezer refrigeration equipment, either by testing, in conjunction with the applicable sampling provisions, or by applying an AEDM.

(i) Units to be tested.

(A) If the represented value for a given basic model is determined through testing, the general requirements of §429.11 apply; and

(B) For each basic model selected for testing, a sample of sufficient size shall be randomly selected and tested to ensure that—

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

(i) The mean of the sample, where:

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

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

(ii) The upper 95 percent confidence limit (UCL) of the true mean divided by 1.05, where:

$$UCL = \bar{x} + t_{.95}(\frac{s}{\sqrt{n}})$$

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

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

(i) The mean of the sample, where:

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

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

(ii) The lower 95 percent confidence limit (LCL) of the true mean divided by 0.95, where:

$$LCL = \bar{x} - t_{.95}(\frac{s}{\sqrt{n}})$$

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

(ii) Alternative efficiency determination methods. In lieu of testing, a represented value of efficiency or consumption for a basic model of a walk-in cooler or freezer refrigeration system must be determined through the application of an AEDM pursuant to the requirements of §429.70 and the provisions of this section, where:

(A) Any represented value of energy consumption or other measure of energy use of a basic model for which consumers would favor lower values shall be greater than or equal to the output of the AEDM and less than or equal to the Federal standard for that basic model; and

(B) Any represented value of energy efficiency or other measure of energy consumption of a basic model for which consumers would favor higher values shall be less than or equal to the output of the AEDM and greater than or equal to the Federal standard for that basic model.

(2) WICF components other than those specified in (a)(1) of this subsection.

(i) Units to be tested.

(A) If the represented value for a given basic model is determined through testing, the general requirements of §429.11 apply; and

(B) For each basic model selected for testing, a sample of sufficient size shall be randomly selected and tested to ensure that—

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

(i) The mean of the sample, where:

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

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

(ii) The upper 95 percent confidence limit (UCL) of the true mean divided by 1.05, where:

$$UCL = \bar{x} + t_{.95}(\frac{s}{\sqrt{n}})$$

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

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

(i) The mean of the sample, where:

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

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

(ii) The lower 95 percent confidence limit (LCL) of the true mean divided by 0.95, where:

$$LCL = \bar{x} - t_{.95}(\frac{s}{\sqrt{n}})$$

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

(b) Certification reports. (1) Except that §429.12(b)(6) applies to the certified component, the requirements of §429.12 are applicable to manufacturers of the components of walk-in coolers and freezers (WICFs) listed in paragraph (b)(2) of this section, and;

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

(i) For WICF doors: The door type, R-value of the door insulation, and a declaration that the manufacturer has incorporated the applicable design requirements. In addition, for those WICFs with transparent reach-in doors and windows: The glass type of the doors and windows (e.g., double-pane with heat reflective treatment, triple-pane glass with gas fill), and the power draw of the antisweat heater in watts per square foot of door opening.

(ii) For WICF panels: The R-value of the insulation (except for glazed portions of the doors or structural members)

(iii) For WICF refrigeration systems: The motor purpose (i.e., evaporator fan motor or condenser fan motor), the horsepower, and a declaration that the manufacturer has incorporated the applicable design requirements.

3. Section 429.70 is amended by adding paragraph (f) to read as follows:

§429.70 Alternative methods for determining energy efficiency or energy use.

***   *   *   *   ***

(f) <u>Alternative efficiency determination method (AEDM) for walk-in refrigeration equipment.</u>

(1) <u>Criteria an AEDM must satisfy.</u> A manufacturer may not apply an AEDM to a basic model to determine its efficiency pursuant to this section unless:

(i) The AEDM is derived from a mathematical model that estimates the energy efficiency or energy consumption characteristics of the basic model as measured by the applicable DOE test procedure;

(ii) The AEDM is based on engineering or statistical analysis, computer simulation or modeling, or other analytic evaluation of performance data; and

(iii) The manufacturer has validated the AEDM, in accordance with paragraph (f)(2) of this section.

(2) Validation of an AEDM. Before using an AEDM, the manufacturer must validate the AEDM's accuracy and reliability as follows:

(i) The manufacturer must select at least the minimum number of basic models for each validation class specified in paragraph (f)(2)(iv) of this section to which the particular AEDM applies. Using the AEDM, calculate the energy use or energy efficiency for each of the selected basic models. Test a single unit of each basic model in accordance with paragraph (f)(2)(iii) of this section. Compare the results from the single unit test and the AEDM output according to paragraph (f)(2)(ii) of this section. The manufacturer is responsible for ensuring the accuracy and repeatability of the AEDM.

(ii) Individual Model Tolerances:

(A) The predicted efficiency for each model calculated by applying the AEDM may not be more than five percent greater than the efficiency determined from the corresponding test of the model.

(B) The predicted energy efficiency for each model calculated by applying the AEDM must meet or exceed the applicable federal energy conservation standard.

(iii) Additional Test Unit Requirements:

(A) Each AEDM must be supported by test data obtained from physical tests of current models; and

(B) Test results used to validate the AEDM must meet or exceed current, applicable Federal standards as specified in part 431 of this chapter;

(C) Each test must have been performed in accordance with the applicable DOE test procedure with which compliance is required at the time the basic model is distributed in commerce; and

(D) For a mismatched WICF refrigeration system, an AEDM may not simulate or model portions of the system that are not required to be tested by the DOE test procedure. That is, if the test results used to validate the AEDM are for either a unit cooler only or a condensing unit only, the AEDM must estimate the system rating using the nominal values specified in the DOE test procedure for the other part of the refrigeration system.

(iv) WICF Refrigeration Validation Classes

Validation Class	**Minimum Number of Distinct Models that Must be Tested**
Dedicated Condensing, Medium Temperature, Indoor System	2 Basic Models
Dedicated Condensing, Medium Temperature, Outdoor System	2 Basic Models
Dedicated Condensing, Low Temperature, Indoor System	2 Basic Models
Dedicated Condensing, Low Temperature, Outdoor System	2 Basic Models
Unit Cooler connected to a Multiplex Condensing Unit, Medium Temperature	2 Basic Models
Unit Cooler connected to a Multiplex Condensing Unit, Low Temperature	2 Basic Models
Medium Temperature, Indoor Condensing Unit	2 Basic Models
Medium Temperature, Outdoor Condensing Unit	2 Basic Models
Low Temperature, Indoor Condensing Unit	2 Basic Models
Low Temperature, Outdoor Condensing Unit	2 Basic Models

(3) AEDM Records Retention Requirements. If a manufacturer has used an AEDM to determine representative values pursuant to this section, the manufacturer must have available upon request for inspection by the Department records showing:

(i) The AEDM, including the mathematical model, the engineering or statistical analysis, and/or computer simulation or modeling that is the basis of the AEDM;

(ii) Equipment information, complete test data, AEDM calculations, and the statistical comparisons from the units tested that were used to validate the AEDM pursuant to paragraph (f)(2) of this section; and

(iii) Equipment information and AEDM calculations for each basic model to which the AEDM has been applied.

(4) Additional AEDM Requirements. If requested by the Department the manufacturer must perform at least one of the following:

(i) Conduct simulations before representatives of the Department to predict the performance of particular basic models of the product to which the AEDM was applied;

(ii) Provide analyses of previous simulations conducted by the manufacturer; or

(iii) Conduct certification testing of basic models selected by the Department.

(5) AEDM Verification Testing. DOE may use the test data for a given individual model generated pursuant to §429.104 to verify the certified rating determined by an AEDM as long as the following process is followed:

(i) Selection of units*:* DOE will obtain units for test from retail, where available. If units cannot be obtained from retail, DOE will request that a unit be provided by the manufacturer.

(ii) Lab Requirements: DOE will conduct testing at an independent, third-party testing facility of its choosing. In cases where no third-party laboratory is capable of testing the equipment, it may be tested at a manufacturer's facility upon DOE's request.

(iii) Manufacturer Participation: Testing will be performed without manufacturer representatives on-site.

(iv) Testing: All verification testing will be conducted in accordance with the applicable DOE test procedure, as well as each of the following to the extent that they apply:

(A) Any active test procedure waivers that have been granted for the basic model;

(B) Any test procedure guidance that has been issued by DOE;

(C) If during test set-up or testing, the lab indicates to DOE that it needs additional information regarding a given basic model in order to test in accordance with the applicable DOE test procedure, DOE may organize a meeting between DOE, the manufacturer and the lab to provide such information.

(D) At no time during the process may the lab communicate directly with the manufacturer without DOE present.

(v) Failure to meet certified rating: If a model tests worse than its certified rating by an amount exceeding the tolerance prescribed in paragraph (f)(5)(vi) of this section, DOE will notify the manufacturer. DOE will provide the manufacturer with all documentation related to the test set up, test conditions, and test results for the unit. Within the timeframe allotted by DOE, the manufacturer may then present all claims regarding testing validity.

(vi) Tolerances:

(A) For consumption metrics, the result from a DOE verification test must be less than or equal to the certified rating × (1 + the applicable tolerance).

(B) For efficiency metrics, the result from a DOE verification test must be greater than or equal to the certified rating × (1 - the applicable tolerance).

Equipment	**Metric**	**Applicable Tolerance**
Refrigeration systems (including components)	AWEF	5%

(vii) Invalid Rating: If, following discussions with the manufacturer and a retest where applicable, DOE determines that the testing was conducted appropriately in accordance with the DOE test procedure, the rating for the model will be considered invalid. Pursuant to 10 CFR 429.13(b), DOE may require a manufacturer to conduct additional testing as a remedial measure.

PART 431 – ENERGY CONSERVATION PROGRAM FOR CERTAIN COMMERCIAL AND INDUSTRIAL EQUIPMENT

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

Authority: 42 U.S.C. 6291-6317.

5. Section 431.304 is amended by:

a. Revising paragraphs (b) introductory text, and (b)(3) through (6);

b. Adding paragraph (b)(7);

c. Revising paragraphs (c) introductory text, and (c)(3) through (6);

d. Re-designating paragraphs (c)(7) through (c)(10) as paragraphs (c)(8) through (c)(11), respectively;

e. Adding new paragraph (c)(7);

f. Revising newly redesignated paragraphs (c)(8) through (10);

g. Adding paragraph (c)(12).

The revisions and additions read as follows:

§431.304 Uniform test method for the measurement of energy consumption of walk-in coolers and walk-in freezers.

*   *   *   *   *

(b) This paragraph (b) shall be used for the purposes of certifying compliance with the applicable energy conservation standards of the R-value of panels until January 1, 2015.

*   *   *   *   *

(3) For calculating the R value for freezers, the K factor of the foam at 20 ± 1 degrees Fahrenheit (average foam temperature) shall be used.

(4) For calculating the R value for coolers, the K factor of the foam at 55 ± 1 degrees Fahrenheit (average foam temperature) shall be used.

(5) Foam shall be tested after it is produced in its final chemical form. (For foam produced inside of a panel (“foam-in-place”), “final chemical form” means the foam is cured as intended and ready for use as a finished panel. For foam produced as board stock (typically polystyrene), “final chemical form” means after extrusion and ready for assembly into a panel or after assembly into a panel.) Foam from foam-in-place panels must not include any structural members or non-foam materials. Foam produced as board stock may be tested prior to its incorporation into a final panel. A test sample no more than one inch in thickness must be taken from the center of a panel (meaning, centered on a plane half the distance between the surfaces on which facers were attached) and any protective skins or facers must be removed. The two

surfaces of the test sample that will contact the hot plate assemblies (as defined in ASTM C518) must both maintain ±0.03 inches flatness tolerance and also maintain parallelism with respect to one another within ±0.03 inches. Testing must be completed within 48 hours of samples being cut for testing.

(6) Internal non-foam member and/or edge regions shall not be considered in ASTM C518 testing.

(7) For panels consisting of two or more layers of dissimilar insulating materials (excluding facers or protective skins), test each material as described in paragraph (4). For a panel with *n* layers of insulating material, the R-Value shall be calculated as follows:

$$R_{panel} = \sum_{1}^{i} \frac{t_i}{k_i}$$

Where:

k_i is the k factor of type *i* material as measured by ASTM C518, and

t_i is the thickness of type *i* material that appears in the panel.

(c) This paragraph (c) shall be used for any representations of energy efficiency or energy use starting on October 12, 2011 and to certify compliance to the energy conservation standards of the R-value of panels on or after January 1, 2015.

*   *   *   *   *

(3) For calculating the R value for freezers, the K factor of the foam at 20 ± 1 degrees Fahrenheit (average foam temperature) shall be used.

(4) For calculating the R value for coolers, the K factor of the foam at 55 ± 1 degrees Fahrenheit (average foam temperature) shall be used.

(5) Foam shall be tested after it is produced in its final chemical form. (For foam produced inside of a panel ("foam-in-place"), "final chemical form" means the foam is cured as intended and ready for use as a finished panel. For foam produced as board stock (typically polystyrene), "final chemical form" means after extrusion and ready for assembly into a panel or after assembly into a panel.) Foam from foam-in-place panels must not include any structural members or non-foam materials. Foam produced as board stock may be tested prior to its incorporation into a final panel. A test sample no more than one inch in thickness must be taken from the center of a panel (meaning, centered on a plane half the distance between the surfaces on which facers were attached) and any protective skins or facers must be removed. The two surfaces of the test sample that will contact the hot plate assemblies (as defined in ASTM C518) must both maintain ±0.03 inches flatness tolerance and also maintain parallelism with respect to one another within ±0.03 inches. Testing must be completed within 48 hours of samples being cut for testing.

(6) Internal non-foam member and/or edge regions shall not be considered in ASTM C518 testing.

(7) For panels consisting of two or more layers of dissimilar insulating materials (excluding facers or protective skins), test each material as described in paragraph (4). For a panel with *n* layers of insulating material, the R-Value shall be calculated as follows:

$$R_{panel} = \sum_{1}^{i} \frac{t_i}{k_i}$$

Where:

k_i is the k factor of type *i* material as measured by ASTM C518, and

t_i is the thickness of type *i* material that appears in the panel.

(8) Determine the U-factor, conduction load, and energy use of walk-in cooler and walk-in freezer display panels by conducting the test procedure set forth in appendix A to this subpart section 4.1.

(9) Determine the energy use of walk-in cooler and walk-in freezer display doors and non-display doors by conducting the test procedure set forth in appendix A to this subpart, sections 4.4 and 4.5, respectively.

(10) Determine the Annual Walk-in Energy Factor of walk-in cooler and walk-in freezer refrigeration systems by conducting the test procedure set forth in AHRI 1250 (incorporated by reference; see §431.303), with the following modifications:

(i) In Table 2, Test Operating and Test Condition Tolerances for Steady-State Test, electrical power frequency shall have a Test Condition Tolerance of 1 percent. Also, refrigerant temperature measurements shall have a tolerance of +/-0.5F for unit cooler in/out, +/-1.0F for all others temperature measurements.

(ii) In Table 2, the Test Operating Tolerances and Test Condition Tolerances for Air Leaving Temperatures shall be deleted.

(iii) In Table 2, The Test Condition Tolerance for Outdoor Wet Bulb Temperature of 0.3 applies only to units with evaporative cooling.

(iv) In section C3.1.6, refrigerant temperature measurements upstream and downstream of the unit cooler may use sheathed sensors immersed in the flowing refrigerant instead of thermometer wells.

(v) In section C3.5, for a given motor winding configuration, the total power input shall be measured at the highest nameplate voltage. For three-phase power, voltage imbalances shall be no more than 2 percent from phase to phase.

(vi) In the test setup (section C8.3), the condenser and unit cooler shall be connected by pipes of the manufacturer specified size. The pipe lines shall be insulated with a minimum total thermal resistance equivalent to ½" thick insulation having a flat-surface R-Value of 3.7 ft^2-°F-hr/Btu per inch or greater. Flow meters need not be insulated but must not be in contact with the floor. The lengths of each of the connected liquid line and suction line shall be 25 feet, not including the requisite flow meters. Of this length, no more than 15 feet shall be in the conditioned space. In the case that there are multiple branches of piping, the maximum length of piping applies to each branch individually as opposed to the total length of the piping.

(vii) In section C3.4.5, for verification of sub-cooling downstream of mass flow meters, only the sight glass and a temperature sensor located on the tube surface under the insulation are required.

(viii) Delete section C3.3.6.

(ix) In section C11.1, to determine frost load defrost conditions, the Frost Load Conditions Defrost Test (C11.1.1) is optional. If the frost load test is not performed, the frost load defrost DF_f shall be equal to 1.05 times the dry coil energy consumption DF_d measured using the dry coil condition test in section C11.1 and the number of defrosts per day N_{DF} shall be set to 4.

(x) In section C11.2, if the system has an adaptive or demand defrost system, the optional test may be run as specified to establish the number of defrosts per day under dry coil conditions and this number shall be averaged with the number of defrosts per day calculated under the frost load conditions. If the system has an adaptive or demand defrost system and the optional test is not run, the number of defrosts per day N_{DF} shall be set to the average of 1 and the number of defrosts per day calculated under the frost load conditions (section (c)(8)(ix)).

(xi) In section C11.3, if the frost load test is not performed, the daily contribution of the load attributed to defrost Q_{DF} in Btu shall be calculated as follows:

$$Q_{DF} = 0.95 \times 3.412 \text{ Btu/W-h} \times \frac{DF_d + DF_f}{2} \times N_{DF}$$

Where:

DF_d = the defrost energy, in W-h, at the dry coil condition

DF_f = the defrost energy, in W-h, at the frosted coil condition

N_{DF} = the number of defrosts per day

(xii) In section C11, if the unit utilizes hot gas defrost, Q_{DF} and DF shall be calculated as follows:

$$Q_{DF} = \times N_{DF}$$

Where:

Q_{ref} = Gross refrigeration capacity in Btu/h as measured at the high ambient condition (90 °F for indoor systems and 95 °F for outdoor systems)

N_{DF} = Number of defrosts per day; shall be set to the number recommended in the installation instructions for the unit (or if no instructions, shall be set to 4) for units without adaptive defrost and 2.5 for units with adaptive defrost

For unit coolers connected to a multiplex system: The defrost energy, DF, in W-h = 0

For dedicated condensing systems or condensing units tested separately:

$$DF = 0.5 \times Q_{DF}/3.412 \text{ Btu/W-h} \times N_{DF}$$

(xiii) In section C3.4.6, for units with integrated oil separators, the ratio of oil to refrigerants can be assumed to be less than 1% without the need for confirmatory testing.

(xiv) Section C10 shall be revised to read:

Off-cycle evaporator fan test. Upon the completion of the steady state test for walk-in systems, the compressors of the walk-in systems shall be turned off. The unit coolers fans' power consumption shall be measured in accordance with the requirements in Section C 3.5. Off-cycle fan power shall be equal to on-cycle fan power unless evaporator fans are controlled by a qualifying control. Qualifying evaporator fan controls shall have a user adjustable method of destratifying air during the off-cycle including but not limited to: adjustable fan speed control or periodic "stir cycles." Controls shall be adjusted so that the greater of a 50% duty cycle or the manufacturer default is used for measuring off-cycle fan energy. For variable speed controls, the greater of 50% fan speed or the manufacturer's default fan speed shall be used for measuring off-cycle fan energy. When a cyclic control is used at least three full “stir cycles” are measured.

(xv) Table 15 and Table 16 are modified as follows:

Table 15. Refrigerator Unit Cooler								
Test Description	**Unit Cooler Air Entering Dry-Bulb, ˚F**	**Unit Cooler Air Entering Relative Humidity, %**	**Saturated Suction Temp, ˚F**	**Liquid Inlet Saturation Temp, ˚F**	**Liquid Inlet Subcooling, ˚F**	**Compressor Capacity**	**Outlet Superheat, ˚F**	**Test Objective**
Off Cycle Fan Power	35	<50	-	-	-	Compressor Off	-	Measure fan input power during compressor off cycle
Refrigeration Capacity Suction A	35	<50	25	105	9	Compressor On	6.5	Determine Net Refrigeration Capacity of Unit Cooler
Refrigeration Capacity Suction B	35	<50	20	105	9	Compressor On	6.5	Determine Net Refrigeration Capacity of Unit Cooler

Table 16. Freezer Unit Cooler								
Test Description	**Unit Cooler Air Entering Dry-Bulb, ˚F**	**Unit Cooler Air Entering Relative Humidity, %**	**Saturated Suction Temp, ˚F**	**Liquid Inlet Saturation Temp, ˚F**	**Liquid Inlet Subcooling, ˚F**	**Compressor Capacity**	**Outlet Superheat, ˚F**	**Test Objective**
Off Cycle Fan Power	-10	<50	-	-	-	Compressor Off	-	Measure fan input power during compressor off cycle
Refrigeration Capacity Suction A	-10	<50	25	105	9	Compressor On	6.5	Determine Net Refrigeration Capacity of Unit Cooler
Refrigeration Capacity Suction B	-10	<50	20	105	9	Compressor On	6.5	Determine Net Refrigeration Capacity of Unit Cooler
Defrost	-10	Various	-	-	-	Compressor Off	-	Test according to Appendix C Section C11

*   *   *   *   *

(12) Rating of walk-in cooler and freezer refrigeration system components sold separately

(i) A unit cooler, if sold separately, shall be rated using the method for testing a unit cooler connected to a multiplex condensing system.

(ii) A condensing unit, if sold separately, shall be rated using the following nominal values:

Saturated suction temperature at the evaporator coil exit T_{evap} (°F) = 25 for coolers and -20 for freezers

On-cycle evaporator fan power $EF_{comp, on}$ (W) = 0.016 W-h/Btu × $q_{mix,cd}$ (Btu/h); where $q_{mix, cd}$ is the gross cooling capacity at the highest ambient rating condition (90 °F for indoor units and 95 °F for outdoor units)

Off-cycle evaporator fan power $EF_{comp,off}$ (W)= 0.2 × $EF_{comp,on}$ (W)

For medium temperature (cooler) condensing units: Daily defrost energy use DF (W-h) = 0 and daily defrost heat load contribution Q_{DF} (Btu) = 0

For low temperature (freezer) condensing units without hot gas defrost capability:

Daily defrost energy use DF (W-h) = 0.12 (W-h/cycle)/(Btu/h) × $q_{mix,cd}$ (Btu/h) × N_{DF} for freezers

Defrost heat load contribution Q_{DF} (Btu) = 0.95 × DF (W-h) / 3.412 Btu/W-h

For low temperature (freezer) condensing units with hot gas defrost capability, DF and Q_{DF} shall be calculated using the method in paragraph (10)(xii) of this section.

The number of defrost cycles per day (N_{DF}) shall be set to the number recommended in the installation instructions for the unit (or if no instructions, shall be set to 4) for units without adaptive defrost and 2.5 for units with adaptive defrost.

(iii) Only fixed capacity condensing units may be certified in this manner. Multiple-capacity condensing units must be rated and certified as part of a matched system.

6. Appendix A to Subpart R of Part 431 is amended by:

a. Removing and reserving sections 4.2, 4.3, 5.1, and 5.2;

b. Revising paragraph 5.3(a)(1);

c. Removing in paragraph 5.3(a)(2) “Internal” and adding “Cold-side” in its place; and

d. Removing in paragraph 5.3(a)(3) “External” and adding “Warm-side” in its place.

The revision reads as follows:

Appendix A to Subpart R of Part 431 – Uniform Test Method for the Measurement of Energy Consumption of the Components of Envelopes of Walk-In Coolers and Walk-In Freezers

* * * * *

4.2 [Removed and Reserved]

4.3 [Removed and Reserved]

* * * * *

5.1 [Removed and Reserved]

5.2 [Removed and Reserved]

5.3 * * *

(a) * * *

(1) The average surface heat transfer coefficient on the cold-side of the apparatus shall be 30 Watts per square-meter-Kelvin (W/m^2*K) ± 5%. The average surface heat transfer coefficient on the warm-side of the apparatus shall be 7.7 Watts per square-meter-Kelvin (W/m^2*K) ± 5%.

* * * * *