DEPARTMENT OF ENERGY

10 CFR Parts 429 and 431

[EERE–2017–BT–TP–0008]

RIN 1904–AD83

Energy Conservation Program: Test Procedure for Commercial Refrigerators, Refrigerator-Freezers, and Freezers

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

ACTION: Final rule.

SUMMARY: The U.S. Department of Energy (''DOE'') amends the test procedures for commercial refrigerators, refrigerator-freezers, and freezers (''CRE'') to reference the latest versions of the applicable industry standards. DOE also establishes definitions and test procedures for new equipment categories, adopts test procedures consistent with recently published waivers and interim waivers, establishes product-specific enforcement provisions, allows for volume determinations based on computer-aided designs, specifies a sampling plan for volume and total display area, and adopts additional clarifying amendments.

DATES: The effective date of this rule is October 26, 2023. The amendments will be mandatory for equipment testing starting September 20, 2024.

The incorporation by reference of certain material listed in the rule is approved by the Director of the Federal Register on October 26, 2023.

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

A link to the docket web page can be found at *www.regulations.gov/docket/EERE-2017-BT-TP-0008.* The docket web page contains instructions on how to access all documents, including public comments, in the docket. For further information on how to review the docket, contact the Appliance and Equipment Standards Program staff at (202) 287–1445 or by email: *ApplianceStandardsQuestions@ee.doe.gov.*

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SUPPLEMENTARY INFORMATION: DOE incorporates by reference the following industry standards into 10 CFR part 431:

AHRI Standard 1200–2023 (I–P), *2023 Standard for Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets,* copyright 2023 (''AHRI 1200–2023'').

ANSI/AHRI Standard 1320–2011 (I–P), *2011 Standard for Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets for Use With Secondary Refrigerants,* copyright 2011 (''ANSI/AHRI 1320–2011'').

ANSI/ASHRAE Standard 72–2022:

- *Method of Testing Open and Closed Commercial Refrigerators and Freezers,* approved June 30, 2022; and
- Errata Sheet, November 11, 2022

(''ANSI/ASHRAE 72–2022'').

ASTM F2143–16, *Standard Test Method for Performance of Refrigerated Buffet and Preparation Tables,* approved May 1, 2016 (''ASTM F2143–16'').

Copies of AHRI 1200–2023 and AHRI 1320–2011 can be obtained by going to *www.ahrinet.org/standards/search-standards.*

Copies of ASHRAE 72–2022 can be obtained by going to *www.techstreet.com/standards/ashrae-72-2022?product_id=1710927* and the November 11, 2022 Errata can be obtained by going to *www.ashrae.org/technical-resources/standards-and-guidelines/standards-errata.*

Copies of ASTM F2143–16 can be purchased at *www.astm.org/f2143-16.html.*

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

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I. Authority and Background

Commercial refrigerators, refrigerator-freezers, and freezers (collectively, commercial refrigeration equipment, or ''CRE'') are included in the list of ''covered equipment'' for which the U.S. Department of Energy (''DOE'') is authorized to establish and amend energy conservation standards and test procedures. (42 U.S.C. 6311)(1)(E)) DOE's energy conservation standards and test procedures for CRE are currently prescribed at subpart C of part 431 of title 10 of the Code of Federal Regulations (''CFR''). The following

sections discuss DOE's authority to establish test procedures for CRE and relevant background information regarding DOE's consideration of test procedures for this equipment.

A. Authority

The Energy Policy and Conservation Act, Public Law 94–163, as amended (''EPCA''),[1] authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part C[2] of EPCA, added by Public Law 95–619, Title IV, section 441(a), established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve energy efficiency. This equipment includes CRE, the subject of this document. (42 U.S.C. 6311 (1)(E))

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42 U.S.C. 6311), test procedures (42 U.S.C. 6314), labeling provisions (42 U.S.C. 6315), energy conservation standards (42 U.S.C. 6313), and the authority to require information and reports from manufacturers (42 U.S.C. 6316; 42 U.S.C. 6296).

The Federal testing requirements consist of test procedures that manufacturers of covered equipment must use as the basis for: (1) certifying to DOE that their equipment complies with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6316(a); 42 U.S.C. 6295(s)), and (2) making other representations about the efficiency of that equipment (42 U.S.C. 6314(d)). Similarly, DOE must use these test procedures to determine whether the equipment complies with relevant standards promulgated under EPCA. (42 U.S.C. 6316(a); 42 U.S.C. 6295(s))

Federal energy efficiency requirements for covered equipment established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (42 U.S.C. 6316(a) and 42 U.S.C. 6316(b); 42 U.S.C. 6297) DOE may, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA. (42 U.S.C. 6316(b)(2)(D))

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

With respect to CRE, EPCA requires DOE to use the test procedures determined by the Secretary to be generally accepted industry standards, or industry standards developed or recognized by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (''ASHRAE'') or American National Standards Institute (''ANSI''). (42 U.S.C. 6314(a)(6)(A)(i)) With regard to self-contained CRE to which statutory standards are applicable, the required initial test procedure is the ASHRAE 117 test procedure in effect on January 1, 2005. (42 U.S.C. 6314(a)(6)(A)(ii)) Additionally, EPCA requires that if ASHRAE 117 is amended, the Secretary shall, by rule, amend the test procedure for the product as necessary to ensure that the test procedure is consistent with the amended ASHRAE 117 test procedure, unless the Secretary makes a determination, by rule, and supported by clear and convincing evidence, that to do so would not meet the statutory requirements regarding representativeness and burden. (42 U.S.C. 6314(a)(6)(E)) Finally, EPCA states that if a test procedure other than the ASHRAE 117 test procedure is approved by ANSI, DOE must review the relative strengths and weaknesses of the new test procedure relative to the ASHRAE 117 test procedure and adopt one new test procedure for use in the standards program. (42 U.S.C. 6314(a)(6)(F)(i))[3]

EPCA also requires that, at least once every 7 years, DOE evaluate test procedures for each type of covered equipment, including CRE, to determine whether amended test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating costs during a representative average use cycle. (42 U.S.C. 6314(a)(1))

In addition, if the Secretary determines that a test procedure amendment is warranted, the Secretary must publish proposed test procedures in the **Federal Register** and afford interested persons an opportunity (of not less than 45 days' duration) to present oral and written data, views, and arguments on the proposed test procedures. (42 U.S.C. 6314(b)) If DOE determines that test procedure revisions are not appropriate, DOE must publish in the **Federal Register** its determination not to amend the test procedures. (42 U.S.C. 6314(a)(1)(A)(ii))

DOE is publishing this final rule in satisfaction of the 7-year review requirement specified in EPCA. (42 U.S.C. 6314(a)(1)(A))

B. Background

DOE's current test procedure for CRE appears at 10 CFR part 431, subpart C, appendix B (''Amended Uniform Test Method for the Measurement of Energy Consumption of Commercial Refrigerators, Freezers, and Refrigerator-Freezers'' or ''appendix B'').

DOE last amended the test procedure for CRE in a final rule published on April 24, 2014 (''April 2014 Final Rule''). 79 FR 22277. Specifically, DOE clarified certain terms, procedures, and compliance dates to improve repeatability and provide additional detail compared to the prior version of the test procedure. DOE noted that the amendments in the April 2014 Final Rule would not affect the energy use of CRE as measured under the prior version of the test procedure. 79 FR 22277, 22280–22281.

The test procedure incorporates by reference the following industry standards: (1) AHRI Standard 1200 (I–P)-2010, ''Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets'' (''AHRI 1200–2010''); (2) ASHRAE Standard 72–2005, ''Method of Testing Commercial Refrigerators and Freezers,'' which was approved by ANSI on July 29, 2005 (''ASHRAE 72–2005''); and (3) ANSI/Association of Home Appliance Manufacturers (''AHAM'') Standard HRF–1–2008, ''Energy and Internal Volume of Refrigerating Appliances'' (''AHAM HRF–1–2008'') for determining refrigerated volumes for CRE.

On June 11, 2021, DOE published in the **Federal Register** an early assessment

[1] All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Public Law 116–260 (Dec. 27, 2020), which reflect the last statutory amendments that impact Parts A and A–1 of EPCA.

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

[3] In 2005, ASHRAE combined Standard 72–1998, ''Method of Testing Open Refrigerators,'' and Standard 117–2002 and published the test method as ASHRAE Standard 72–2005, ''Method of Testing Commercial Refrigerators and Freezers,'' which was approved by ANSI on July 29, 2005.

request for information (''June 2021 RFI'') seeking comments on the existing DOE test procedure for CRE. 86 FR 31182. In the June 2021 RFI, DOE requested comments, information, and data regarding a number of issues, including (1) scope and definitions, (2) updates to industry standards, (3) test conditions for specific CRE categories, (4) harmonization with food safety standards, (5) remote condensing units, (6) test procedure clarifications, (7) alternative refrigerants, (8) compartment volume certification, and (9) test procedure waivers.

On June 30, 2022, DOE published in the **Federal Register** a notice of proposed rulemaking (''NOPR'') that proposed to update and establish test procedures for CRE (''June 2022 NOPR''). 87 FR 39164. In the June 2022 NOPR, DOE proposed to and requested feedback on the following:

(1) Establish new definitions for high-temperature refrigerator, medium-temperature refrigerator, low-temperature freezer, and mobile refrigerated cabinet, and amend the definition for ice-cream freezer;

(2) Incorporate by reference the most current versions of industry standards AHRI 1200, ASHRAE 72, and AHRI 1320;

(3) Establish definitions and a new appendix C including test procedures for buffet tables and preparation tables;

(4) Establish definitions and a new appendix D including test procedures for blast chillers and blast freezers;

(5) Amend the definition for chef base or griddle stand;

(6) Specify refrigerant conditions for CRE that use R–744;

(7) Allow for certification of compartment volumes based on computer-aided design (''CAD'') models;

(8) Incorporate provisions for defrosts and customer order storage cabinets currently specified in waivers and interim waivers;

(9) Adopt product-specific enforcement provisions;

(10) Clarify use of the lowest application product temperature (''LAPT'') provisions;

(11) Remove the obsolete test procedure in appendix A; and

(12) Specify a sampling plan for volume and total display area (''TDA''). 87 FR 39164.

DOE received comments in response to the June 2022 NOPR from the interested parties listed in Table I.1.

TABLE I.1—LIST OF COMMENTERS WITH WRITTEN SUBMISSIONS IN RESPONSE TO THE JUNE 2022 NOPR

Commenter(s)	Reference in this final rule	Comment No. in the docket	Commenter type
AHT Cooling Systems GmbH	AHT	40	Manufacturer.
Air-Conditioning, Heating, and Refrigeration Institute	AHRI	38	Trade Association.
Appliance Standards Awareness Project, American Council for an Energy-Efficient Economy, and Natural Resources Defense Council.	Joint Commenters	31	Efficiency Organizations.
Continental Refrigerator	Continental	29	Manufacturer.
Hillphoenix, Inc	Hillphoenix	35	Manufacturer.
Hoshizaki America, Inc	Hoshizaki	30	Manufacturer.
Hussmann Corporation	Hussmann	32	Manufacturer.
National Automatic Merchandising Association	NAMA	33	Trade Association.
North American Association of Food Equipment Manufacturers.	NAFEM	34	Trade Association.
Northwest Energy Efficiency Alliance	NEEA	39	Efficiency Organization.
Pacific Gas and Electric Company, San Diego Gas & Electric, and Southern California Edison; collectively, the California Investor-Owned Utilities.	CA IOUs	36	Energy Utilities.
True Manufacturing Company, Inc	True	28	Manufacturer.
Zero Zone, Inc	Zero Zone	37	Manufacturer.

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.[4] To the extent that interested parties have provided written comments that are substantively consistent with any oral comments provided during the August 1, 2022, public meeting, DOE cites the written comments throughout this final rule. Any oral comments provided during the public meeting that are not substantively addressed by written comments are summarized and cited separately throughout this final rule.

[4] The parenthetical reference provides a reference for information located in the docket of DOE's rulemaking to develop test procedures for CRE. (Docket No. EERE–2017–BT–TP–0008, which is maintained at *www.regulations.gov*). The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

II. Synopsis of the Final Rule

In this final rule, DOE amends and establishes test procedures for CRE as follows:

(1) Establish new definitions for high-temperature refrigerator, medium-temperature refrigerator, low-temperature freezer, and mobile refrigerated cabinet, and amend the definition for ice-cream freezer;

(2) Incorporate by reference the most current versions of industry standards AHRI 1200, ASHRAE 72, and AHRI 1320;

(3) Establish definitions and a new appendix C including test procedures for buffet tables and preparation tables;

(4) Establish definitions and a new appendix D including test procedures for blast chillers and blast freezers;

(5) Amend the definition and certain test conditions for chef bases or griddle stands;

(6) Specify refrigerant conditions for CRE that use R–744;

(7) Allow for certification of compartment volumes based on computer-aided design (''CAD'') models;

(8) Incorporate provisions for defrosts and customer order storage cabinets currently specified in waivers and interim waivers;

(9) Adopt product-specific enforcement provisions;

(10) Clarify use of the lowest application product temperature (''LAPT'') provisions;

(11) Remove the obsolete test procedure in appendix A; and

(12) Specify a sampling plan for volume and total display area (''TDA'').

The adopted amendments are summarized and compared to the test procedure provision prior to the amendment in Table II.1, along with the reason for the adopted change.

TABLE II.1—SUMMARY OF CHANGES IN THE AMENDED TEST PROCEDURE

DOE Test Procedure Prior to Amendment	Amended Test Procedure	Changes from the June 2022 NOPR proposed test procedure summary of changes	Attribution
Defines commercial refrigerator without delineating between units that operate at medium and high temperatures.	Defines high-temperature refrigerator and medium-temperature refrigerator to account for new high-temperature rating point.	None	Improves representativeness.
Defines ice-cream freezer as a type of commercial freezer.	Defines low-temperature freezer to delineate between ice-cream freezers and other commercial freezers.	None	Improves representativeness.
Ice-cream freezer definition refers only to ''ice cream''.	Ice-cream definition refers more broadly to ''ice cream and other frozen desserts''.	Expanded to ''ice cream and other frozen desserts''.	Improves representativeness.
References AHRI 1200–2010 for rating requirements.	References AHRI 1200–2023 for rating requirements.	Updated to harmonize with most recent version of AHRI 1200.	Harmonizes with most recent industry standard.
References ASHRAE 72–2005 for test requirements.	References ASHRAE 72–2022 with Errata for test requirements.	Updated to harmonize with most recent version of ASHRAE 72.	Harmonizes with most recent industry standard.
References AHAM HRF–1–2008 for volume measurement.	References AHRI 1200–2023 for volume requirements.	Updated to harmonize with most recent version of AHRI 1200.	Harmonizes with most recent industry standard.
Includes a single 38 °F rating point for commercial refrigerators.	Specifies 38 °F rating point for medium-temperature refrigerators and 55 °F rating point for high-temperature refrigerators.	None	Improves representativeness; harmonizes with industry standard.
Does not specify a method for testing CRE with secondary coolants.	References AHRI 1320–2011 for CRE used with secondary coolants.	None	Improves representativeness; harmonizes with industry standard.
Does not specify definitions or test procedures for buffet tables and preparation tables.	Defines buffet table and preparation table and establishes test procedures based on ASTM F2143–16.	None	Improves representativeness; harmonizes with industry standard.
Does not specify definitions or test procedures for blast chillers and blast freezers.	Defines blast chiller and blast freezer and establishes test procedures based on expected industry test method.	None	Improves representativeness; harmonizes with industry standard.
Chef base or griddle stand definition does not refer to a maximum height.	Clarifies chef base or griddle stand definition by specifying a maximum height of 32 in. for this equipment.	None	Improves representativeness.
Chef bases or griddle stands have a dry-bulb temperature of 75.2 °F; wet-bulb temperature of 64.4 °F; and radiant heat temperature of greater than or equal to 70.0 °F.	Chef bases or griddle stands have a dry-bulb temperature of 86.0 °F; wet-bulb temperature of 73.7 °F; and radiant heat temperature of greater than or equal to 81.0 °F.	Updated test conditions	Improves representativeness.
Does not provide procedures for CRE with no automatic defrost or with long duration defrost cycles.	References ASHRAE 72–2022 with Errata for test instructions for units with no automatic defrost and adopts optional two-part test for CRE with defrost cycles longer than 24 hours.	Updated to harmonize with most recent version of ASHRAE 72.	Addresses existing waiver; harmonizes with industry standard.
Includes conflicting instructions regarding TDA calculation.	Corrects errors in current test procedure by reference to AHRI 1200–2023.	Updated to harmonize with most recent version of AHRI 1200.	Improves representativeness, repeatability, and reproducibility; harmonizes with industry standard.
Provides refrigerant conditions that are applicable only to common refrigerants.	Specifies refrigerant conditions to allow for testing with carbon dioxide refrigerant.	Includes tolerances and updates conditions to ensure appropriate operation within tolerances.	Improves representativeness; harmonizes with existing waiver.
Requires determining volume based on testing.	Allows the use of CAD models to certify volume.	None	Reduces test burden.
Specifies a single door opening sequence.	Defines customer order storage cabinet equipment category and specifies an alternate door opening sequence for this equipment.	None	Improves representativeness; harmonizes with existing waiver.
Does not specify product-enforcement provisions.	Includes product-enforcement provisions for determining volume and TDA.	None	Improves clarity.

TABLE II.1—SUMMARY OF CHANGES IN THE AMENDED TEST PROCEDURE—Continued

DOE Test Procedure Prior to Amendment	Amended Test Procedure	Changes from the June 2022 NOPR proposed test procedure summary of changes	Attribution
Specifies LAPT instructions for temperatures above target test temperature.	Clarifies use of LAPT provisions for operating temperatures below the target test temperature.	None	Improves clarity.
Includes obsolete appendix A and current appendix B test procedures.	Removes obsolete appendix A; adds new appendix C for testing buffet tables and preparation tables, and adds new appendix D for testing blast chillers and blast freezers.	None	Improves readability.
Does not specify a sampling plan for volume and TDA.	Specifies that volume and TDA be determined based on the mean of the test sample.	None	Improves representativeness, repeatability, and reproducibility.

DOE has determined that the amendments described in section III of this document and adopted in this document will not alter the measured efficiency of CRE currently subject to energy conservation standards, or require retesting or recertification solely as a result of DOE's adoption of the amendments to the test procedures. Additionally, DOE has determined that the amendments will not increase the cost of testing for CRE currently tested to the existing test procedure. For chef bases or griddle stands, buffet tables and preparation tables, and blast chillers and blast freezers, testing according to the amended or established test procedure will not be required until the compliance date of any energy conservation standards for that equipment. However, any representations of energy use for chef bases or griddle stands, buffet tables and preparation tables and blast chillers and blast freezers must be made in accordance with the amended test procedure starting 360 days after this final rule publishes in the **Federal Register**. While DOE does not expect that manufacturers will incur additional cost as a result of the established test procedure, DOE provides a discussion of testing costs in section III.O.1 of this document. Discussion of DOE's actions are addressed in detail in section III of this document.

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

III. Discussion

A. Scope and Definitions

''Commercial refrigerator, freezer, and refrigerator-freezer'' means refrigeration equipment that is not a consumer product (as defined in 10 CFR 430.2); is not designed and marketed exclusively for medical, scientific, or research purposes; operates at a chilled, frozen, combination chilled and frozen, or variable temperature; displays or stores merchandise and other perishable materials horizontally, semi-vertically, or vertically; has transparent or solid doors, sliding or hinged doors, a combination of hinged, sliding, transparent, or solid doors, or no doors; is designed for pull-down temperature applications or holding temperature applications; and is connected to a self-contained condensing unit or to a remote condensing unit. 10 CFR 431.62.

For the purpose of determining applicability of certain test procedure provisions, DOE proposed in the June 2022 NOPR to amend certain existing definitions and to establish certain new definitions, as discussed in the following paragraphs. 87 FR 39164, 39168–39171. DOE discusses additional equipment definitions and test procedures for specific equipment categories in section III.C of this document.

1. Ice-Cream Freezers

DOE defines certain categories of CRE, including ''ice-cream freezer.'' DOE defines an ''ice-cream freezer'' as a commercial freezer that is designed to operate at or below $-5\ °F \pm 2\ °F$ ($-21\ °C \pm 1.1\ °C$) and that the manufacturer designs, markets, or intends for the storing, displaying, or dispensing of ice cream. 10 CFR 431.62.

In the June 2022 NOPR, DOE did not identify any technical features that would allow for distinguishing ice-cream freezers from other commercial freezers capable of operating at low temperatures and therefore did not propose in the June 2022 NOPR to include any additional equipment characteristics in the ice-cream freezer definition. 87 FR 39164, 39168.

a. Frozen Desserts

DOE noted in the June 2022 NOPR that the equipment term and definition reference ''ice cream,'' but ''ice cream'' is not defined. 87 FR 39164, 39168. DOE acknowledged that other frozen products may be similarly stored and displayed. *Id.* For example, food products such as gelato, frozen yogurt, and sorbet are typically displayed, stored, and dispensed in the same manner as ice cream. *Id.* The CRE used for these products is likely similar, if not identical, to equipment used to store, display, or dispense ice cream. *Id.*

To clarify the equipment classification and to avoid potential misunderstanding that the term ''ice-cream freezer'' is limited to equipment associated with ice cream and not other similar products, DOE proposed in the June 2022 NOPR to amend this term's definition to refer to equipment designed, marketed, or intended for the storing, displaying, or dispensing of ''frozen desserts,'' rather than ice cream specifically. 87 FR 39164, 39169. DOE stated in the NOPR that it does not expect this proposal to affect testing or certifications for existing CRE, because equipment designed for frozen desserts other than ice cream that otherwise meets the ice-cream freezer definition are likely already tested and certified as ice-cream freezers. *Id.*

As proposed in the June 2022 NOPR, *ice-cream freezer* means:

(1) Prior to the compliance date(s) of any amended energy conservation standard(s) for ice-cream freezers, a commercial freezer that is designed to

operate at or below −5.0 °F (±2.0 °F) and that the manufacturer designs, markets, or intends for the storing, displaying, or dispensing of frozen desserts; or

(2) Upon the compliance date(s) of any amended energy conservation standard(s) for ice-cream freezers, a commercial freezer that is designed for an operating temperature at or below −15.0 °F (±2.0 °F) and that the manufacturer designs, markets, or intends for the storing, displaying, or dispensing of frozen desserts. *Id.*

In response to the June 2022 NOPR, Hussmann stated its support of the amended definition for ''frozen desserts'' rather than ice cream specifically. (Hussmann, No. 32, p. 2) Hussmann also asked DOE to include in this definition the temperature range needed to operate ice-cream freezers, stating it does not oppose the definition change, but cautioning that some models intended for ''frozen desserts'' may not be able to achieve the DOE ice-cream ratings. *Id.*

The CA IOUs stated their support to amend the definition for ''ice-cream freezer'' to include all ''frozen desserts'' and to test frozen dessert freezers at either 0 °F or −15 °F. (CA IOUs, No. 36, p. 10)

AHRI disagreed with DOE's proposal to amend the ice-cream freezer definition to refer to equipment intended for ''frozen desserts,'' because while some commercial refrigeration equipment models are sold and marketed as ''ice-cream freezers,'' AHRI was not aware of any product specifically marketed for ''frozen desserts.'' (AHRI, No. 38, p. 2). AHRI noted that the term ''frozen desserts'' was not defined, and that DOE indicated its intention to clarify ''ice cream'' could include gelato, frozen yogurt, sorbet, and other ice-cream-like products. *Id.* AHRI commented that they disagree with DOE's statement that these products are typically displayed, stored, and dispensed in the same manner as ice cream; in fact, these additional products have an array of temperature requirements depending on their characteristics (fat content, etc.) and the application holding, dispensing, etc.). *Id.* AHRI also noted that the term ''frozen desserts'' is problematic because it might encompass products with requirements different than ice-cream-like, such as frozen pastries, cakes, fruits, chocolates, and other confectionary items served frozen at the end of a meal, while excluding ''frozen treats'' or ''frozen snacks.'' *Id.*

Continental commented that it disagreed with DOE's proposal to amend the ice-cream freezer definition to refer to equipment intended for ''frozen desserts;'' while some commercial refrigeration equipment models are sold and marketed as ''ice-cream freezers,'' Continental knew of none marketed for ''frozen desserts,'' a term DOE has not defined. (Continental, No. 29, p. 1–2) Continental disagreed with DOE's statement that gelato, frozen yogurt, sorbet, and other ice-cream-like products were typically displayed, stored, and dispensed in the same manner as ice cream, as described in the NOPR, since these products have an array of temperature requirements depending on their characteristics (fat content, etc.) and the application (holding, dispensing, etc.). *Id.* Continental also found the term ''frozen desserts'' problematic because it might include frozen pastries, cakes, fruits, chocolates, and other confectionary items served frozen at the end of a meal, but with temperature requirements different than ice-cream-like products. *Id.* Continental commented that ice-cream freezers have features, such as manual defrost systems and cold-wall evaporators, that differentiate them from standard freezers to minimize temperature excursions during normal defrost periods. *Id.*

Hillphoenix disagreed with the proposal to amend the ice-cream freezer definition to refer to frozen desserts, as this change will not clarify the intended equipment to which this category is applied and will continue to drive uncertainty in the industry. (Hillphoenix, No. 35, p. 1) Hillphoenix recommended removing the product type reference from the category name and referencing a general name based on manufacturers' intent and internal air temperature (''IAT''). *Id.* Hillphoenix commented that the operating temperature combined with manufacture intent would be the main characteristic that distinguishes different types of freezers, and noted that the proposed high-temperature, the existing medium-temperature, and low-temperature categories do not reference a specific product type. *Id.* Hillphoenix stated the term ''ice-cream freezer'' could be named ''sub-zero freezer.'' *Id.*

In response to Hussmann's comment, DOE states that the definition of ''ice-cream freezer,'' as proposed in the June 2022 NOPR, includes the operating temperature range required to meet the definition of an ice-cream freezer. 87 FR 39164, 39168. Any model that is unable to operate at the required integrated average temperature shall use the lowest application product temperature to certify.

In response to AHRI's, Continental's, and Hillphoenix's comments, DOE provided examples in the June 2022 NOPR of ice-cream-like products that are typically displayed, stored, and dispensed in the same manner as ice cream (gelato, frozen yogurt, and sorbet). 87 FR 39164, 39168–39169. As stated in the June 2022 NOPR, the CRE used for these food products is likely similar, if not identical, to equipment used to store, display, or dispense ice cream. *Id.* In addition, DOE has determined that ''frozen treats'' or ''frozen snacks'' are understood to be synonymous with ''frozen desserts.'' To provide greater clarity, DOE is amending the definition to specify ''of ice cream or other frozen desserts''. DOE also notes that the definition of ''ice-cream freezer,'' as proposed in the June 2022 NOPR, includes the operating temperature range required to meet the definition, and that the manufacturer designs, markets, or intends for the storing, displaying, or dispensing of frozen desserts. 87 FR 39164, 39168–39170. If a commercial freezer does not meet the requirements of an ice-cream freezer, then it would be a low-temperature freezer, according to the definition as proposed in the June 2022 NOPR. *Id.*

In response to Continental's comment regarding certain features of ice-cream freezers, DOE stated in the June 2022 NOPR that, while ice-cream freezers may implement manual defrosts or cold wall evaporators, DOE is aware of these equipment designs in other commercial freezers, such that they do not uniquely distinguish ice-cream freezers. 87 FR 39164, 39169.

b. Operating Temperature Range

Appendix B requires testing all ice-cream freezers to an IAT of −15 °F. However, the term ''ice-cream freezer'' includes a variety of equipment with a range of typical operating temperatures during normal use. For example, certain ice-cream freezers are designed to operate considerably below −5 °F (sometimes referred to as ''hardening cabinets'' and specifically designed for ice-cream storage), while other ice-cream freezers are designed to operate closer to 0 °F during typical use (*e.g.,* ''dipping cabinets'' and other equipment used to hold ice cream intended for immediate consumption). Ice-cream freezers intended for higher-temperature operation are often not capable of achieving an IAT of −15 °F. In such an instance, appendix B requires testing the units to the LAPT.

AHRI 1200–2023 maintains the existing rating points for commercial freezers (*i.e.,* −15.0 °F ±2.0 °F for ice-cream applications and 0.0 °F ±2.0 °F for low-temperature applications) in section 4.1.1, ''Integrated Average

Temperature.'' Consistent with AHRI 1200–2023, DOE is not amending the commercial freezer target IATs for testing.

Of the 346 ice-cream freezer models certified to DOE,[5] 21 are rated based on LAPTs higher than −15 °F, including 12 models with a rating temperature of −5 °F. Many of these models have a horizontal or service over counter configuration and are intended to hold ice cream for immediate consumption.

DOE recognizes that testing and rating certain commercial freezers to 0 °F may be more appropriate than testing and rating to −15 °F. DOE already requires a 0 °F rating temperature for commercial freezers. In the June 2022 NOPR, DOE tentatively determined that ice-cream freezers that meet the current ice-cream freezer definition but cannot operate as low as an IAT of −15 °F ±2 °F can be tested at an IAT of 0 °F ±2 °F. 87 FR 39164, 39170.

To better distinguish between ice-cream freezers and other commercial freezers (*i.e.,* ice-cream freezers not capable of reaching an IAT of −15 °F ±2.0 °F), DOE proposed in the June 2022 NOPR to amend the ice-cream freezer definition to specify that the designed operating temperature is required to be at or below −15.0 °F (±2.0 °F), upon the compliance date(s) of any amended energy conservation standard(s) for ice-cream freezers. 87 FR 39164, 39170. DOE also proposed to clarify which commercial freezers are required to test at an IAT of 0 °F according to appendix B by defining the term ''low-temperature freezer'' to mean a commercial freezer that is not an ice-cream freezer. *Id.* In the June 2022 NOPR, DOE requested comment on the proposed amended definition for ''ice-cream freezer'' and the proposed definition for ''low-temperature freezer.'' *Id.*

Zero Zone and AHRI commented that modifying the definition of ''ice-cream freezer'' through two separate requests is confusing and asked that in future correspondence, DOE provide the composite final draft of a definition. (Zero Zone, No. 37, p. 2; AHRI, No. 38, p. 2) Zero Zone and AHRI also commented that the rules for different product categories are based on temperature, but both groups could find no mention of temperature in this context and assumed it was the IAT. *Id.* Zero Zone and AHRI asked that DOE clarify and state that the temperatures listed are the integrated average product temperature. *Id.* In addition, Zero Zone and AHRI commented that mixing product types and product temperatures in a definition was challenging and confusing. *Id.* Zero Zone and AHRI stated that manufacturers make generic commercial freezers that customers employ in a variety of uses. *Id.* Finally, Zero Zone and AHRI stated that in the 2007 proposed rule (RE: 10 CFR part 431.62 and FR/Vol 72 No. 143/ Thursday, July 26, 2007 page 41173)[6] (''July 2007 ANOPR''), DOE clarified the application and definition of ''generic commercial freezer'' and requested that DOE codify its comments from 2007 into the formal definition, because it currently exists only in a proposed rule and should be clarified in a final rule to ease manufacturer concerns. *Id.*

In the August 2022 public meeting, ICF commented that rather than saying ''operate at or below −5 plus-or-minus 2 Fahrenheit,'' there should be a threshold and no tolerance because ''at or below'' contradicts ''plus-or-minus 2,'' and the same is the case with the refrigerators. (Public Meeting Transcript, No. 41, p. 21).

AHRI, Continental, and Hussmann commented that they agree with DOE's intention to amend the definition of ''ice-cream freezer'' to products with operating temperatures at or below −15 °F, but recommended refining the definition to specify ''ice-cream hardening freezer'' or ''ice-cream holding freezer'' to clarify the proper application and equipment marketing. (AHRI, No. 38, p. 3; Continental, No. 29, p. 2; Hussmann, No. 32, p. 2) AHRI, Continental, and Hussmann also commented they were unaware of any ice cream that was dispensed or served at or below −15 °F. *Id.*

Continental agreed with DOE that a separate definition for ''low-temperature freezer'' as a commercial freezer that will maintain −15 °F but is not an ice-cream freezer was appropriate. (Continental, No. 29, p. 2) Continental further commented that equipment in this category should be tested and rated at −15 °F to reflect the intended application. *Id.* Continental stated commercial freezers that cannot operate as low as −15 °F, and are not marketed for ice-cream applications, can be tested and rated at 0 °F, and should be classified under the current definition of ''commercial freezer.'' *Id.* In addition, Continental commented that although the test procedures for ''ice-cream hardening/holding'' and ''non-ice-cream'' freezers at −15 °F may be similar, DOE's energy standards expressed in 10 CFR part 431 have significant differences in how allowable energy consumption levels are calculated for self-contained ice-cream freezers versus other self-contained commercial freezers, therefore changes in this test procedure rulemaking will have substantial impact. *Id.*

Hillphoenix agreed with the proposal to amend the ice-cream freezer operating temperature to be ≤ −15 °F and to include this in the definition, but recommended that DOE specify if the rating temperature of −15 °F IAT will change, as currently the ice-cream freezer category has an operating temperature of ≤ −5 °F and a rating temperature of −15 °F ±2 °F IAT. (Hillphoenix, No. 35, p. 1)

Hillphoenix disagreed with the proposal to modify the definition of ''low-temperature freezer'' to refer to a non-ice-cream freezer, as this change will not clarify the intended equipment in this category since ice cream can be displayed in freezers not intended to operate at ≤ −15 °F, which will continue to drive uncertainty in the industry. (Hillphoenix, No. 35, p. 1) Hillphoenix recommended that DOE amend the operating temperature of the low-temperature category from > −5 °F and <32 °F to > −15 °F and <32 °F if such changes are applied to the ice-cream category. *Id.* Hillphoenix also proposed that each category of CRE reference the IAT only and not the operating temperature to drive consistency between categories. *Id.*

NEEA supported DOE's proposed modifications to the definition of ''ice-cream freezers'' to include operating characteristics instead of how the equipment was marketed for use because technical characteristics provide clearer differentiation of equipment than marketing materials. (NEEA, No. 39, p. 2). NEEA restated its previous concern that some ice-cream freezers that meet the existing marketing-based definition cannot operate at an IAT of −15 °F ±2 °F, which represents DOE's proposed defining characteristic and DOE has proposed a new term, ''low-temperature freezer'' for those ice-cream freezers, with their testing point at 0 °F. *Id.* NEEA recommended that DOE review the products that meet this new definition of ''low-temperature freezer'' but not the new definition for ''ice-cream freezer'' to ensure that the equipment is similar enough to be grouped together and that the test conditions are representative for all products. *Id.*

The Joint Commenters stated support for DOE's proposed changes that remove ambiguity in the definition of ''ice-cream freezers'' and ensure all ice-cream

[5] Based on review of DOE's Compliance Certification Database, available at *www.regulations.doe.gov/certification-data* (last accessed February 23, 2023).

[6] See *www.govinfo.gov/content/pkg/FR-2007-07-26/pdf/07-3640.pdf.*

and low-temperature freezers are tested at a uniform temperature, −15 °F and 0 °F, respectively. (Joint Commenters, No. 31, p. 1)

The CA IOUs commented that, in a survey of products available on the market, they determined ice-cream dipping cabinets listed in DOE's Compliance Certification Management System (''CCMS'') that were tested at −5 °F and −10 °F can achieve 0 °F. (CA IOUs, No. 36, p. 10)

True commented that the equipment category of ''low-temperature freezer'' is not included in NSF/ANSI 7–2021. (True, No. 28, p. 4) True also commented that when a freezer is designed to hold −15.0 °F (±2.0 °F), the energy consumption will be much higher due to the use of larger displacement compressors, as well as the use of more anti-condensation and defrost heaters, such as heated glass. *Id.*

In response to Zero Zone's and AHRI's comments, DOE notes that the definition of ''ice-cream freezer,'' as proposed in the June 2022 NOPR, refers to ''operating temperature,'' defined in 10 CFR 431.62 as follows:

Operating temperature means the range of integrated average temperatures at which a self-contained commercial refrigeration unit or remote-condensing commercial refrigeration unit with a thermostat is capable of operating or, in the case of a remote-condensing commercial refrigeration unit without a thermostat, the range of integrated average temperatures at which the unit is marketed, designed, or intended to operate.

However, DOE understands the definition of ''ice-cream freezer,'' as proposed in the June 2022 NOPR, states ''operating temperature'' in the second part of the definition and ''to operate'' in the first part of the definition. 87 FR 39164, 39168–39170. Therefore, DOE is amending the definition of ''ice-cream freezer'' to include ''operating temperature'' in both parts of the definition.

Zero Zone and AHRI also referenced the July 2007 ANOPR discussion of the ''ice-cream freezer'' definition. DOE expects that Zero Zone and AHRI are referring to the discussion which states that unless equipment is designed, marketed, or intended specifically for the storage, display or dispensing of ice cream, it would not be considered an ''ice-cream freezer.'' 72 FR 41161, 41173. Multi-purpose commercial freezers, manufactured for storage and display, for example, of frozen foods as well as ice cream would not meet this definition. *Id.* DOE also expects that the update to ''ice-cream applications'' in section 4.1.1.2 of AHRI 1200–2023 is consistent with Zero Zone's and AHRI's comments. Consistent with the discussion of the July 2007 ANOPR, DOE is amending the definition of ''ice-cream freezer'' to include the term ''specifically''.

In response to ICF's comment, DOE is amending the definition of ''ice-cream freezer'' to remove the temperature tolerances and adjusting the temperature in the second part of the definition to specify the upper bound of the ice-cream freezer IAT test condition tolerance, consistent with DOE's intention of the definition proposed in the June 2022 NOPR.

In response to AHRI's, Continental's, and Hussmann's comments, the definition of ''ice-cream freezer,'' as proposed in the June 2022 NOPR, states that the manufacturer designs, markets, or intends for the storing, displaying, or dispensing of frozen desserts which encompasses terms or equipment such as ''ice-cream hardening'' or ''ice-cream holding.'' 87 FR 39164, 39168–39169. DOE notes that if a commercial freezer does not meet the requirements of an ice-cream freezer, then the commercial freezer would be a low-temperature freezer, according to the definition as proposed in the June 2022 NOPR. 87 FR 39164, 39170. Commercial freezers that are not ice-cream freezers (*i.e.,* low-temperature freezers) are currently tested at 0 °F (±2 °F). As discussed in the June 2022 NOPR, the definition of ''ice-cream freezer'' will not require a more restrictive operating temperature range until the compliance date(s) of any amended energy conservation standard(s) for ice-cream freezers. 87 FR 39164, 39170.

In response to Hillphoenix's comment, as stated in the June 2022 NOPR, DOE is not amending the commercial freezer target IATs for testing, which is consistent with AHRI 1200–2023. 87 FR 39164, 39170. As stated in the June 2022 NOPR, DOE recognizes that the reference to ''ice-cream'' in the definition of ''ice-cream freezer'' does not itself distinguish this equipment from other commercial freezers, and that the additional descriptors specified in the definition (*i.e.,* designed to operate at or below −5 °F) together classify a unit as an ice-cream freezer. 87 FR 39164, 39169. Therefore, a commercial freezer that is not designed for an operating temperature at or below −5.0 °F, or −13.0 °F upon the compliance date(s) of any amended energy conservation standard(s) for ice-cream freezers, and that the manufacturer designs, markets, or intends specifically for the storing, displaying, or dispensing of ice cream or other frozen desserts would meet the definition of a low-temperature freezer.

In response to NEEA's comment, DOE states the CRE that currently meet the definition of ''ice-cream freezer'' but that would only meet the definition of ''low-temperature freezer'' upon the compliance date(s) of any amended energy conservation standard(s) for ice-cream freezers, are likely similar, if not identical, to certain equipment that currently meet the definition of ''low-temperature freezer.''

In response to True's comment, DOE recognizes that the definitions and categories do not necessarily match those included in the NSF 7 standard, but DOE is establishing definitions for the purposes of the DOE test procedure. To the extent that different equipment categories require different components due to different operating temperatures, DOE would consider the corresponding energy use impacts as part of the energy conservation standards rulemaking.

Therefore, as described, DOE is amending the definition of ''ice-cream freezer'' as follows:

Ice-cream freezer means:

(1) Prior to the compliance date(s) of any amended energy conservation standard(s) for ice-cream freezers, a commercial freezer that is capable of an operating temperature at or below −5.0 °F and that the manufacturer designs, markets, or intends specifically for the storing, displaying, or dispensing of ice cream or other frozen desserts; or

(2) Upon the compliance date(s) of any amended energy conservation standard(s) for ice-cream freezers, a commercial freezer that is capable of an operating temperature at or below −13.0 °F and that the manufacturer designs, markets, or intends specifically for the storing, displaying, or dispensing of ice cream or other frozen desserts.

DOE is establishing the definition of ''low-temperature freezer'' as proposed in the June 2022 NOPR in this final rule:

Low-temperature freezer means a commercial freezer that is not an ice-cream freezer.

2. High-Temperature CRE

DOE defines ''commercial refrigerator'' as a unit of commercial refrigeration equipment in which all refrigerated compartments in the unit are capable of operating at or above 32 °F (±2 °F). 10 CFR 431.62.

Section 2.1 of appendix B requires testing commercial refrigerators to an IAT of 38 °F ±2 °F. DOE is aware of equipment that meets the definition of a commercial refrigerator but is capable of operating only at temperatures above the 38 °F ±2 °F IAT required for testing. Examples of these types of equipment

include CRE designed for storing or displaying chocolate and/or wine, with typical recommended storage temperatures around 55 °F. Consistent with the current test procedure, manufacturers certify such equipment using the LAPT setting. LAPT can vary by model, so this approach, which does not rely on a uniform operating temperature, can result in measured energy consumptions that are not necessarily comparable between models. Currently, 145 models of single-compartment commercial refrigerators are certified to DOE with an LAPT above 40.0 °F.[7] Categorizing these commercial refrigerators in a separate high-temperature refrigerator category would allow DOE to consider test procedures for this equipment that may better represent actual use.

To allow for differentiating typical commercial refrigerators from commercial refrigerators that operate only at higher temperatures, DOE proposed in the June 2022 NOPR to define ''high-temperature refrigerator'' as a commercial refrigerator that is not capable of operating with an integrated average temperature as low as 38.0 °F (±2.0 °F). 87 FR 39164, 39171.

DOE stated in the June 2022 NOPR that it recognized certain commercial refrigerators may be capable of operating with an IAT of 38.0 °F (±2.0 °F) but are intended for use at higher storage temperatures. *Id.* However, DOE proposed to define ''high-temperature refrigerator'' based on operating capability rather than intended use to ensure consistent application of DOE's definitions and to ensure that CRE currently tested and rated with an IAT of 38.0 °F (±2.0 °F) would continue to be categorized, tested, and rated at that operating condition. *Id.*

To clarify the classification of commercial refrigerators overall, DOE also proposed in the June 2022 NOPR to define the term ''medium-temperature refrigerator'' to refer to commercial refrigerators capable of operating with an IAT of 38.0 °F (±2.0 °F) or lower. *Id.*

DOE also proposed to require testing high-temperature refrigerators according to AHRI 1200–2023, which requires an IAT of 55 °F ±2.0 °F. *Id.* Under the June 2022 NOPR approach, a commercial refrigerator would be tested and rated as either a medium-temperature refrigerator (if capable of operating with an IAT of 38.0 °F (±2.0 °F)) or as a high-temperature refrigerator (if not capable of operating with an IAT as low as 38.0 °F (±2.0 °F)). *Id.*

In the June 2022 NOPR, DOE recognized that certain commercial refrigerators may be capable of operating at IATs of both 38 °F (±2.0 °F) and 55 °F (±2.0 °F). *Id.* In the April 2014 Final Rule, DOE stated that CRE capable of operating at IATs that span multiple equipment categories must be certified and comply with DOE's regulations for each applicable equipment category. 79 FR 22277, 22291. The definition of ''high-temperature refrigerator,'' as proposed in the June 2022 NOPR, would exclude CRE capable of operating at medium temperatures (*i.e.,* an IAT of 38 °F), and therefore would exclude models capable of operating at both IATs. 87 FR 39164, 39171. Thus, as proposed in the June 2022 NOPR, a unit of CRE capable of operating at both IATs of 38 °F and 55 °F would only meet the definition of a medium-temperature refrigerator. *Id.*

As an alternative to the definition proposed in the June 2022 NOPR, DOE stated that it could instead define ''high-temperature refrigerator'' based only on the capability of a commercial refrigerator to operate at an IAT of 55 °F (±2.0 °F). 87 FR 39164, 39171. Under this alternate approach, a unit of CRE capable of operating at IATs of both 38 °F and 55 °F would meet the definitions of both a medium-temperature refrigerator and a high-temperature refrigerator. *Id.*

In the June 2022 NOPR, DOE requested comment on the proposed definitions for ''high-temperature refrigerator'' and ''medium-temperature refrigerator,'' including whether the terms should be mutually exclusive or constructed such that equipment could be considered to meet both definitions. 87 FR 39164, 39171.

The Joint Commenters supported DOE's proposed changes regarding the establishment of a definition and uniform test procedure for high-temperature refrigerators. (Joint Commenters, No. 31, p. 1) The Joint Commenters expressed support for DOE's proposed definition and test procedure for high-temperature CRE, particularly basing the distinction between medium and high temperature on operating ability rather than intended use, as this will ensure consistent application of DOE's definitions and test procedures. (Joint Commenters, No. 31, p. 2)

NEEA commented that it supports the new definitions DOE proposed for high-temperature CRE, stating that these equipment types have unique applications compared to other CRE, and these definitions allowed consideration (potential standards), categorization (equipment classes), and testing of this equipment separate from other CRE. (NEEA, No. 39, p. 2). NEEA also stated its support for DOE's proposal to establish test procedures for new and/or newly defined categories of CRE, and restated its recommendation from the 2021 CRE Test Procedure RFI that DOE establish test methods for new CRE product types, including high-temperature CRE. (NEEA, No. 39, p. 2)

Hussmann commented that it favors the proposed mutually exclusive definitions of ''high-temperature refrigerator'' and ''medium-temperature refrigerator.'' (Hussmann, No. 32, p. 2). Hussmann commented in favor of rating only at medium temperature if the CRE are capable of operating at both high and medium temperatures. (Hussmann, No. 32, p. 3) In the August 2022 public meeting, Hussmann commented that there are specialty applications that run in between the low-temperature and medium-temperature rating points. (Public Meeting Transcript, No. 41, p. 18) Hussmann added that a unit may run between 8 °F and 10 °F as the current LAPT for that product. *Id.* Hussmann noted that these products won't run at 0 °F, and they don't run at 32 °F, and that is something for DOE to consider. *Id.*

Hillphoenix agreed with the proposed definitions of ''high-temperature refrigerator'' including the IAT of 55 °F ±2 °F, and ''medium-temperature refrigerator'' including the IAT of 38 °F ±2 °F. (Hillphoenix, No. 35, p. 1). Hillphoenix commented that the proposed separate designation for ''medium-temperature refrigerator'' is not needed and could introduce confusion, and it recommended DOE amend the definitions of ''commercial freezer'' and ''commercial refrigerator'' in which high- and medium-temperature refrigerators are already addressed. *Id.* Hillphoenix suggested, as an alternative, that ''commercial freezer'' and ''commercial refrigerator'' could be replaced by the terms ''medium-temperature refrigerator'' and ''low-temperature freezer.'' *Id.* Hillphoenix also agreed with DOE that a single CRE unit capable of operating in both high- and medium-temperature categories should only be required to meet the 38 °F ±2 °F IAT. *Id.*

AHRI commented that DOE should consider using existing product designations and existing labelling as found in ANSI/NSF 7–2019 for ''high-temperature refrigerators.'' (AHRI, No. 38, p. 3). AHRI stated that to meet applicable sanitation requirements, self-contained storage refrigerators must be capable of maintaining an air

[7] Based on review of DOE's Compliance Certification Database, available at *www.regulations.doe.gov/certification-data* (last accessed February 23, 2023).

temperature of 40 °F in 100 °F ambient temperature (AHRI stated a presumption that such products should be able to maintain IAT of 38 °F for the DOE energy test). *Id.* AHRI commented that two equipment types represent refrigerators that meet applicable sanitation requirements for high-temperature applications: (1) beverage coolers are exempt from temperature test requirements if they bear a permanently attached label reading, ''This equipment is intended for the storage and display of non-potentially hazardous bottled or canned products only''; and (2) self-contained display refrigerators are exempt from temperature performance testing if they bear a label reading, ''This display refrigerator is not for the display of potentially hazardous foods.'' *Id.* AHRI commented that there is no need for the proposed separate designation for ''medium-temperature refrigerator'' since such products would already be covered under the current definition of ''refrigerator'' if they do not fall under the proposed sub-classification of ''high-temperature refrigerator.'' *Id.* AHRI stated that this approach would be consistent with the proposed new definition of ''low-temperature freezer'' because a category for ''medium-temperature freezer'' has not been suggested. *Id.*

Continental commented that the term ''commercial refrigerator'' should be retained to encompass all CRE capable of operating at or above 32 °F and that the proposed additional definition of ''medium-temperature refrigerator'' for CRE at or below 38 °F down to 32 °F is unnecessary and may introduce confusion. (Continental, No. 29, p. 2) Continental also commented that the ANSI/NSF 7–2019 sanitation standard for commercial refrigerators and freezers requires that self-contained storage refrigerators must be tested and proven to maintain an air temperature of 40 °F in 100 °F ambient, and capable of maintaining product simulator IAT of 38 °F in 75 °F ambient, as prescribed by ASHRAE 72–2022. *Id.* Continental stated no objection to DOE's proposed definition of the term ''high-temperature refrigerator'' as a commercial refrigerator that is not capable of operating with an IAT as low as 38 °F in 75 °F ambient, but it added that DOE should reference existing labelling prescribed in ANSI/NSF 7–2019 to identify ''high-temperature refrigerators'' that meet required sanitation requirements but are not required to meet temperature testing requirements. *Id.* Continental stated its awareness that equipment identified with the current NSF labels of beverage cooler and self-contained display refrigerator would be the only commercial refrigerators meeting applicable sanitation standards without being required to maintain specified temperatures that align with product simulator IAT of 38 °F. *Id.*

True commented that any unit unable to store food products at a temperature of 38.0 °F (±2.0 °F) is not a commercial refrigerator and as a result, the term ''high-temperature refrigerator'' could be construed as misleading. (True, No. 28, p. 4) True noted that the proposed terms ''high-temperature refrigerator'' and ''medium-temperature refrigerator'' are seen in the new AHRI–1200 standard, which is not yet public. *Id.* True commented that commercial refrigerators must comply with NSF–7, and for a storage refrigerator, test per NSF–7 such that they cannot exceed 40 °F at any point. (True, Public Meeting Transcript, No. 41, p. 15). True commented that the NSF–7 temperature ranges should be considered for the applicable equipment, noting that high-temperature refrigerators are not covered under any health and safety standards. *Id.* True further commented that for chocolate, wine, and flower storage applications, refrigerated units unable to meet the 38.0 °F (±2.0 °F) requirement should be labeled as ''commercial display refrigerators for non-hazardous (food) applications,'' and added that True units are all capable of operating from 32.0 °F to 55 °F, with control settings changed for higher-temperature applications. (True, No. 28, p. 4).

In response to Hussmann's comment, AHRI 1200–2023 maintains the existing rating points for Medium Temperature Applications and Low Temperature Applications (*i.e.,* 38 °F ±2.0 °F for medium-temperature applications and 0.0 °F ±2.0 °F for low-temperature applications) in section 4.1.1, ''Integrated Average Temperature.'' Consistent with AHRI 1200–2023, DOE is not amending the medium-temperature refrigerator or low-temperature freezer target IATs for testing. To the extent that a model may not be able to maintain the target IATs for testing, the LAPT provisions would continue to apply, as discussed in section III.K of this document.

In response to Hillphoenix's, AHRI's, Continental's, and True's comments, the definitions for ''medium-temperature refrigerator'' and ''low-temperature freezer,'' as proposed in the June 2022 NOPR, indicate they are subsets of the definitions for ''commercial refrigerator'' and ''commercial freezer,'' respectively. DOE is establishing the separate definitions to ensure clarity of when certain provisions apply specifically to either medium-temperature refrigerators or low-temperature freezers rather than the broader categories of commercial refrigerators or commercial freezers.

Consistent with the comments discussed in section III.A.1.b regarding ''operating temperature'' and temperature tolerances, DOE is amending the definitions of ''high-temperature refrigerator'' and ''medium-temperature refrigerator'' to specifically include the definition for ''operating temperature'' and to replace the temperature tolerances with the upper bound of the medium-temperature refrigerator IAT test condition tolerance which is consistent with DOE's intentions of these definitions in the June 2022 NOPR.

Therefore, as described, DOE is amending the definitions of ''high-temperature refrigerator'' and ''medium-temperature refrigerator'' as follows:

High-temperature refrigerator means a commercial refrigerator that is not capable of an operating temperature at or below 40.0 °F.

Medium-temperature refrigerator means a commercial refrigerator that is capable of an operating temperature at or below 40.0 °F.

DOE discusses test requirements for this equipment in section III.B.1.b of this document.

3. Convertible Equipment

In the April 2014 Final Rule, DOE noted that some basic models of CRE may have operating characteristics that include an operating temperature range that spans multiple equipment classes, and subsequently required that self-contained equipment or remote condensing equipment with thermostats capable of operating at IATs that span multiple equipment categories be certified and comply with DOE's regulations for each applicable equipment category. 79 FR 22277, 22291. Similarly, DOE adopted requirements for remote condensing equipment without thermostats that specify that if a given basic model of CRE is marketed, designed, or intended to operate at IATs spanning multiple equipment categories, the CRE basic model must be certified and comply with the relevant energy conservation standards for all applicable equipment categories. *Id.*

In the June 2022 NOPR, DOE proposed to specify in 10 CFR 429.42 the requirements from the April 2014 Final Rule that require basic models of CRE that operate in multiple equipment classes to certify and comply with the

energy conservation standards for each applicable equipment class. 87 FR 39164, 39171. This proposal is consistent with the notice of petition for a test procedure waiver that DOE published on May 26, 2017, for AHT Cooling Systems GmbH and AHT Cooling Systems USA Inc. (''AHT'') in which DOE declined to grant AHT an interim waiver that would allow for testing only in the ice-cream freezer equipment class for AHT's specified multi-mode CRE basic models. 82 FR 24330.

In the June 2022 NOPR, DOE requested comment on the proposal to specify the requirements from the April 2014 Final Rule regarding basic models of CRE that operate in multiple equipment classes. 87 FR 39164, 39171.

AHRI recommended that because the phrase ''capable of operating at'' was included for marketing purposes and not technical capability, DOE should consider removing that phrase as unnecessary in the following 2014 Final Rule language: ''CRE with thermostats capable of operating at integrated average temperatures (''IATs'') that span multiple equipment categories must be certified and comply with DOE's regulations for each applicable equipment category.'' (AHRI, No. 38, p. 4) AHRI used the same reasoning to further recommend that DOE remove the word ''or'' from the following language: ''. . . remote condensing equipment without a thermostat that is marketed, designed, *or* intended to operate at IATs spanning multiple equipment categories must be certified and comply with the relevant energy conservation standards for all applicable equipment categories.'' [8] *Id.*

Hussmann recommended removing the phrase ''capable of operating at'' from the following 2014 Final Rule sentence: ''CRE with thermostats capable of operating at integrated average temperatures (''IATs'') that span multiple equipment categories must be certified and comply with DOE's regulations for each applicable equipment category.'' (Hussmann, No. 32, p. 2).

AHT commented that it is overly burdensome to test and certify very efficient closed equipment in all three temperature classes when it is capable of operating in all three classes, and that only the most energy-consuming temperature class should be used for testing and certifying, as in Europe. (AHT, No. 40, p. 1)

True commented that when designing a unit for multiple temperature ratings, the systems will not be as energy efficient at the higher operating temperature rating, compared to a system designed specifically for the higher temperature rating. (True, No. 28, p. 2) True stated that, in one example, a unit passes ENERGY STAR® 5.0 requirements as a storage freezer (0 °F ±2 °F) but, when tested as a storage refrigerator (38 °F ±2 °F), will consume about twice the energy of a unit specifically designed to operate only as a storage refrigerator, due mostly to the excess capacity of the compressor and refrigeration system required to operate the unit at the lower temperature application. *Id.*

Hillphoenix disagreed with the proposal to specify the requirements stated in the 2014 Final Rule and recommended that basic models of CRE that operate in multiple equipment classes should only be required to meet the coldest application for a CRE product, which would be less burdensome on manufacturers. (Hillphoenix, No. 35, p. 2)

In response to AHRI's and Hussmann's comments, DOE notes the phrase ''capable of operating at'' does refer to technical capability and is consistent with phrasing in current DOE definitions (*e.g.,* commercial refrigerator and commercial freezer). Therefore, DOE is maintaining this phrase in this document.

In response to AHRI's comment, DOE notes that the word ''or'' is necessary for the construction of the sentence that contains the requirements for remote condensing equipment without a thermostat and is therefore maintaining the word ''or'' in this document.

In response to AHT's, True's, and Hillphoenix's comments, DOE notes that the definitions discussed in sections III.A.1 and III.A.2 would only require CRE including an operating temperature range that spans multiple equipment classes to certify in a maximum of two equipment classes (*i.e.,* ice-cream freezer and medium-temperature refrigerator, ice-cream freezer and high-temperature refrigerator, low-temperature freezer and medium-temperature refrigerator, or low-temperature freezer and high-temperature refrigerator). Testing to the coldest applicable temperature would be expected to result in the highest energy consumption, but does not necessarily ensure that a model would meet the energy conservation standards for multiple applicable equipment classes at different operating temperatures.

As proposed in the June 2022 NOPR, DOE is specifying in 10 CFR 429.42 the requirements from the April 2014 Final Rule that basic models of CRE that operate in multiple equipment classes must be certified and comply with the energy conservation standards for each applicable equipment class.

B. Updates to Industry Standards

DOE's test procedure for CRE currently adopts through reference certain provisions of AHRI 1200–2010, ASHRAE 72–2005, and AHAM HRF–1–2008. 10 CFR 431.63. With regard to the provisions relevant to the DOE test procedure, AHRI 1200–2010 references certain provisions of ASHRAE 72–2005 and AHAM HRF–1–2008.

Since establishing the DOE test procedure in appendix B, AHRI, ASHRAE, and AHAM have published updated versions of the referenced test standards. On October 1, 2013, ANSI approved an updated version of AHRI 1200, ANSI/AHRI Standard 1200 (I–P), ''2013 Standard for Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets'' (''AHRI 1200–2013''). On April 12, 2023, AHRI issued an updated version of AHRI 1200 (''AHRI 1200–2023''). On August 1, 2018, ANSI approved an updated version of ASHRAE 72, ANSI/ASHRAE Standard 72–2018, ''Method of Testing Open and Closed Commercial Refrigerators and Freezers'' (''ASHRAE 72–2018''). On June 30, 2022, ANSI approved an updated version of ASHRAE 72, ANSI/ASHRAE Standard 72–2022, ''Method of Testing Open and Closed Commercial Refrigerators and Freezers'' (''ASHRAE 72–2022''). On November 11, 2022, Errata Sheet for ANSI/ASHRAE Standard 72–2022, ''Method of Testing Open and Closed Commercial Refrigerators and Freezers'' was published (''ASHRAE 72–2022 with Errata''). AHAM more recently approved and published an updated version of its industry test standard, AHAM HRF–1–2019, ''Energy and Internal Volume of Refrigerating Appliances'' (''AHAM HRF–1–2019''). DOE initially determined in the June 2022 NOPR that the changes within AHRI 1200–2013, ASHRAE 72–2018, and AHAM HRF–1–2019 are editorial, improve clarity, better harmonize with the DOE test procedure, or not relevant to CRE (*e.g.,* relevant to products such as consumer refrigerators). 87 FR 39164, 39171. Based on DOE's assessment, the changes in the latest versions of the industry test standards, AHRI 1200–2023 and ASHRAE 72–2022 with Errata, will not impact the measured energy consumption, volume, or TDA of CRE, as applicable.

DOE discusses AHRI 1200–2023 and ASHRAE 72–2022 with Errata in sections III.B.1 and III.B.2 of this document.

[8] 79 FR 22277, 22291.

In response to the June 2022 NOPR, AHRI, Zero Zone, and NAFEM recommended that DOE use the referenced standards as intended. (AHRI, No. 38, p. 1; Zero Zone, No. 37, p. 1; NAFEM, No. 34, p. 1) AHRI cautioned DOE that combining test standards was unnecessary and inadvisable, and recommended that DOE regulate the issues in the test procedure under a singular standard. *Id.* AHRI stated concern that the data set used here did not provide clarity as to whether the testing is indicative of energy efficiency. *Id.* AHRI recommended that DOE wait to update certain regulations until clearer test standards had been determined through consensus by manufacturers and third parties. *Id.* AHRI also noted that ENERGY STAR was not ready to employ certain referenced standards, raising concerns that DOE was prematurely adopting these requirements. *Id.*

Zero Zone recommended that DOE wait for the updated standard whenever possible and that under current rules, DOE has been able to call out a standard that was nearly revised (ASHRAE 72 and AHRI 1200). (Zero Zone, No. 37, p. 1). Zero Zone commented that possibly DOE could follow this process for other standards as well, and that when this was not possible, Zero Zone asked DOE to request that standards development groups immediately focus on areas of DOE concern to allow for industry input and consensus building and allow DOE to have improve information in the standard. *Id.*

NAMA recommended that DOE use the referenced standards as intended and cautioned DOE that combining test standards was unnecessary and inadvisable and recommended that DOE regulate the issues in the test procedure under a singular standard. (NAFEM, No. 34, p. 2) NAMA stated concern that the test procedures mentioned in many of these items did not clarify which standard was to be used for which measurement. *Id.* NAMA commented that referencing multiple standards could be a problem when one standard was updated before the other, and, in general, NAMA recommended that referencing one standard would be preferred unless DOE specified which sections in the standards were being required. *Id.* NAMA commented that many sections in the ASTM, ASHRAE, and AHRI standards were written to measure the performance of the product, not just the energy measurement and DOE therefore needed to identify the standards sections carefully so as to not move DOE into writing performance test methods. *Id.* NAMA commented it would be willing to support such activities in joint discussions on the sections to ensure that the measurement of energy for NAMA-covered products was accurate. *Id.*

Hussmann commented that combining test standards was not a typical practice and recommended that DOE regulate the issues in the CRE TP NOPR under a single, universally accepted established standard. (Hussmann, No. 32, p. 1). Hussmann expressed concern that the data acquired during a hybrid standard approach would not yield representative results of intended product use by already established means throughout the industry. *Id.* Hussmann recommended that DOE work with the appropriate standards committees to update regulations until the standards have been established, determined to yield consistent results, and are representative of typical manufactured products. *Id.*

True commented that it uses NSF/ANSI 7–2021 as the performance standard for commercial food service equipment, in addition to UL 471 (''Standard for Commercial Refrigerators and Freezers,'' soon to be replaced by UL CSA 60335–2–89, by October 2024), and ASHRAE 72–2005 for energy consumption reporting to DOE, Natural Resources Canada (''NRCAN''), CEC, and ENERGY STAR. (True, No. 28, p. 1) True listed four current NSF 7 performance tests that must be complied with to certify that its equipment meets the NSF 7 food safety requirements for temperature testing (performance), construction, and materials used. *Id.* True commented that AHRI–1200 is not considered to be the standard used for all commercial refrigeration, and that AHRI standards and guidelines do not address food safety temperatures or food sanitation concerns and requirements, making AHRI standards and guidelines inappropriate for commercial food service refrigeration equipment. *Id.*

DOE has evaluated existing industry standards, and where applicable, is incorporating by reference the industry standard into the relevant appendix. DOE considers incorporating by reference an industry standard as a standalone reference whenever possible. DOE has identified certain areas in which provisions of industry standards require additional specifications or are inconsistent with the existing regulatory test method. To clarify the applicability of provisions from standards that are incorporated by reference, DOE occasionally may need to supplement an industry standard with additional clarifications. For CRE, instead of duplicating requirements necessary to improve clarify of the test procedure into the regulatory text, DOE is referring to provisions in other industry standards that provide the necessary clarifications. This leads to DOE referencing specific provisions from multiple different industry standards. DOE specifically refers to individual sections of industry standards as appropriate to ensure only relevant provisions are incorporated in the regulatory test method such that the test method is not unduly burdensome to conduct and is reasonably designed to produce test results that reflect energy use during a representative average use cycle.

DOE recognizes the value of industry standards setting processes and regularly participates in committees that develop and review industry standards. DOE has statutory timelines for test procedure rulemakings that require DOE to determine whether amendments to test procedures are necessary to carry out the requirements of EPCA at least once every 7 years. (42 U.S.C. 6314(a)(1)) DOE has evaluated industry standards applicable to CRE that are both available now and under development as it conducts the rulemaking activity to consider whether the CRE test method requires amendment. DOE will continue to participate in industry committees and will consider future industry standards in future test procedure rulemakings.

DOE and EPA coordinate their product and equipment efficiency programs to harmonize test requirements when possible and appropriate. While EPA did not adopt test methods for additional categories of CRE during its last revision of the ENERGY STAR specification, DOE has evaluated test procedures for these categories and determined that the procedures adopted in this rule produce test results which reflect energy use during a representative average use cycle, and are not unduly burdensome to conduct. To the extent that EPA revises its specification to include these new categories of CRE into the ENERGY STAR program, DOE will coordinate with EPA to harmonize requirements when appropriate.

In response to True's comment, DOE has evaluated existing industry test procedures for the use as the basis of the DOE test procedure for energy consumption. DOE recognizes that the industry test procedures serve different purposes, including for food safety. DOE discusses the individual industry test procedures considered and incorporated by reference in the following sub-sections, section III.C, and section III.D of this document.

1. AHRI 1200

The revisions included in AHRI 1200–2023 are largely to provide editorial, clarifying, or harmonizing updates that will not impact the measured energy consumption, volume, or TDA of CRE as compared to the current test procedure. Specifically, AHRI 1200–2023 includes the following updates: definitions intended to harmonize with ASHRAE 72–2022 and DOE's existing regulations; updated definitions for consistency with the use of the rating standard; removal of test requirements that were duplicative with ASHRAE 72–2022; clarified measurement requirements and the use of calculations; inclusion of direct refrigerated volume measurement instructions (rather than referencing the AHAM test standard); and detailed total display area requirements and examples.

DOE proposed in the June 2022 NOPR to incorporate by reference AHRI 1200–202X for use in the DOE test procedure because DOE tentatively determined that the updates compared to AHRI 1200–2013 would improve the clarity of the test standard, ensure consistent testing, and as a result would improve reproducibility of the test procedure. 87 FR 39164, 39172. AHRI 1200–202X includes procedures for measuring refrigerated volume rather than referring to the AHAM standard (although the procedures are consistent between these standards). *Id.* Therefore, DOE proposed in the NOPR to remove the incorporation by reference of AHAM HRF–1–2008 and instead refer to AHRI 1200–202X directly for refrigerated volume measurement. *Id.* Based on DOE's review of AHRI 1200–2023, the updates included in the standard are primarily editorial and are not expected to change test results as compared to the existing test procedure, except for the specific updates as discussed in the following paragraphs. Therefore, DOE has determined in this document that any existing test data for CRE currently available on the market is expected to be consistent with the amended test procedure.

In the June 2022 NOPR, DOE requested comment on the proposal to incorporate by reference AHRI 1200–202X and whether the use of the updated test method would impact CRE ratings based on the current DOE test procedure. 87 FR 39164, 39173.

AHRI commented that it supports DOE's proposal to incorporate by reference AHRI 1200–202X, noting that select AHRI members consistently test and rate remote condensing CRE using high-glide refrigerants. (AHRI, No. 38, p. 4) AHRI commented that refrigerants 407, 448A, and 449A are considered ''high glide'' under the new definition in AHRI 1200–202X and that the updated test method is the most accurate way to determine the rated energy consumption, resulting in similar rated numbers to previous non-high-glide refrigerants like R–404A. *Id.* AHRI further noted that the current AHRI 1200–202X standard does not include testing requirements for CO_2 (*i.e.,* R–744), so this refrigerant would require DOE waivers for future use. *Id.*

Continental supported DOE's proposal to incorporate by reference the most recent versions of applicable industry standards, including AHRI 1200–202X. (Continental, No. 29, p. 3) Continental added that use of the latest standards should not be required until the compliance date of any new energy conservation standards established, based on the proposed rating standards, to allow time for stakeholders to thoroughly evaluate any impact on energy consumption. *Id.*

Hillphoenix commented that it agreed with the proposal to incorporate AHRI 1200–202X by reference, as no significant impacts to CRE ratings could be foreseen. (Hillphoenix, No. 35, p. 2)

Hussmann commented that it favors the proposal to incorporate by reference AHRI 1200–202X. (Hussmann, No. 32, p. 2)

True commented that it opposes removing the AHAM HRF–1–2008 standard and referencing AHRI 1200–202X in future DOE test procedures, as revisions to AHRI 1200 are in draft form and have not been publicly reviewed. (True, No. 28, p. 5). True recommended that the NSF/ANSI–2021 standard be added to this list because AHRI 1200 only references self-contained commercial refrigeration sporadically and does not specifically address the issues of self-contained refrigeration. *Id.* In the August 2022 public meeting, True commented that AHRI–1200 does not apply to all commercial refrigeration but does apply to display refrigeration. (Public Meeting Transcript, No. 41, p. 16) True added that it believes DOE is bringing in two different standards used in two different applications, additionally stating that AHRI–1200 does not address any food health/safety issues. *Id.* Hussmann agreed with True's comment, and added that it thinks DOE needs to make a distinction and understand that AHRI–1200 is typically a rating point and does not necessarily align with NSF 7. (Public Meeting Transcript, No. 41, p. 17)

AHRI 1200–2023 had two public review periods prior to publication. DOE has reviewed the updates to AHRI 1200–2023 and determined that the updates will not impact the measured volume of CRE as compared to the existing DOE test procedure (which currently references HRF–1–2008 [9]).

DOE acknowledges that NSF 7 is a performance standard applicable to multiple CRE categories; however this standard addresses food safety and sanitation performance. DOE test procedures must produce test results which reflect energy use during a representative average use cycle, and not be unduly burdensome to conduct as required by EPCA. DOE has evaluated NSF 7, other available industry test standards, and industry standards under development when considering test procedures for these equipment categories as discussed in this document. DOE also notes that the current [10] and amended [11] test procedures allow for optional testing at NSF test conditions for commercial refrigeration equipment that are also tested in accordance with NSF test procedures (Type I and Type II) (*i.e.,* integrated average temperatures and ambient conditions used for NSF testing may be used in place of the DOE-prescribed integrated average temperatures and ambient conditions provided they result in a more stringent test).

In the June 2022 NOPR, DOE proposed alternate refrigerant conditions to be used for testing remote CRE with CO_2 refrigerant. 87 FR 39164, 39210. See section III.G of this document for a discussion of remote CRE with CO_2 refrigerant (*i.e.,* R–744).

Based on the June 2022 NOPR and comments received in response, DOE is finalizing its proposal to incorporate by reference AHRI 1200–2023.

In addition to the clarifying revisions that would not substantively change testing as compared to the current approach using the DOE test procedure and AHRI 1200–2010, AHRI 1200–2023 also includes two substantive additions: addressing the use of high glide refrigerants and providing an additional temperature rating point for ''high-temperature'' applications. DOE proposed in the June 2022 NOPR to adopt these provisions in its test procedure, as discussed in the following sections. 87 FR 39164, 39172. Additionally, DOE identified updates in AHRI 1200–2023 as compared to AHRI 1200–202X discussed in the following

[9] Section 3.1 of Appendix B to Subpart C of 10 CFR part 431.

[10] Section 2.3 of Appendix B to Subpart C of 10 CFR part 431.

[11] Section 2.3 of Appendix B to Subpart C of 10 CFR part 431.

sections regarding chef bases, certain definitions, and night curtains.

a. High Glide Refrigerants

For remote condensing CRE, AHRI 1200 provides calculations to estimate the compressor energy consumption necessary to provide the cooling to the refrigerator or freezer. These calculations are based on the dew point of the refrigerant during testing, which is intended to be representative of the evaporator temperature. See Table 1 and section 5.2.1 of AHRI 1200–2013 and Table 1 and section 5.1.2 of AHRI 1200–2023.

For certain refrigerants, the saturated vapor temperature (*i.e.,* the dew point) can be different from the saturated liquid temperature at a given pressure, in which case the refrigerant is considered to have ''glide.'' AHRI 1200–2023 includes a definition for ''high glide refrigerant'' as a zeotropic refrigerant blend whose temperature glide is greater than 2 °F. ASHRAE defines ''glide'' as the absolute value of the difference between the starting and ending temperatures of a phase-change process by a refrigerant within a component of a refrigerating system, exclusive of any subcooling or superheating. This term usually describes condensation or evaporation of a zeotrope.[12]

For high glide refrigerants, the refrigerant dew point is not necessarily representative of the overall evaporator temperature. AHRI 1200–2023 specifies that for high glide refrigerants, the temperature used to calculate compressor energy consumption is based on an adjusted mid-point evaporator temperature rather than an adjusted dew point temperature.

Because the evaporator provides cooling to the CRE over the entire heat exchanger surface, using the evaporator mid-point temperature would ensure that the temperature used to calculate compressor energy consumption is more representative of the overall evaporator temperature. DOE determined in the June 2022 NOPR that the AHRI 1200–202X approach of using the evaporator mid-point temperature rather than refrigerant dew point is more representative of actual remote condensing CRE use for which the equipment uses high glide refrigerants and would improve consistency of remote testing using different refrigerants. 87 FR 39164, 29172. Additionally, this approach would improve consistency when testing a given remote condensing CRE model with either high glide or low glide refrigerants by ensuring that the evaporator mid-point temperature for a high glide refrigerant is similar to the refrigerant dew point for a low glide refrigerant.

DOE proposed in the June 2022 NOPR to adopt through reference the high glide refrigerant provisions of AHRI 1200–202X. 87 FR 39164, 29173. Because the existing DOE test procedure, by reference to AHRI 1200–2013, only references adjusted dew point for calculating compressor energy consumption, this proposed amendment would yield different results for remote condensing CRE models tested with a high glide refrigerant. However, DOE expects that current remote condensing CRE models are typically tested and rated using low glide refrigerants (most commonly R–404A); therefore, DOE tentatively determined in the NOPR that this proposed test procedure amendment is not expected to result in changes to rated energy consumption for any currently available remote CRE models. 87 FR 39164, 29173.

In the June 2022 NOPR, DOE requested comment on the proposal to incorporate by reference AHRI 1200–202X, including the new provisions regarding high glide refrigerants. *Id.* DOE also requests information on whether any remote condensing CRE are currently tested and rated using high glide refrigerants and whether the proposed test procedure would impact the rated energy consumption for such models. *Id.*

Hussmann commented that it favors the proposal to incorporate by reference AHRI 1200–202X, including the new provisions regarding high glide refrigerants. (Hussmann, No. 32, p. 3)

Hillphoenix stated its agreement with the proposal to incorporate AHRI 1200–202X by reference, including the provisions for high glide refrigerants such as 407, 448A, and 449A, as no significant impacts to CRE ratings could be foreseen if incorporated. (Hillphoenix, No. 35, p. 2)

True commented that the proposed use of AHRI 1200–202X referencing high-glide refrigerants indicated a bias toward remote refrigeration manufacturers. (True, No. 28, p. 5) True commented that there are small numbers of self-contained refrigerators using high-glide (synthetic) refrigerants, and that in fact the self-contained industry is a high adopter of hydrocarbon refrigerants. *Id.*

In this rule, DOE is incorporating by reference AHRI 1200–2023. AHRI 1200 includes a definition for ''high glide refrigerants'' and specifies that for high glide refrigerants, the temperature used to calculate compressor energy consumption is based on an adjusted mid-point evaporator temperature rather than an adjusted dew point temperature. DOE notes that this provision addresses the fact that AHRI 1200–2013 results in high-glide refrigerants having an energy penalty relative to no-glide refrigerants. The update to AHRI 1200–2023 provides a more representative test method of remote condensing CRE and improves consistency when testing a given remote condensing CRE model. AHRI 1200–2023 includes parallel provisions for remote and self-contained refrigerators to ensure there is no bias towards remote-condensing units. Self-contained CRE are tested based on the refrigerant and refrigeration system contained within the unit and no refrigerant measurements are necessary. Therefore, the test procedure directly accounts for the energy impacts of refrigerants used in self-contained CRE.

b. High-Temperature Applications

In the June 2022 NOPR, DOE proposed a definition for ''high-temperature refrigerators''. 87 FR 39164, 39173. As discussed in section III.A.2 of this final rule, DOE is establishing an amended definition of ''high-temperature refrigerator'' from the June 2022 NOPR.

Section 4.1.1.1 of AHRI 1200–2023 specifies that CRE intended for high-temperature applications shall have an integrated average temperature of 55 °F ±2.0 °F. DOE requires testing high-temperature consumer refrigeration products (*i.e.,* ''coolers'') at a standardized cabinet temperature of 55 °F. 10 CFR part 430, subpart B, appendix A.

In the June 2022 NOPR, DOE proposed to require testing high-temperature refrigerators according to AHRI 1200–202X, which requires an integrated average temperature of 55 °F ±2.0 °F. 87 FR 39164, 39173–39174.

High-temperature refrigerators are used in many distinct applications, each with specific intended storage conditions. However, DOE determined in the June 2022 NOPR that the IAT specified in AHRI 1200–202X is the most representative of high-temperature refrigerator operating conditions, because the high-temperature refrigerators that DOE identified have operating temperature ranges which include 55 °F, and allows for consistent measurements of energy use for equipment in this category. 87 FR 39164, 39174.

In referencing AHRI 1200–2023, the DOE test procedure would also require that high-temperature refrigerators be tested according to the same procedure

[12] *See* ASHRAE's glossary of defined terms at *xp20.ashrae.org/terminology/.*

as other CRE, except for the IAT. DOE tentatively determined in the June 2022 NOPR that the door opening and loading procedures in ASHRAE 72–2018R are appropriate for high-temperature refrigerators. Following the proposed test approach would also ensure consistent test methods across CRE categories, albeit at different IATs. 87 FR 39164, 39174.

Because the proposed test procedure for high-temperature refrigerators would amend the current test approach for certain commercial refrigerators (*i.e.,* those currently rated using the LAPT), DOE proposed in the June 2022 NOPR that the high-temperature refrigerator provisions in AHRI 1200–202X would not be required for use until the compliance date of any energy conservation standards established for high-temperature refrigerators based on the proposed test procedure. *Id.* Under this approach, CRE that would be defined as high-temperature refrigerators would continue to be tested and rated at the LAPT and subject to the current DOE energy conservation standards for CRE. *Id.*

In the June 2022 NOPR, DOE requested comment on the proposal to adopt a rating point of 55 °F ±2.0 °F for high-temperature refrigerators by adopting through reference certain provisions of AHRI 1200–202X. 87 FR 39164, 39172.

AHRI commented that the 55 °F (±2 °F) rating point aligns with AHRI standard 1200–202X and supported adopting the proposed rating point for high-temperature refrigerators. (AHRI, No. 38, p. 4)

Hussmann commented in favor of the proposal to adopt a rating point of 55 °F ±2.0 °F for high-temperature refrigerators. (Hussmann, No. 32, p. 3)

Hillphoenix commented that it agreed with the proposal to adopt the rating point temperature of 55 °F ±2 °F for the proposed new category of high-temperature refrigerators through reference of AHRI 1200–202X. (Hillphoenix, No. 35, p. 2) Hillphoenix requested confirmation that the LAPT provisions will remain to cover rare occurrences driven by customer expectations, which could suggest a design that is outside the requirements of each category. *Id.*

Continental commented it had no objection to DOE's proposed 55 °F ±2 °F rating temperature for ''high-temperature'' refrigerators that cannot maintain 38 °F. (Continental, No. 29, p. 3) Continental added that DOE should consider referencing existing NSF labeling requirements for equipment that is intended for ''non-potentially hazardous bottled or canned products only'' and ''not for the display of potentially hazardous foods,'' as this would identify equipment that meets required sanitation requirements in the proposed ''high-temperature'' range. *Id.* In addition, Continental agreed with DOE that the high-temperature refrigerator provisions in AHRI 1200–202X should not be required until the compliance date of any energy conservation standards established for these product types, based on the proposed test procedure. *Id.*

For the reasons discussed in the June 2022 NOPR, DOE is adopting the high-temperature refrigerator test provisions in AHRI 1200–2023. Because these provisions would impact the measured energy use for certain CRE currently subject to the test procedure and energy conservation standard, DOE is specifying that the high-temperature refrigerator testing would not be required for use until the compliance date of any energy conservation standards established for high-temperature refrigerators based on the amended test procedure.

As discussed in section III.K of this document, DOE is retaining the LAPT definition with modifications.

As discussed in section III.A.2 of this document, DOE is establishing a definition for high-temperature refrigerator that is based on the operating temperature of the equipment. Identifying equipment that meets NSF 7 sanitation requirements is not within the scope of the DOE CRE test procedure. Therefore, DOE has not included reference to equipment labeling in the definition or test requirements for high-temperature refrigerators.

c. Chef Bases

Section 2 of AHRI 1200–202X and AHRI 1200–2023 covers the scope of the standard. AHRI 1200–202X listed certain exclusions from scope (*i.e.,* refrigerated vending machines, ice makers, soft serve extruders, and secondary coolant applications). AHRI 1200–2023 added certain additional exclusions that were not excluded in previous versions of the standard, including AHRI 1200–202X (*i.e.,* chef bases, buffet tables, preparation tables, walk-in coolers, and blast chillers and freezers). DOE notes that none of these excluded categories are defined in AHRI 1200–2023.

DOE has not observed any changes from AHRI 1200–202X to AHRI 1200–2023 that would affect the ability to test chef bases and griddle stands in accordance with the standard. Current representations of chef bases and griddle stands are required to be based on the current DOE test procedure at Appendix B, which references AHRI Standard 1200–2010 and ASHRAE 72–2005, neither of which excludes chef bases or griddle stands. ASHRAE 72–2022 with Errata similarly does not exclude chef bases or griddle stands (section 2 ''Scope'' states that this standard does not apply to walk-in coolers, or refrigerators and freezers where the refrigerated air is in communication with walk-in coolers).

In the April 2014 Final Rule, DOE determined that, for chef bases and griddle stands, the refrigeration system and design of this equipment is not significantly different from other types of commercial refrigeration equipment, and DOE believes that the existing DOE test procedure is sufficiently representative of field use, and application of the existing energy conservation standard appropriate for this equipment. 79 FR 22277, 22282. Therefore, DOE is maintaining the reference to AHRI 1200 for chef bases and griddle stands and updating the reference to AHRI 1200–2023 consistent with other CRE that are in scope of appendix B. See section III.C.4 for further discussion of chef bases and griddle stands.

d. Definitions

AHRI 1200–2023 updated several of its definitions as compared to AHRI 1200–202X (*e.g., High Temperature Applications* was updated from ''Commercial Refrigerated Display Merchandisers and Storage Cabinets intended for High Temperature Applications, shall have an Integrated Average Temperature of 55 °F ±2.0 °F'' to ''An application where the Integrated Average Temperature is at, or above, 45 °F''). As proposed in the June 2022 NOPR, 10 CFR 431.62 would include some similar terms as the definitions in AHRI 1200–202X. Based on the updated definitions in AHRI 1200–2023 as compared to AHRI 1200–202X and to avoid potential confusion regarding multiple definitions of similar terms, DOE is clarifying in 10 CFR 431.62 that where definitions in AHRI 1200–2023 conflict with those in DOE's regulations, the DOE definitions take precedence.

e. Night Curtains

AHRI 1200–202X contained a definition of ''night curtain'' (a device which is temporarily deployed to decrease air exchange and heat transfer between the refrigerated case and the surrounding environment) and certain test requirements for ''night curtains''.[13]

[13] For display cases sold with Night Curtains installed, the Night Curtain shall be employed for

Night curtains are currently required in section 1.3.10 of appendix B of the DOE test procedure.[14] Therefore, DOE is maintaining the requirements for night curtains that were contained in AHRI 1200–202X as proposed in the June 2022 NOPR.

2. ASHRAE 72

As stated in the June 2022 NOPR, the 2014 and 2018 revisions to ASHRAE 72 provide editorial, clarifying, or harmonizing revisions that would not impact the measured energy consumption, volume, or TDA of CRE as compared to the existing DOE test procedure. 86 FR 31182, 31184.

The revisions in ASHRAE 72–2022 with Errata, as compared to the most recent 2018 version, include substantial reorganization largely to improve clarity of the test standard. Specifically, the foreword to ASHRAE 72–2022 with Errata states that the revision reorganizes the standard to make it easier to read and use; includes updates in the loading of test simulators and filler material; revises the sequence of operations during the test; provides instructions for certain measurements; and adds provisions for roll-in racks. The following paragraphs describe these revisions in more detail.

The reorganization of the test standard in ASHRAE 72–2022 with Errata is not expected to substantively change any test requirements as compared to the current test procedure. DOE acknowledges that the intent of the reorganization is to more closely align the test standard with the order of operations a test facility would follow when conducting testing.

The updates to the loading of test simulators (small packages with temperature-measuring devices) and filler material (material loaded between test simulators for additional product mass, intended to approximate food product loading) in ASHRAE 72–2022 with Errata revise certain requirements included in ASHRAE 72–2005. These updates change certain instructions regarding loading, but DOE tentatively determined in the June 2022 NOPR that these updates are either clarifying in nature or more closely align ASHRAE 72 with the capability of test facilities to conduct testing. 87 FR 39164, 39174. Specifically, ASHRAE 72–2022 with Errata would improve the clarity of the simulator loading location instructions, more clearly define net usable volume (*i.e.,* interior volume intended for refrigerated storage or display within the outermost manufacturer-specified load limit boundaries) to determine the loaded volume, and adjust the fill volume from 70 to 90 percent of the net usable volume to 60 to 80 percent. *See* section 5.4.8 of ASHRAE 72–2022 with Errata.

DOE tentatively acknowledged in the NOPR that, in principle, the update to the fill volume requirement would be a substantive change to the current DOE test procedure. 87 FR 39164, 39174. However, DOE has determined that ASHRAE implemented this revision because test facilities currently may have difficulty loading to more than 80 percent of the net usable volume. Based on this difficulty, DOE expects that most tests are currently conducted with loads between 70 to 80 percent of the net usable volume. Additionally, the revision to allow loading as low as 60 percent of net usable volume would allow additional flexibility for test facilities when loading equipment for testing, and any impact on measured energy use is expected to be minimal. DOE also expects that if testing with a lower load percentage has any impact on measured energy use, it is likely to increase measured energy use, as CRE with doors would have more internal compartment volume occupied by air rather than the test load, allowing for more internal air to exchange with warm ambient air during the test procedure's door opening period. Therefore, DOE tentatively determined in the NOPR that this proposed amendment to the test procedure would not allow any CRE that does not currently comply with DOE's energy conservation standards to become compliant. 87 FR 39164, 39174.

Section 7.1 of ASHRAE 72–2022 with Errata specifies the sequence of operations for conducting a test. The overall sequence requires conducting two tests, Test A and Test B, to verify stability of the unit under test. Both Test A and Test B would be conducted in the same way—starting with a defrost and with door or drawer openings, night curtains, and lighting occupancy sensors and controls, as applicable—as specified in section 7.3 of ASHRAE 72–2022 with Errata. The test is determined to be stable if the average temperature of simulators during Test B is within 0.4 °F of the average measured temperature during Test A. *See* section 7.5 of ASHRAE 72–2022 with Errata. As compared to the current DOE test procedure and ASHRAE 72–2005, ASHRAE 72–2022 with Errata specifies how to determine that a test is stable. ASHRAE 72–2005 currently requires steady-state conditions for the test (section 7.1.1) and a stabilization period during which the CRE operates with no adjustment to controls for at least 12 hours (section 7.4). Section 3 of ASHRAE 72–2005 defines ''steady-state'' as the condition in which the average temperature of all test simulators changes less than 0.4 °F from one 24-hour period or refrigeration cycle to the next. ASHRAE 72–2005 does not specify whether the 24-hour periods used to determine steady-state conditions include door openings, which are required to be performed during the 24-hour performance test. Additionally, the temperatures maintained over a 24-hour period with door openings may differ from a 24-hour period with no door openings. If steady-state is determined without door openings, then door openings during a test may increase simulator temperatures outside of the desired range, requiring a change to the temperature setting and restarting the steady-state determination prior to another test period.

The testing approach in ASHRAE 72–2022 with Errata specifies that Test A and Test B are conducted in the same way, and therefore the temperatures used to determine stability would also be at the target temperatures for the test. DOE determined in the June 2022 NOPR that this approach provides clarity to the existing test procedure while limiting burden by reducing the need for retests (*i.e.,* by maintaining target temperatures during the stability determination). 87 FR 39164, 39175. Because the sequence of operations in ASHRAE 72–2022 with Errata is generally consistent with ASHRAE 72–2005 but with added specificity, DOE does not expect that the updated sequence of operations would impact current CRE ratings based on the current DOE test procedure.

Moreover, ASHRAE 72–2022 with Errata explicitly specifies test conditions and data collection requirements in a new appendix A: ''Measurement Locations, Tolerances, Accuracies, and Other Characteristics.'' This appendix includes a table that presents the measurements required during testing, the measurement location (if applicable), the period of time the measurement is taken (*e.g.,* once per minute throughout Test A and Test B, once before Test B, and once after Test B), the required measurement accuracy, and the required value (*i.e.,* the test condition, if applicable). The measurement instructions and

6 hours; beginning 3 hours after the start of the test period. Upon the completion of the 6-hour period, the Night Curtain shall be raised until the completion of the 24-hour test period.

[14] For display cases sold with night curtains installed, the night curtain shall be employed for 6 hours; beginning 3 hours after the start of the first defrost period. Upon the completion of the 6-hour period, the night curtain shall be raised until the completion of the 24-hour test period.

requirements in appendix A to ASHRAE 72–2022 with Errata are generally consistent with those required by the current DOE test procedure, by reference to ASHRAE 72–2005, but with added specificity to clarify the applicable requirements. Because the measurement instructions in ASHRAE 72–2022 with Errata are generally consistent with ASHRAE 72–2005 but with added specificity, DOE does not expect that the updated requirements in appendix A would impact current CRE ratings based on the current DOE test procedure.

ASHRAE 72–2022 with Errata also adds provisions for testing CRE used with roll-in racks. Sections 5.4.1 and 5.4.5 of ASHRAE 72–2022 with Errata provide loading instructions for CRE used with roll-in racks. These sections are generally consistent with the existing test requirements for CRE, but provide additional clarification specific to roll-in racks to describe the determination of net usable volume and loading of test simulators. ASHRAE 72–2005 includes roll-in racks within the scope of the test standard (section 9.1) but does not provide additional test instructions for these models. Because the instructions for testing CRE used with roll-in racks in ASHRAE 72–2022 with Errata are generally consistent with ASHRAE 72–2005 but with added specificity, DOE does not expect that the updated requirements in appendix A would impact current CRE ratings based on the current DOE test procedure.

As discussed, the test procedure in ASHRAE 72–2022 with Errata is generally consistent with the existing DOE test procedure, which references ASHRAE 72–2005. The updates included in ASHRAE 72–2022 with Errata are generally editorial, clarifying, or harmonizing revisions. Additionally, the substantive revisions in ASHRAE 72–2022 with Errata provide further specificity to the existing test procedure requirements and would improve repeatability, reproducibility, and representativeness of the test procedure while limiting test burden. For these reasons, in the June 2022 NOPR, DOE proposed to incorporate by reference ASHRAE 72–2018R into the DOE test procedure and tentatively determined that any test data for CRE currently available on the market are expected to be consistent with the proposed test procedure. 87 FR 39164, 39174.

In the June 2022 NOPR, DOE requested comment on its proposal to incorporate by reference ASHRAE 72–2018R, including whether the updates included in the industry test standard would impact the measured energy consumption of any CRE currently available. *Id.*

AHRI commented that it supports DOE's proposal to incorporate by reference ASHRAE 72–2022 because the updates included in the industry test standard should not significantly impact the measured energy consumption of any CRE currently available. (AHRI, No. 38, p. 4)

AHT supported incorporating by reference ASHRAE 72–2018R. (AHT, No. 38, p. 1).

Hillphoenix agreed with the proposal to incorporate by reference the newer version of ASHRAE 72, but recommended version 202X, which is currently in public review. (Hillphoenix, No. 35, p. 2) Hillphoenix commented that this approach would align with the incorporation of other standards referenced that are not yet released and would maintain consistency within the industry. *Id.*

Continental supported DOE's proposal to incorporate the most recent edition of the ASHRAE 72 test procedure, pointing out that ASHRAE 72–2022, the most recent standard, prescribes separate 24-hour A and B test periods to provide more consistent verification of stability than the previous version of the procedure. (Continental, No. 29, p. 3) Continental commented that it is still evaluating impacts of this change on the energy consumption of equipment, particularly for freezers, and stated that provisions of ASHRAE 72–2022 should not be required until the compliance date of any new energy conservation standards are established, based on the proposed test procedure, to allow time for vetting any impact on energy consumption. *Id.* Continental also commented that the use of separate 24-hour test periods, including additional door opening requirements, is desirable for the reasons noted above, but the revised method will increase the test burden for some equipment types and substantially increase costs for laboratory and staff time, reducing the capacity to perform other testing to meet regulations. *Id.* Continental commented that these factors and their related costs will impact a small business like itself. *Id.*

Hoshizaki commented that it would like to state for the record that there is an ASHRAE 72–2018 standard and an ASHRAE 72–2022 standard, and that it agrees to proposing the incorporation of ASHRAE 72–2018. (Hoshizaki, No. 30, p. 1) Hoshizaki noted that the ASHRAE 72–2022 standard was just finalized in July of 2022 and, as of the filing date of this rulemaking, was not approved and published for all parties to see. *Id.* Hoshizaki noted that while most changes to the standard were editorial, the change from stabilization to new test cycle may leave many manufacturers without the opportunity to review and comment. *Id.* Hoshizaki commented that enough time would be needed for manufacturers to fully digest these new changes to determine for themselves whether these changes affect their designs. *Id.*

Based on the June 2022 NOPR and comments received in response, DOE is incorporating by reference ASHRAE 72–2022 with Errata. Based on comments received in response to the June 2022 NOPR and DOE's review of ASHRAE 72–2022 with Errata, DOE does not expect any impact on ratings as a result of the updates to the standard. DOE notes that ASHRAE 72–2022 with Errata is available for purchase, as discussed in this **SUPPLEMENTARY INFORMATION** section.

In response to Continental's comment regarding test burden for some types of CRE, ASHRAE 72–2005, currently incorporated by reference, requires stabilization periods generally consistent with ASHRAE 72–2022 with Errata. The updates clarify procedures in the stabilization period and limit the need for iterative testing. DOE expects no significant change in test burden associated with testing to ASHRAE 72–2022 with Errata as compared to ASHRAE 72–2005.

a. Drawers

Section 1.3.16 of appendix B of the DOE test procedure specifies that drawers are to be treated as identical to doors when conducting the DOE test procedure, and that drawers should be configured with the drawer pans that allow for the maximum packing of test simulators and filler packages without the filler packages and test simulators exceeding 90 percent of the refrigerated volume. Packing of test simulators and filler packages must be in accordance with the requirements for commercial refrigerators without shelves, as specified in section 6.2.3 of ASHRAE 72–2005.

CRE with drawers are typically configured to hold standardized food pans for food storage. Pans loaded into the drawers are not typically filled with food above their top edges to prevent spilling or interfering with other drawers. Additionally, these CRE may require the space above the pans to be unloaded to allow for air circulation within the cabinet.

The current DOE test procedure instructions do not specify any test simulator or filler package load limits for pans, other than not exceeding 90 percent of the refrigerated volume. For

other CRE tests, ASHRAE 72–2005 and ASHRAE 72–2022 with Errata specify test simulator and filler package loading based on net usable volume rather than refrigerated volume. *See* section 6.2.5 of ASHRAE 72–2005 and section 5.4.1 of ASHRAE 72–2022 with Errata. Loading based on the net usable volume accounts for load limits within the CRE and would prevent overloading CRE to the extent of impacting airflow circulation within the cabinet.

To ensure consistent testing for CRE with drawers, and to allow for testing that is most representative of typical use, DOE proposed in the June 2022 NOPR to specify in appendix B that CRE with drawers be tested according to the existing requirements with the additional instruction that, for the purposes of loading pans in drawers, the net usable volume is the storage volume of the pans up to their top edge. 87 FR 39164, 39175.

The drawer loading instructions in appendix B reference section 6.2.3 of ASHRAE 72–2005, which specifies instructions for loading compartments without shelves. Specifically, section 6.2.3 requires situating test simulators at the left and right ends (*i.e.,* sides), the front and back, and the top and bottom locations of the compartment. To make explicit the application of this instruction to standardized food pans, DOE proposed in the June 2022 NOPR to require that test simulators be placed at the corner locations of each pan. 87 FR 39164, 39175. For any pans not wide or deep enough to allow for test simulators at each corner (*i.e.,* less than 7.5 inches (''in.'') wide or deep, based on the 3.75-in. test simulator width), DOE proposed that test simulators be centered along the width or depth accordingly. 87 FR 39164, 39175–39176. Similarly, for any pans not tall enough to allow for test simulators at the specified top and bottom locations (*i.e.,* pans less than 4 in. tall, based on the 2-in. test simulator height), DOE proposed that a test simulator only be loaded at the specified top location within the standardized food pan. 87 FR 39174, 39176.

In the June 2022 NOPR, DOE requested comment on the proposed additional instructions regarding loading drawers. *Id.* DOE additionally requested information on whether the proposed approach is consistent with any future industry standard revisions to address this issue. *Id.* DOE also requested comment on whether other instructions for CRE with drawers should be revised (*e.g.,* fully open definition for drawers) or if additional instructions are needed. *Id.*

AHRI commented that the additional loading drawer instructions proposed by DOE are incomplete and provide a suboptimal approach. (AHRI, No. 38, p. 4) AHRI pointed out that ASHRAE Standard 72–2022 may be available as early as May 2024 as an update to ASHRAE Standard 72–2018, with revisions including the addition of a specific test procedure for drawers as well as more complete instructions. *Id.* AHRI recommended that DOE pause the process of providing additional instructions regarding loading drawers and await ASHRAE 72–2022. *Id.*

Continental commented that DOE should delay adoption of additional instructions for testing drawers since the ASHRAE 72 standards committee is in the process of updating the current Standard 72–2022, and is working to resolve a number of significant challenges with loading and testing drawers to ensure a reliable and repeatable process that is not overly burdensome. (Continental, No. 29, p. 4) Continental stated that DOE should continue to work with ASHRAE to complete incorporation of an industry-accepted standard procedure. *Id.*

Hoshizaki commented that, currently, the ASHRAE 72 Standards Committee is working on specifying test setup and procedure for drawer units and that any changes should be made in this committee. (Hoshizaki, No. 30, p. 2) Hoshizaki noted that making suggestions in the DOE NOPR phase is not the proper process by which to change standards, and that using a published standard for some parts and requesting revisions in CFR could only confuse both manufacturers and third-party testing agencies. *Id.*

Hillphoenix stated its disagreement with the proposal to include additional instructions regarding drawers and recommended referencing the new version of ASHRAE 72–202X, which will maintain alignment in the industry without creating new or duplicate requirements that would otherwise be added to the final rule. (Hillphoenix, No. 35, p. 3)

DOE recognizes that a future update to the ASHRAE 72 standard may include additional instructions for CRE with drawers, but a revision to ASHRAE 72 including such instruction is not yet available.

Consistent with AHRI's comment that the additional loading drawer instructions proposed by DOE are incomplete and provide a suboptimal approach, DOE reviewed the approach specified in the June 2022 NOPR. As stated in the June 2022 NOPR, DOE proposed additional instructions to ensure testing that is most representative of typical use. 87 FR 39164, 39175. DOE re-ordered the instructions in this final rule to better clarify the proposed approach and better specify some requirements. Specifically, DOE has added a definition for fully open (for drawers) which means opened not less than 80 percent of their full travel which is consistent with the fully open (for sliding doors) definition in ASHRAE 72 with Errata which means opened at least 80 percent of its full normal travel. Currently, ASHRAE 72 with Errata includes a definition for fully open (for drawers) that requires drawers to be opened not less than 66 percent of their full travel. This definition allows a wider range of openings than for sliding doors despite the fact that, similar to sliding doors, drawers require users to almost fully open the drawer to expose the full contents to the user. DOE has determined that a definition of fully open (for drawers) that is consistent with the definition for fully open (for sliding doors) would result in more representative results by reducing the range of allowable percent open. Additionally, DOE has revised the food service pan requirement from Gastronorm to stainless steel to ensure a repeatable and reproducible test with the same pan material while allowing test flexibility for different pan sizes as specified in manufacturer instructions.

DOE proposed in the June 2022 NOPR that the net usable volume of drawers is the storage volume of the pans up to the top edge of the pan. 87 FR 39164, 39175. DOE has determined that ''up to the top edge of the pan'' is better specified by providing a more detailed description of this instruction that is harmonized with the net usable volume determination for buffet tables or preparation tables established in this final rule. Specifically, DOE is specifying that the net usable volume of pans is determined by filling pans with water to within 0.5 in. of the top edge of the pan.

DOE proposed in the June 2022 NOPR additional test simulator loading instructions to clarify the application of ASHRAE 72 loading to pans. 87 FR 39164, 39175. DOE has revised the test simulator locations proposed for drawers to be less burdensome and to align more closely with the simulator loading requirements in ASHRAE 72 with Errata. Specifically, DOE has determined that loading test simulators into every individual pan (*i.e.,* at each corner of every pan), as proposed, is not appropriate and would be overly burdensome as compared to the simulator loading requirements for shelves in ASHRAE 72 with Errata. For example, under the proposed approach,

a large drawer loaded with small pans would require many more simulators (in every pan) than a similarly-sized CRE with a shelf in place of a drawer (at the shelf corners and at specified intervals). To ensure consistent application of the ASHRAE 72 with Errata instructions, DOE is specifying that drawers be loaded with simulators in locations similar to those required for shelves (*i.e.,* at the drawer ends and at specified length intervals, at the front and back of the drawers, and on the bottom of the pan(s)) which is representative of the integrated average temperature of the drawer(s) while reducing the test burden of requiring additional test simulators and to account for pans which may not accommodate two test simulators stacked in the vertical direction. Additionally, DOE is specifying that test simulators shall be secured during testing to ensure the specified locations are maintained throughout drawer openings. DOE has determined that this revised method is representative, repeatable, and reproducible for testing of CRE with drawers and maintains consistency with the loading instructions in ASHRAE 72 with Errata.

b. Liquid Refrigerant Pressure Accuracy

On April 14, 2023, ASHRAE published the first public review draft of Addendum a to ASHRAE 72–2022 with Errata.[15] The purpose of Addendum a is to correct the required liquid refrigerant pressure measurement accuracy in Table A–1 in Normative Appendix A. The required accuracy for liquid refrigerant pressure in ASHRAE 72–2022 with Errata is ±7.0 kPa (±1.0 psi). However, this is an error because in previous versions of ASHRAE 72 (*e.g.,* the version currently incorporated by reference at 10 CFR 431.63, ASHRAE 72–2005), the required accuracy for liquid refrigerant pressure was ±35 kPa (±5.1 psi). Addendum a corrects the required accuracy for liquid refrigerant pressure to be ±35 kPa (±5.1 psi), consistent with previous versions of ASHRAE 72. Therefore, DOE is clarifying in this final rule that the required accuracy for liquid refrigerant pressure is ±35 kPa (±5.1 psi).

3. Secondary Coolants

Certain CRE are installed for use with a secondary coolant. In this configuration, a remotely cooled fluid (*e.g.,* a propylene glycol solution) is supplied to the cabinet and absorbs heat from the cabinet without the secondary coolant undergoing a phase change.

AHRI publishes a rating standard applicable to CRE that use a secondary coolant or refrigerant, AHRI Standard 1320 (I–P), ''2011 Standard for Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets for Use With Secondary Refrigerants'' (''AHRI 1320–2011''), approved by ANSI on April 17, 2012. AHRI 1320–2011 is applicable to CRE that are equipped and designed to work with electrically driven, medium-temperature, single-phase secondary coolant systems, but excludes equipment used for low-temperature applications, secondary coolants involving a phase change (*e.g.,* ice slurries or carbon dioxide), and self-contained CRE. AHRI 1320–2011 includes similar rating temperature conditions as those in AHRI 1200–2013 and references ASHRAE 72–2005 and AHAM HRF–1–2008 for the measurement of energy consumption and calculation of refrigerated volume, respectively. The only substantive differences between AHRI 1200–2013 and AHRI 1320–2011 are the inclusion of secondary refrigerant circulation pump energy consumption in the calculation of total daily energy consumption and revised coefficients of performance to determine compressor energy consumption.

While CRE cooled by secondary coolants are less common than self-contained or remote CRE, DOE proposed in the June 2022 NOPR to incorporate by reference AHRI 1320–2011 to reference only the specific sections within the standard that apply to CRE tested with secondary coolants (*i.e.,* those referring to pump energy and coolant flow) and to otherwise reference the applicable requirements in AHRI 1200–202X. 87 FR 39164, 39176. DOE acknowledges that AHRI 1320–2011 may be updated consistent with the updates in AHRI 1200–2023.

Because CRE cooled by secondary coolants are not currently subject to DOE's test procedure, DOE proposed in the June 2022 NOPR that the test procedure referencing AHRI 1320–2011 would not be required for use until the compliance date of any amended energy conservation standards for CRE that consider such testing. 87 FR 39164, 39176. DOE is aware that direct-expansion remote CRE may also be capable of being installed with a secondary coolant. *Id.* Under the June 2022 NOPR proposal, such equipment would continue to be tested and rated using the approach currently required for remote condensing CRE. *Id.* The test procedure for secondary coolants proposed in the June 2022 NOPR would be applicable to equipment only capable of being installed with secondary coolants, should any such models become available. *Id.*

In the June 2022 NOPR, DOE requested comment on the proposal to incorporate by reference AHRI 1320–2011 for CRE used with secondary coolants, including the proposal to only reference the industry standard for provisions specific to secondary coolants and to otherwise reference AHRI 1200–202X, as proposed for other CRE. 87 FR 39164, 39176.

The CA IOUs commented that they support the addition of a test procedure for secondary coolant systems in reference to ANSI/AHRI Standard 1320 and recommended distinguishing between secondary coolant systems and cascade systems and including both system types in the scope of DOE's test procedures. (CA IOUs, No. 36, p. 11) The CA IOUs also encouraged DOE to develop a test procedure to address CO_2-based (*i.e.,* R–744) secondary coolant systems and cascade systems. *Id.*

AHRI recommended that DOE avoid incorporating by reference AHRI 1320–2011 for CRE used with secondary coolants because AHRI will likely update AHRI 1320–2011 during 2023, and an updated standard could create confusion for compliance purposes. (AHRI, No. 38, p. 5) AHRI noted that AHRI 1320–2011 is not a widely used or needed standard and that waiting for the update would benefit the test procedure. *Id.*

Zero Zone stated agreement that AHRI 1320 was the appropriate standard for secondary coolants, as stated in previous comments. (Zero Zone, No. 37, p. 3) Zero Zone stated it had not used the standard, expressed concern it would not produce reliable results, and agreed with AHRI's position that the standard was out of date and not used by manufacturers. *Id.* Zero Zone commented that generally speaking, a commercial refrigerator has the same amount of heat infiltration regardless of the refrigerant used to cool the equipment, plus the number of cases sold that use a secondary coolant is extremely low, and adding a requirement to test and certify this equipment would create an enormous test burden. *Id.*

Hussmann recommended against DOE's proposal to incorporate by reference AHRI 1320–2011 for CRE used with secondary coolants, as AHRI is likely to update AHRI 1320–2011 during 2023. (Hussmann, No. 32, p. 3) Hussmann commented that an updated standard could create confusion for compliance purposes, adding that AHRI

[15] *See www.ashrae.org/File%20Library/Technical%20Resources/Standards%20and%20Guidelines/Standards%20Actions/SAApr142023.pdf.*

1320–2011 is not a widely used or needed standard, and that waiting for a more updated standard to incorporate in the test procedure would be beneficial. *Id.*

Hillphoenix disagreed with the proposal to incorporate AHRI 1320–2011 and recommended that DOE allow the standard to be reviewed by the industry and aligned with current technology before being referenced. (Hillphoenix, No. 35, p. 3)

DOE recognizes that AHRI 1320–2011 is not a widely used standard and that AHRI may work on an update to the standard, but DOE also recognizes that AHRI 1320 parallels AHRI 1200. Therefore, DOE is adopting the provisions for CRE used with secondary coolants as proposed in the June 2022 NOPR, which is consistent with the updates in AHRI 1200–2023, so that CRE using secondary coolants can be tested and rated. DOE will evaluate any future updates to AHRI 1320–2011 as they become public. Consistent with the June 2022 NOPR, the test procedure for CRE using secondary coolants would not be required for use until the compliance date of any amended energy conservation standards for CRE that consider such testing.

As stated in the June 2022 NOPR, DOE is aware that direct-expansion remote CRE may also be capable of being installed with a secondary coolant. Such equipment will continue to be tested and rated using the approach currently required for remote condensing CRE. The test procedure for CRE with secondary coolants will be applicable to equipment only capable of being installed with secondary coolants, should any such models become available.

C. Test Conditions for Specific CRE Categories

DOE has identified specific categories of CRE that are not currently subject to the DOE test procedure or in which the current test procedure may not produce results that are representative of their use. Additionally, the EPA's ENERGY STAR program considered three of these equipment categories for scope expansion and test method development during the Version 5.0 Specification development process: refrigerated preparation and buffet tables; chef bases or griddle stands; and blast chillers and freezers.[16] DOE has considered information gathered through the ENERGY STAR process when developing the proposals included in this final rule. DOE discusses each of these categories in the following sections.

In response to the June 2022 NOPR, NEEA encouraged DOE to align test methods for this equipment with EPA ENERGY STAR 5.0 where applicable to reduce manufacturer burden and establish consistently used ratings. (NEEA, No. 39, p. 2). NEEA commented that DOE had reviewed the test procedures it recommended for these four products and considered any anticipated updates to industry TP or active product committees, such as ASHRAE 220. *Id.* NEEA stated support for DOE's proposed test procedures for this equipment, noting that establishing Federal test procedures was key to providing consistent ratings to consumers and enabling data collection that would inform establishing standards for this newly defined equipment. *Id.* NEEA recommended that DOE establish energy conservation standards for newly defined CRE equipment classes, including test procedures for refrigerated preparation and buffet tables; chef bases or griddle stands; blast chillers and blast freezers; and high-temperature CRE. *Id.*

As discussed in the following sections, DOE is establishing test procedures for new equipment categories as proposed in the June 2022 NOPR. DOE has considered the latest ENERGY STAR requirements in evaluating the requirements for these equipment categories. DOE may evaluate energy conservation standards for these new equipment categories as part of a separate energy conservation standards rulemaking.

1. Salad Bars, Buffet Tables, and Refrigerated Preparation Tables

Salad bars, buffet tables, and other refrigerated holding and serving equipment, including refrigerated preparation tables,[17] are CRE that store and display perishable items temporarily during food preparation or service. These units typically have design attributes such as easily accessible or open bins that allow convenient and unimpeded access to the refrigerated products, which make them unique from CRE designed for storage or retailing. In the April 2014 Final Rule, DOE did not establish test procedures for this equipment but maintained that it meets the definition of CRE and is covered equipment that could be subject to future test procedures and energy conservation standards. 79 FR 22277, 22281. In the June 2022 NOPR, DOE proposed definitions and test procedures applicable to salad bars, buffet tables, and refrigerated preparation tables.

a. Definitions

In the June 2022 NOPR, DOE noted that ASTM International F2143–16, ''Standard Test Method for Performance of Refrigerated Buffet and Preparation Tables'' (''ASTM F2143–16'') provides the following definitions for refrigerated buffet and preparation tables:

- *Refrigerated buffet and preparation table*—equipment designed with a refrigerated open top or open condiment rail.
- *Refrigerated buffet table or unit*—equipment designed with mechanical refrigeration that is intended to receive refrigerated food and maintain food product temperatures and is intended for customer service such as a salad bar. A unit may or may not be equipped with a lower refrigerated compartment.
- *Refrigerated food preparation unit*—equipment designed with a refrigerated open top or open condiment rail such as refrigerated sandwich units, pizza preparation tables, and similar equipment. The unit may or may not be equipped with a lower refrigerated compartment.

86 FR 31182, 31185–31186.

DOE discussed in the June 2022 NOPR that certain terms used within these definitions are undefined (*e.g.,* condiment rails, food product temperatures) and that it was not aware of any other industry standard definitions for these equipment categories. *Id.*

DOE also noted in the June 2022 NOPR that the California Code of Regulations (''CCR'')[18] defines ''buffet table'' and ''preparation table'' as follows:

- ''Buffet table'' means a commercial refrigerator, such as a salad bar, that is designed with mechanical refrigeration and that is intended to receive refrigerated food, to maintain food product temperatures, and for customer service; and
- ''Preparation table'' means a commercial refrigerator with a countertop refrigerated compartment with or without cabinets below, and

[16] Information and materials for ENERGY STAR's Specification Version 5.0 process are available at *www.energystar.gov/products/spec/commercial_refrigerators_and_freezers_specification_version_5_0_pd* (last accessed March 11, 2023).

[17] While the April 2014 Final Rule did not specifically refer to refrigerated preparation tables, DOE is including them in this category because they have similar features to salad bars and buffet tables. Each of these equipment categories includes an open-top area for holding refrigerated pans and is used during food preparation and service.

[18] California's regulations for buffet tables and preparation tables refer to the 2001 version of ASTM F2143. For this final rule, DOE has reviewed ASTM F2143–16, as it is the most current version of the standard.

with self-contained refrigeration equipment. 20 CCR § 1602.

87 FR 39164, 39177.

Furthermore, the EPA's ENERGY STAR program's Final Draft Version 5.0 Eligibility Criteria for commercial refrigerators and freezers includes a definition for ''preparation or buffet table'' as a commercial refrigerator, freezer, or refrigerator-freezer with a food condiment rail designed to hold open perishable food and may or may not be equipped with a lower compartment that may or may not be refrigerated.

In the June 2022 NOPR, DOE stated that the configuration of salad bars, buffet tables, and refrigerated preparation tables may raise questions as to whether a unit is commercial hybrid refrigeration equipment. 87 FR 39164, 39177. DOE defines ''commercial hybrid refrigeration equipment'' as a unit of CRE (1) that consists of two or more thermally separated refrigerated compartments that are in two or more different equipment families, and (2) that is sold as a single unit. 10 CFR 431.62.

DOE discussed in the June 2022 NOPR that additional detail may be necessary to distinguish between a unit that is a salad bar, buffet table, or refrigerated preparation table and a unit that is commercial hybrid equipment that includes a salad bar, buffet table, or refrigerated preparation table. 87 FR 39164, 39177. Refrigerated salad bars, buffet tables, and preparation tables typically have removable pans or bins that directly contact the chilled air in the refrigerated compartment of the unit. With that configuration, the entirety of the chilled compartment and surface pans would potentially be considered a refrigerated salad bar, buffet table, or preparation table. In contrast, if a unit includes solid partitions between the chilled compartment and the pans or bins on top of the unit, such a configuration would potentially be considered thermal separation and the unit would be considered a commercial hybrid consisting of a refrigerated salad bar, buffet table, or preparation table with a refrigerator and/or freezer.

To delineate this equipment from other types of CRE, DOE proposed in the June 2022 NOPR to define the term ''buffet table or preparation table.'' 87 FR 39164, 39179. DOE proposed a definition for this term that combines elements of the existing industry and ENERGY STAR definitions, includes language for consistency with DOE's existing CRE definitions, and includes further specificity regarding the characteristics of this equipment. *Id.* Specifically, DOE proposed to define this term as follows:

''Buffet table or preparation table'' means a commercial refrigerator with an open-top refrigerated area, that may or may not include a lid, for displaying or storing merchandise and other perishable materials in pans or other removable containers for customer self-service or food production and assembly. 87 FR 39164, 39179. The unit may or may not be equipped with a refrigerated storage compartment underneath the pans or other removable containers that is not thermally separated from the open-top refrigerated area. *Id.*

DOE did not propose in the NOPR to define the term ''salad bar,'' as this equipment would be captured within the proposed definition of ''buffet table or preparation table.'' 87 FR 39164, 39179. DOE tentatively determined that additional equipment definitions are not necessary for the purposes of testing buffet tables and preparation tables. *Id.*

Additionally, DOE did not propose in the NOPR any reference to storage temperature or duration in the proposed definition for ''buffet table or preparation table.'' 87 FR 39164, 39179–39180. DOE recognized that these are important aspects of the equipment operation but has tentatively determined that they are not necessary for the purpose of defining the equipment to establish test procedures. *Id.* By specifying that such units are commercial refrigerators, buffet tables and preparation tables would be units capable of operating at or above 32 °F (±2 °F).

As discussed, CRE may include single refrigeration systems to provide cooling to multiple compartments or areas within a unit. Additionally, CRE may include multiple distinct refrigeration systems or evaporator coils to individually cool separate compartments or refrigerated areas. DOE's proposed definition in the June 2022 NOPR would include units both with and without a refrigerated storage compartment underneath the pans or other removable containers. The proposed definition in the June 2022 NOPR, however, specifies that units including a refrigerated storage compartment underneath the pans or other removable containers may not be thermally separated from the open-top refrigerated area.

DOE noted in the June 2022 NOPR that while industry may use the term ''hybrid'' to refer to different combinations of equipment capabilities and configurations, the term ''commercial hybrid'' is specifically defined by DOE in 10 CFR 431.62. 87 FR 39164, 39180. Currently, CRE with refrigerated storage compartments thermally separated from the open-top refrigerated area of the buffet table or preparation table are ''commercial hybrid'' CRE and must be tested in accordance with the applicable test procedures and comply with the applicable standards. Such equipment would continue to be tested as currently required to determine compliance with the existing energy conservation standards applicable to the non-buffet table or preparation table element. As noted, DOE has not established energy conservation standards for CRE covered under the proposed definition of ''buffet table or preparation table.'' DOE discussed in the April 2014 Final Rule that because only the refrigerated storage compartment is subject to current energy conservation standards, the unit would be tested with the buffet table or preparation table portion disabled and not included in the determination of energy consumption. 79 FR 22277, 22289. If the same refrigeration system serves both the refrigerated compartment and the open-top refrigerated area and refrigeration of the open-top area cannot be disabled, manufacturers may apply for a test procedure waiver for such equipment if the measured energy use would not be representative of the portion of the unit that is not a buffet table or preparation table of the CRE basic model. *Id.*

In the June 2022 NOPR, DOE requested comment on the proposed definition for ''buffet table or preparation table.'' 87 FR 39164, 39180. DOE also requested information on whether any additional definitions are necessary for the purposes of testing this equipment, or whether any additional equipment characteristics are necessary to differentiate this equipment from other categories of CRE. *Id.*

Hoshizaki supported this proposed definition and stated that it is like the definition given in ASTM F2143–16. (Hoshizaki, No. 30, p. 2)

Hillphoenix agreed with the proposed definitions for buffet table and preparation table as documented in the NOPR. (Hillphoenix, No. 35, p. 3)

NEEA supported the new definitions DOE proposed for buffet tables and preparation tables, stating that these equipment types have unique applications compared to other CRE, and these definitions allow consideration (potential standards), categorization (equipment classes), and testing of this equipment separate from other CRE. (NEEA, No. 39, p. 2)

Continental commented it continues to support the use of NSF 7–2019

(defined within NSF/ANSI 170–2019, ''Glossary of Food Equipment Terminology'') definitions for ''Refrigerated Buffet Units'' and ''Refrigerated Food Preparation Units.'' (Continental, No. 29, p. 4)

True commented that the terms used to define the categories of ''buffet table'' and ''preparation table'' correspond to (match) those as defined by NSF/ANSI 170 (referenced in NSF/ANSI 7–2021). (True, No. 28, p. 2) True commented that the definition for a buffet table can be found at NSF/ANSI 170 3.22, which defines a buffet unit as ''Equipment that is designed to receive and maintain food product(s) at proper temperatures and is intended for customer service,'' and that the definition for a preparation table can be found at NSF/ANSI 170 3.173, which defines a refrigerated food preparation unit as ''Equipment designed with a refrigerated open top or open condiment rail such as refrigerated sandwich units, pizza preparation tables, and similar equipment. The unit may or may not be equipped with a lower refrigerated compartment.'' *Id.*

AHRI commented that it found the proposed definition for ''buffet table or preparation table'' to be broad enough for testing this equipment and defining necessary equipment characteristics; as a result, additional definitions may be unnecessary. (AHRI, No. 38, p. 5) AHRI recommended that DOE should specify that this definition applies to self-contained units and add to the definition whether the equipment does or does not share a coil. *Id.*

Hussmann commented that while it did not oppose the proposed definitions, it requested that DOE include that the definition pertained to self-contained units only, and that DOE include language about sharing the coil with other compartments. (Hussmann, No. 32, p. 4) Hussmann also commented that the definition included ''may or may not be equipped with a refrigerated storage compartment underneath the pans'' but did not mention any other equipment category, and that the buffet/prep section may share a coil with a different equipment category other than storage and mention should be in the definition because it already considers the lower storage. *Id.* Hussmann requested clarification about, and a definition of, ''non-thermally separated compartments,'' as the proposal stated ''closed.'' (Hussmann, No. 32, p. 5) Hussmann commented that currently, open display cases (''SVO'') share the same coil/discharge air with the buffet/prep section. *Id.* Hussman questioned whether DOE considered this condition as not thermally separated. *Id.* Hussmann added that if so, a ''no-load'' in the SVO section of the case would result in higher infiltration of warm air. *Id.* Hussmann also commented by asking if night curtains would be allowed to be installed on the case or if the unloaded compartment could be protected or, alternatively, if the SVO section of the case could be loaded. *Id.*

The CA IOUs commented that DOE's proposed definition for ''buffet table or preparation table'' raises the issue that if an energy conservation standard is established in the future for this equipment, refrigerated rails will have to meet the same energy conservation standard as prep tables with a refrigerated bottom component if that bottom component is not ''thermally separated'' from the open-top refrigerated area. (CA IOUs, No. 36, p. 1) The CA IOUs also commented that DOE should consider defining ''refrigerated rail'' separately from ''buffet table or preparation table'' and that the definition of ''buffet table or preparation table'' include both sandwich and pizza prep tables; and that ''commercial hybrid'' CRE consists of compartments refrigerated by separate evaporators with fully independent temperature control between the different compartments. (CA IOUs, No. 36, p. 3)

The CA IOUs amended the proposed NOPR definitions with strikeout deletions and underline additions. *Id.* The CA IOUs agreed with the current definition of a ''refrigerated rail.'' *Id.* The CA IOUs amended the proposed NOPR definition of ''buffet table or preparation table'' to ''a commercial refrigerator with an open-top refrigerated area, that may or may not include a lid, for displaying or storing merchandise and other perishable materials in pans or other removable containers for customer self-service or food production and assembly. The unit may or may not be equipped with a refrigerated storage compartment underneath the pans or other removable containers, that is not thermally separated from the open-top refrigerated area that is conditioned by the same refrigeration circuit as the open-top refrigerated area.'' *Id.* The CA IOUs slightly altered the definition of ''commercial hybrid'' refrigeration equipment to ''a unit of CRE (1) that consists of two or more thermally separated refrigerated compartments with independent control of temperature amongst the refrigerated compartments and that are in two or more different equipment families, and (2) that is sold as a single unit.'' *Id.*

The CA IOUs commented that prep tables (either sandwich tables or pizza prep tables) are similar in having an open-top refrigerated area with a refrigerated storage compartment underneath. (CA IOUs, No. 36, p. 2) The CA IOUs stated that in the absence of a definition for ''thermal separation,'' pizza prep tables could be misclassified as ''commercial hybrid'' CRE with the open-top refrigerated area evaluated as a ''buffet table or preparation table'' and the refrigerated compartment tested as Vertical Closed Solid (VCS.SC.M), while sandwich prep tables would be tested as ''buffet table or preparation table.'' *Id.* The CA IOUs commented that rating sandwich prep tables differently from pizza prep tables would create market confusion. *Id.*

Consistent with the June 2022 NOPR, DOE is not limiting the definition of buffet tables or preparation tables to self-contained configurations but is specifying that the test procedure is only applicable to self-contained configurations [19] because DOE has not evaluated test provisions for remote equipment.

The existing hybrid definition is based on thermally separated compartments, not independent coils or separate temperature control. DOE is maintaining the existing approach for hybrids, which will avoid reclassifying all existing hybrid CRE.

DOE acknowledges that energy consumption likely varies depending on equipment configuration. For the purposes of testing, DOE has determined there is not a need to separately define equipment categories within buffet tables or preparation tables and is not establishing separate definitions. DOE has determined that test instructions regarding refrigerated pan areas and compartments are sufficient for testing the referenced configurations. DOE would consider energy impacts of different configurations as part of energy conservation standards rule evaluating this equipment category, and would consider appropriate definitions for those configurations at that time. Therefore, DOE is maintaining definitions as proposed in the June 2022 NOPR, which combine aspects of existing industry definitions, ENERGY STAR definitions, and other DOE definitions for CRE.

b. Test Methods

In the June 2022 NOPR, DOE considered potential test methods for buffet tables and preparation tables. 87 FR 39164, 39180. DOE reviewed both ASTM F2143–16 and NSF 7–2019 in considering test methods for buffet

[19] *See* section 1.1 of appendix C of the June 2022 NOPR.

tables and preparation tables. As described in section 1 of ASTM F2143–16 (''Scope''), that test method covers evaluation of the energy consumption of refrigerated buffet and preparation tables and allows food service operators to use this evaluation to select a refrigerated buffet and preparation table and understand its energy performance. The foreword to NSF 7–2019 specifies that the purpose of the industry testing standard is to establish minimum food protection and sanitation requirements for the materials, design, construction, and performance of commercial refrigerators and freezers.

The general test approach in ASTM F2143–16 is to load the unit with distilled water in pans and no load in any refrigerated compartment, operate the unit to confirm stability, then conduct testing for 24 hours, with an 8-hour ''active period'' with lid and door openings followed by a 16-hour ''standby period'' with no door openings. DOE understands that this test is intended to represent unit operation and energy consumption over a 24-hour day.

The NSF 7–2019 test approach requires loading the unit pans with refrigerated food-simulating test media (a specified mixture of water, salt, and hydroxypropyl methylcellulose) and no load in any refrigerated compartment and operating the unit for 4 hours to determine whether temperatures at all measured locations are within the acceptable range. DOE acknowledges that this test is intended to evaluate the ability of a unit to maintain the temperature of refrigerated pans (and any compartments) during a 4-hour period.

While these two industry test methods contain certain similarities (*e.g.,* loading pans but not compartments, ambient temperature conditions), DOE initially determined in the June 2022 NOPR that ASTM F2143–16 provides the more appropriate basis for an energy consumption test representative of typical use. 87 FR 39164, 39181. As discussed in the following subsections, DOE initially determined in the June 2022 NOPR that 24 hours of maintaining stable temperatures, as required in the ASTM F2143–16 method, is representative of average use for this equipment. *Id.* DOE also tentatively determined in the June 2022 NOPR that the stabilization and operating periods specified in ASTM F2143–16 would ensure that units maintain temperatures on a consistent basis during testing and would allow for comparative energy use measurements across units. *Id.* NSF 7–2019 provides a basis for determining whether a unit is capable of maintaining certain temperatures over a shorter period, but without additional instructions to ensure energy consumption testing on a consistent basis (*i.e.,* the temperatures maintained over the shorter test period may not necessarily be stable).

For these reasons, DOE proposed in the June 2022 NOPR to reference ASTM F2134–16 as the basis for testing buffet tables and preparation tables. 87 FR 39164, 39181. Consistent with the scope of ASTM F2134–16, DOE proposed test procedures only for self-contained buffet tables and preparation tables. *Id.* While DOE proposed to base the test procedure for buffet tables and preparation tables on ASTM F2134–16, DOE also proposed certain additional and different requirements for test conditions, setup, and conduct to ensure the representativeness of the test procedure, as discussed in the following sections. *Id.*

To avoid confusion regarding testing of other CRE, DOE also proposed in the June 2022 NOPR to establish the test procedure for buffet tables and preparation tables as a new appendix C to subpart C of 10 CFR part 431. 87 FR 39164, 39181. DOE also proposed to refer to the proposed appendix C as the test procedure for buffet tables and preparation tables in 10 CFR 431.64. *Id.*

In the June 2022 NOPR, DOE requested comment on its proposal to adopt through reference certain provisions of ASTM F2143–16 as the basis for testing buffet tables and preparation tables. 87 FR 39164, 39181. DOE also sought comment on the proposal to specify test procedures only for self-contained buffet tables and preparation tables, consistent with ASTM F2143–16. *Id.*

The Joint Commenters supported DOE's proposed changes regarding the proposed test methods for additional equipment categories including buffet and preparation tables. (Joint Commenters, No. 31, p. 1)

NEEA stated its support for DOE's proposal to establish test procedures for new and/or newly defined categories of CRE, and restated its recommendation from the 2021 CRE TP RFI that DOE establish test methods for new CRE product types, including refrigerated preparation and buffet tables. (NEEA, No. 39, p. 2)

The Joint Commenters expressed support for establishing test procedures for buffet and preparation tables, citing a statistic from the California Energy Commission (''CEC'') Modernized Appliance Efficiency Database System (''MAEDbS'') that listed over 100 buffet/preparation tables with a broad range of energy usage, and a 2014 report that discussed testing on 11 preparation tables, revealing a wide range of measured energy consumption. (Joint Commenters, No. 31, p. 2) The Joint Commenters stated that findings in the 2014 report suggested the potential for meaningful energy savings for these products and establishing test procedures for buffet and preparation tables would ensure that the energy consumption of this equipment would be measured in a consistent manner. *Id.*

Continental commented that it supports the NOPR proposal to add new test procedures for product categories such as refrigerated buffet and preparation tables. (Continental, No. 29, p. 1) Continental noted, however, that attempting to develop test procedures that combine aspects of different existing industry standards and introducing significant modifications is not sufficient or appropriate for this type of rulemaking. *Id.* Continental recommended that DOE work with ASHRAE, AHRI, ASTM, and other stakeholders to develop suitable test procedures for any additional product categories so that new or modified industry standards are comprehensive, reliable, and repeatable for many equipment types, with minimal additional testing burden. *Id.* Continental expressed significant concerns with ASTM F2143–16, stating that DOE recognized many of the same issues in the NOPR and, as a result, DOE should delay adoption of a test procedure for refrigerated buffet and preparation tables, and work in depth with industry associations and other stakeholders to develop an appropriate standard procedure. (Continental, No. 29, p. 4) Continental commented that attempting to combine existing test standards was likely to result in excessive testing burden, inconsistent results, and confusion for stakeholders. *Id.* Continental added that ENERGY STAR had expressed a desire to include buffet tables and preparation tables in its most recent standards revision, but recognized that an appropriate standard test method has not been used by industry and declined to include this equipment. *Id.*

AHRI recommended that DOE use ASTM F2143–16 only as intended and not impose additional provisions and restrictions in testing buffet tables and preparation tables. (AHRI, No. 38, p. 6) AHRI commented that test standards should not be combined and recommended regulating this issue under a single standard. *Id.* AHRI commented with concern that the data set used in testing failed to indicate energy efficiency, and that DOE should wait to update this regulation until

clearer test standards have been determined through consensus by manufacturers and third parties. *Id.* AHRI noted that ENERGY STAR was not employing ASTM F2143–16, indicating that DOE's adoption was premature. *Id.* AHRI commented that it had numerous concerns with ASTM F2143–16 and advised that this standard may not be ready for use in a DOE test procedure. *Id.* AHRI added that if DOE were to use this standard in a test procedure, it should only apply to self-contained equipment. *Id.* AHRI commented that it could not determine the impacts of employing the standard because it is not widely used. *Id.*

Hoshizaki commented in agreement with the proposal to use test procedures from ASTM F–2143–2016, but in disagreement with the proposal to have additional requirements from other standards. (Hoshizaki, No. 30, p. 2) Hoshizaki commented that if DOE wants to use a standard only in part, it should request to have a single standard updated with proposed changes and wait for the standard process to complete before publishing a test procedure. *Id.* Hoshizaki stated that this would give manufacturers a chance to see the final standard and prepare for testing prior to the implementation of new regulations. *Id.*

Hillphoenix stated its disagreement with the proposal to adopt ASTM F2143–16 as the basis for testing buffet and preparation tables, as it is not widely utilized by all manufacturers. (Hillphoenix, No. 35, p. 3) Hillphoenix recommended that DOE approach the industry and request updated testing standards that better reflect actual product intent, stating this approach would (1) cause less confusion than referencing portions of multiple standards, (2) drive consistency within the industry, and (3) be less burdensome on manufacturers. *Id.* Hillphoenix agreed that ASTM F2143–16 only pertained to self-contained models, and if adopted against industry recommendations, the proposed test procedure should reflect self-contained models only, as in ASTM F2143–16. *Id.*

Hussmann cautioned DOE that ASTM F2143–16 was not a commonly used standard in the industry and contained many holes and gaps common to DOE test procedures. (Hussmann, No. 32, p. 4) Hussmann added that combining test standards would cause confusion and disruption to the industry as the different standards were revised and therefore recommended adopting buffet/prep cases under a single standard that would be widely accepted across the industry. *Id.*

In the August 2022 public meeting, True commented that ASTM–F2143–16 is only required by the State of California for reporting energy, and that it is surprised NSF–7 is not being used as a standard for consideration, since that is a de facto national standard in place for the United States and Canada. (Public Meeting Transcript, No. 41, p. 38) True commented that ASTM F2143–16 is not an industry standard used by the food service industry or by local health inspectors. (True, No. 28, p. 2) True stated that NSF 7 is the food service industry standard for the performance rating, food safety, and evaluation of refrigerated food preparation units (tables); that local United States and Canada food safety and sanitation inspectors (health inspectors) require the NSF 7 compliance logo; and that certificates of occupancy are issued based on NSF 7 Standard compliance. *Id.*

True also commented that the proposed ASTM F2143–16 standard is not a suitable standard that should be used to evaluate these products. (True, No. 28, p. 6) True stated that consideration should be given to the fact ASTM F2143–16 does not address food safe temperatures (water as the test media is not representative of food), and adding this test setup would increase testing and lab burdens to all manufacturers. *Id.* True pointed to NSF/ANSI 7–2021 as the reference standard recommended for this type of equipment and noted that ASTM F2143–16 is in review and has not been presented publicly. *Id.*

As discussed in section III.C.1.a, DOE is establishing test procedures only for self-contained buffet tables or preparation tables.

DOE agrees with commenters that ASTM F2143–16 cannot be referenced as a standalone test method and, accordingly, DOE proposed deviations and additional specifications in the June 2022 NOPR. DOE recognizes that not all manufacturers currently use ASTM F2143–16, but DOE has determined the approach based on ASTM F2143–16 with additional requirements is representative and not unduly burdensome to conduct. If a new or updated industry standard that measures the energy consumption of buffet tables or preparation tables becomes available, DOE will consider it in a future test procedure rulemaking.

DOE has evaluated ASTM F2143–16 and identified the need for additional provisions or alternate requirements. To the extent that additional provisions are consistent with requirements in other industry methods, DOE has incorporated by reference those other methods. This approach makes it easier to determine where requirements are harmonized across industry standards. In response to combining multiple standards, DOE is not applying each standard in whole to this equipment, but rather is adopting the appropriate provisions to result in a representative DOE test procedure. The regulatory text is located in appendix C established in this final rule is the DOE test procedure for this equipment, and the requirements in appendix C clearly outline when to use requirements from each standard.

As discussed in section III.C.1.a, NSF 7 is intended to ensure refrigerating performance and food safety, not energy use. ASTM F2143–16 was developed to evaluate energy performance, and with the additional requirements established in this final rule, DOE has determined that referencing ASTM F2143–16 is appropriate and meets the EPCA requirements.

DOE's determination to establish test procedures consistent with EPCA requirements is not impacted by ENERGY STAR's specification review process. To the extent that ENERGY STAR considers this equipment in future updates, the ENERGY STAR program typically adopts DOE test procedures and DOE will coordinate with ENERGY STAR to harmonize requirements.

As discussed, DOE is establishing a test procedure for buffet tables and preparation tables based on ASTM F2143–16 with additional requirements. The following sub-sections describe additional details of the test procedure.

Test Conditions

ASTM F2143–16 specifies different rating conditions for test room dry-bulb temperature and moisture content than the current DOE test procedure. NSF 7–2019 also specifies test conditions similar to those in ASTM F2143–16. Table III.1 summarizes these differences.

TABLE III.1—TEST ROOM DRY-BULB TEMPERATURE AND MOISTURE CONTENT STANDARDS COMPARISON

Equipment type	Test standard	Test room dry bulb temperature	Wet bulb temperature (relative humidity)	Moisture content (lb/lb dry air)
Currently Covered CRE	ASHRAE 72 (2005 and 2022 with Errata).	75.2 °F ±1.8 °F	64.4 °F ±1.8 °F (49%–62%)	0.009–0.011.
Buffet and Preparation Tables	ASTM F2143–16	86 °F ±2 °F	66.2 °F ±1.8 °F (30%–40%)	0.008–0.010.
Buffet and Preparation Tables	NSF 7–2019	86 °F ±2 °F	Max 72 °F (based on max 50%)	Max 0.013.

As previously described, the apparent purpose of the NSF 7–2019 test is to determine the capability of a unit to maintain refrigerated temperature in the conditions specified by the industry testing standard. The ASTM F2143–16 ambient conditions match those in NSF 7–2019. However, DOE initially determined in the June 2022 NOPR that these conditions are not necessarily the most representative of typical use. 87 FR 39164, 39182. As discussed in the June 2022 NOPR, buffet tables and preparation tables are typically installed in locations similar to other CRE (*e.g.,* food service areas, supermarkets, commercial kitchens) and would be subject to the same ambient conditions during typical use. *Id.* DOE acknowledged in the June 2022 NOPR that the ambient conditions at the point of installation may vary. *Id.* However, DOE determined that the conditions in ASHRAE 72 (in both the currently referenced 2005 version and the 2022 with Errata version) are appropriately representative of the average use of CRE. 79 FR 22277, 22283. For consistency with other CRE testing, DOE proposed in the June 2022 NOPR that the ambient conditions specified in ASHRAE 72–2018R also apply for testing buffet tables and preparation tables. 87 FR 39164, 39182.

For measuring these ambient conditions, ASHRAE 72–2022 with Eratta and ASTM F2143–16 specify the same measurement locations; however, the locations may require further specificity depending on the configuration of the refrigerated buffet table or preparation table under test. For example, the specified measurement location based on the highest point of the unit under test as provided in ASTM F2143–16 could be based on the height of the refrigerated table surface and pan openings or on the height of any lid or cover over the pans, if included. Additionally, the specified measurement location at the center of the unit as provided in ASTM F2143–16 could be based on the geometric center of the unit determined from the height of the open pan surfaces or on the geometric center of any door openings (for those units with refrigerated compartments below the pan area).

As described, DOE proposed in the June 2022 NOPR to incorporate by reference ASTM F2143–16 rather than NSF 7–2019 as the basis for testing buffet tables and preparation tables. 87 FR 39164, 39182. The ASTM F2143–16 ambient measurement locations are generally consistent with those in the current DOE test procedure and the provisions in ASHRAE 72–2022 with Errata, but ASHRAE 72–2022 with Errata includes additional specificity regarding ambient measurement locations. To ensure appropriate measurement locations, DOE proposed in the NOPR to reference ASHRAE 72–2018R rather than ASTM F2143–16 for ambient condition measurement locations. 87 FR 39164, 39183. To provide additional specifications for thermocouple placement to accommodate different buffet table and preparation table configurations, DOE proposed to add an instruction that the ''highest point'' of the buffet table or preparation table is determined as the highest point of the open-top refrigerated area of the buffet table or preparation table, without including the height of any lids or covers. *Id.* DOE also proposed to specify that the geometric center of the buffet table or preparation table is: for buffet tables or preparation tables without refrigerated compartments, the geometric center of the top surface of the open-top refrigerated area; and for buffet tables or preparation tables with refrigerated compartments, the geometric center of the door opening area for the refrigerated compartment. *Id.* DOE proposed this specification because the geometric center of the unit is used to measure ambient temperature gradient. *Id.* For units with refrigerated compartments, this instruction referencing the center of the door opening area would ensure that the air entering the compartment during door openings is within the allowable temperature range.

Regarding electrical supply requirements and measurements, appendix A to ASHRAE 72–2022 with Errata provides greater specificity for testing as compared to ASTM F2143–16. To improve test repeatability and reproducibility, DOE proposed in the June 2022 NOPR to reference the electric supply and measurement requirements specified in appendix A to ASHRAE 72–2018R for testing buffet tables and preparation tables. 87 FR 39164, 39183.

In the June 2022 NOPR, DOE similarly proposed to adopt through reference certain provisions in ASHRAE 72–2018R rather than ASTM F2143–16 for instrumentation requirements for consistency with other CRE testing and with the proposed test conditions (*e.g.,* wet-bulb temperature as specified in ASHRAE 72–2018R rather than relative humidity as specified in ASTM F2143–16). *Id.*

In the June 2022 NOPR, DOE requested comment on the proposal for testing buffet tables and preparation tables with test conditions (*i.e.,* test chamber conditions, measurement location, and electric supply conditions) consistent with ASHRAE 72–2018R, with additional detail specific to buffet tables and preparation tables. *Id.*

AHRI commented that it supports DOE's inclusion of the ASHRAE 72–2022 ambient testing conditions with the qualification that DOE not combine test standards, which would be unnecessary and inadvisable. AHRI recommended regulation through a singular standard using a test procedure developed through industry consensus and one that had been referred to an appropriate standards committee. (AHRI, No. 38, p. 6)

AHRI noted that ASHRAE 72–2022 does not address areas with two different cooling spaces. (AHRI, No. 38, p. 6)

Continental stated a belief that 86 °F ambient better reflected the application temperature for food preparation tables used in commercial kitchens, which are often in proximity of cooking equipment and that 75 °F conditions reflect an applicable ambient temperature for buffet tables used in restaurant front-of-house and supermarket applications. (Continental, No. 29, p. 5) Continental reiterated that DOE should not attempt to merge different aspects of existing

test methods into a new amalgamated test procedure within a rulemaking, and that DOE should delay adoption of a test procedure for refrigerated buffet and preparation tables, instead working with stakeholders to develop an appropriate standard procedure. *Id.*

Hillphoenix stated agreement with the proposal to use ASHRAE 72 to establish the conditions in which buffet and preparations tables should be tested, as this standard already applies to existing CRE. (Hillphoenix, No. 35, p. 4) Hillphoenix recommended referencing ASHRAE 72–202x, which would align with the incorporation of other standards that are referenced but not yet released. *Id.* Hillphoenix recommended against specifying alternate definitions for portions not covered by an existing industry standard and advised DOE to allow the industry to develop procedures through consensus. *Id.*

Hussmann supported the use of ASHRAE 72 for ambient conditions, which more accurately resemble conditions in normal use, and which would reduce test burden for testing a new equipment category, as industry test chambers and conditions were not set for testing to different standards. (Hussmann, No. 32, p. 4) Hussmann recommended that DOE avoid combining sections from different standards to create a test procedure, because doing so would provide results not yet tested and proven by the industry. *Id.* Hussmann added that combining test standards would cause confusion and disruption to the industry as the different standards went through revisions and stated support for creating a universal standard for buffet/prep tables. *Id.*

Hoshizaki agreed with the proposal to use test procedures from ASTM F–2143–2016, but disagreed with the proposal to have additional requirements from other standards. (Hoshizaki, No. 30, p. 2) Hoshizaki commented that if DOE wants to use a standard only in part, DOE should request to have a single standard updated with proposed changes and wait for the standard process to complete before publishing a test procedure, which would give manufacturers a chance to see the final standard and prepare for testing prior to the implementation of new regulations. *Id.*

True recommended the use of NSF ANSI 7–2021, with the following test conditions: (1) ambient temperature of 86 ±2 °F (30 ±1 °C); (2) no vertical temperature gradient exceeding 1.5 °F/ft (2.5 °C/m); (3) maximum relative humidity of 50 percent; and (4) maximum air current velocity of 50 ft/min (0.25 m/s) across the surfaces of the test pans. (True, No. 28, p. 6)

DOE recognizes that CRE across all categories, including buffet tables or preparation tables, can be used in a range of installations, (*e.g.,* in commercial kitchens or in front-of-house installations). Other CRE currently installed in these locations are tested per the ASHRAE 72 conditions.

DOE understands that ASTM F2143–16 is currently under revision and may harmonize test conditions with ASHRAE 72–2022 with Errata. Buffet tables or preparation tables have the same energy use metric, kWh/day, as other CRE equipment. Test conditions consistent with ASHRAE 72–2022 with Errata will allow for better comparisons between hybrid buffet tables or preparation tables and other buffet tables or preparation tables.

As stated earlier in this section, the purpose of NSF 7 is to determine refrigerating performance for food safety requirements. While the elevated ambient temperature may be appropriate to ensure food safety, DOE has determined that the existing test condition based on ASHRAE 72–2022 with Errata provides the most appropriate test condition for the purpose of energy testing.

For these reasons and consistent with the discussion in section III.C.1.b of the June 2022 NOPR, DOE has determined that the ASHRAE 72–2022 with Errata test conditions are representative for buffet tables or preparation tables. DOE is establishing these conditions in appendix C by referencing ASHRAE 72–2022 with Errata.

Test Setup

Section 9.1 of ASTM F2143–16 specifies installation of the buffet table or preparation table for testing according to the manufacturer's instructions, with 6 in. of rear clearance, at least 12 in. of clearance to any side wall or partition, and at least 3 feet of clearance from the front of the unit. Section 5.2 of ASHRAE 72–2022 with Errata specifies that the test unit be installed next to a wall or vertical partition in the direction of (a) the exhaust, (b) the intake, or (c) both the exhaust and the intake at the minimum clearance, ±0.5 in., as specified in the installation instructions; if the installation instructions do not provide a minimum clearance, the vertical partition or wall shall be located 4 ±0.5 in. from the sides or rear of the cabinet and extend at least 12 in. beyond each side of the cabinet from the floor to at least 12 in. above the top of the cabinet.

DOE determined in the June 2022 NOPR that the installation instructions in ASHRAE 72–2018R are more representative of actual use, as they require testing according to the minimum manufacturer-specified clearance in the direction of air exhaust or intake rather than a constant 6 in. 87 FR 39164, 39183. DOE expects that CRE are typically installed with minimum installation clearances due to the space-constrained locations in which they operate (*e.g.,* commercial kitchens or food service areas). DOE proposed in the June 2022 NOPR to reference the installation requirements in section 5.2 of ASHRAE 72–2018R for buffet table and preparation table testing to represent typical use and to ensure consistency with appendix B test requirements. 87 FR 39164, 39183.

Sections 5.1 and 5.3 of ASHRAE 72–2022 with Errata also provide additional instructions regarding test unit installation and setup that are not addressed in ASTM F2143–16. Specifically, section 5.1 provides instructions regarding test unit installation within the test facility and section 5.3 specifies test requirements for components and accessories. While these provisions were established for conventional CRE, DOE initially determined in the June 2022 NOPR that they are also applicable to buffet table and preparation table installation and use due to both categories having similar installation locations and similar accessories available for use. 87 FR 39164, 39183. DOE proposed in the June 2022 NOPR to also reference these sections in ASHRAE 72–2018R for buffet table and preparation table testing to ensure consistent testing that is representative of actual use. *Id.*

In the June 2022 NOPR, DOE requested comment on the proposal for testing buffet tables and preparation tables with test setup instructions consistent with ASHRAE 72–2018R rather than ASTM F2143–16. *Id.*

Hillphoenix commented that it agrees with the proposal to use ASHRAE 72 for testing setup requirements for buffet and preparations tables as this standard already applies to existing CRE and allows testing that is more representative of the end use installations. (Hillphoenix, No. 35, p. 4) Hillphoenix recommended referencing ASHRAE 72–202X, which would align with the incorporation of other standards that are being referenced but that are not yet released. *Id.*

Hussmann stated its support for the ASTM F2143–16 test set-up instructions as they more closely resembled typical use. (Hussmann, No. 32, p. 4) Hussmann also cautioned DOE against combining sections from different standards to create a test procedure, commenting that

combining different standards would provide unsupported results not yet tested and proven by the industry. *Id.* Hussmann added that combining test standards would cause confusion and disruption to the industry as the different standards were revised. *Id.*

AHRI stated support for test setup conditions consistent with ASTM F2143–16, but with the qualification that test standards not be combined, which would be unnecessary and inadvisable. (AHRI, No. 38, p. 6) AHRI recommended that DOE should regulate this issue under a singular standard and advised that small business retailers especially could be negatively impacted by the proposed leapfrogging of standards, especially for buffet tables, where full analysis of testing had not been completed. *Id.* AHRI commented that ASTM F2143–16 was under review and might be updated within the next one to two years, making it prudent for DOE to wait to further regulate. *Id.*

Hoshizaki repeated their previous comment, commenting in agreement with the proposal to use test procedures from ASTM F–2143–2016, but in disagreement with the proposal to have additional requirements from other standards. (Hoshizaki, No. 30, p. 2) They commented that if DOE wants to use a standard only in part, they should request to have a single standard updated with proposed changes and wait for the standard process to complete before publishing a test procedure. *Id.* Hoshizaki stated that this will give manufacturers a chance to see the final standard and prepare for testing prior to the implementation of new regulations. *Id.*

Continental commented that the ASHRAE 72 committee has discussed requirements for testing buffet and preparation tables, concluded that ASHRAE 72 is not appropriate for these product types, and determined that a new standard procedure would be needed, but that combining existing test standards is unnecessary, inadvisable, and likely to result in excessive testing burden and confusion for stakeholders. (Continental, No. 29, p. 5) Continental commented that DOE should not attempt to merge different aspects of ASHRAE and ASTM standards into a test procedure for refrigerated buffet and preparation tables and instead should work with stakeholders to develop and thoroughly assess a single comprehensive standard procedure. *Id.*

As discussed in the June 2022 NOPR, DOE recognizes that the ASHRAE 72–2022 with Errata provisions apply to conventional CRE, but has determined that the installation instructions specified in ASHRAE 72–2022 with Errata provide for more representative installation instructions when testing buffet tables and preparation tables as compared to those specified in ASTM F2143–16. Specifically, DOE maintains that this equipment is typically installed in space-constrained locations, and therefore the manufacturer specified minimum clearances are most representative of actual use. Additionally, ASHRAE 72–2022 with Errata provides additional instructions regarding test unit installation within the test facility and for components and accessories. These provisions are necessary to ensure consistent testing.

Regarding combining references to multiple industry test standards within the test procedure in appendix C, as discussed in sections III.B and III.C.1.b of this document, DOE references specific sections of the applicable industry standards for testing in appendix C rather than incorporating the industry standards in full. This approach makes it easier to determine where requirements are harmonized across industry standards.

For these reasons, DOE is maintaining references to ASTM F2143–16 as appropriate for test conduct, but DOE is additionally specifying instructions based on ASHRAE 72–2022 with Errata for certain installation provisions, as appropriate, in appendix C.

Test Load

ASTM F2143–16 specifies that temperature measurements for preparation tables or buffet tables be taken from standardized pans filled with distilled water. ASTM F2143–16 also specifies measuring the temperature in any chilled compartments for refrigerated buffet and preparation tables using three thermocouples in an empty, unloaded compartment. DOE's current test procedure for CRE requires that integrated average temperature measurements be taken from test simulators consisting of a plastic container filled with a sponge saturated with a 2-percent mixture of propylene glycol and distilled water. *See* ASHRAE 72–2005, section 6.2.1. Additionally, the DOE test procedure requires 70 to 90 percent of the compartment net usable volume to be loaded with filler material and test simulators for testing (60 to 80 percent as proposed in this final rule by referencing section 5.4.8 of ASHRAE 72–2022 with Errata). *See* ASHRAE 72–2005, section 6.2.5. Buffet tables and preparation tables may not typically be loaded to 70 percent of their net usable volume due to their use for service rather than long-term storage, but testing with the refrigerated compartment entirely empty also may not be representative of average use.

DOE initially determined in the June 2022 NOPR that the distilled water pan loading as specified in ASTM F2143–16 provides a representative test load for the open-top refrigerated areas of buffet tables and preparation tables, while limiting test burden, and is consistent with the filler material specified in both ASHRAE 72–2005 and ASHRAE 72–2018R (*i.e.,* filler material that consists of water, a 50/50 mixture (±2 percent) of distilled water and propylene glycol, or wood blocks with an overall density not less than 480 kg/m^3 (30 lb/ft^3). 87 FR 39164, 39184. Typical food loads are composed mostly of water, such that water is a representative test medium. Additionally, distilled water does not require any additional preparation by the test laboratory, limiting test burden and ensuring a consistent test medium across different test facilities.

DOE acknowledges that using water would not accommodate testing at conditions at and below 32 °F. However, ASTM F2143–16 specifies pan temperature to be within 33 °F and 41 °F for a valid test. As discussed later in this section, DOE proposed in the June 2022 NOPR that the integrated average pan temperature be 38 °F ±2 °F for buffet table and preparation table testing. 87 FR 39164, 39184. At these temperatures, the distilled water would be liquid and would not result in the testing issues associated with freezing. Additionally, DOE observed during investigative testing that individual pans filled with distilled water did not reach temperatures lower than 33 °F when tested with an integrated average pan temperature of 38 °F ±2 °F.

In addition to proposing the water test load, DOE proposed in the June 2022 NOPR that pans for testing be loaded to within 0.5 in. of the top of the pan. 87 FR 39164, 39184. For pans that are not configured in a horizontal orientation, DOE proposed that only the lowest side of the pan be loaded to within 0.5 in. of the top of the pan. *Id.* ASTM F2143–16 specifies a pan loading procedure based on the weight of water needed to load pans to 0.5 in. of the top of the pan. DOE expects that a loading method based on marking pans or measuring distance from the water to the top of the pan would limit test burden as compared to the weight-based method in ASTM F2143–16 and that both the loads and loading methods would be substantively the same.

ASTM F2143–16 specifies the pans for holding water to be standard 4-in. deep 1/6-size metal steam table pans with a weight of 0.70 ±0.07 lb. ASTM F2143–16 allows for manufacturer-

specified pans if the unit is designed specifically for such pans. DOE notes that manufacturers typically specify pan dimensions or provide pans for their units, but some manufacturers do not provide a pan depth or may specify a range of possible pan depths. DOE also notes that pan materials can vary and are not always specified by the manufacturer.

Based on a review of buffet tables and preparation tables available on the market, manufacturers typically allow for a range of pan configurations in the open-top refrigerated area. These configurations can nearly always accommodate the ⅙-size steam table pans referenced in ASTM F2143–16. To ensure consistent testing for units that offer multiple pan configurations, DOE proposed in the June 2022 NOPR to reference the pan instructions in ASTM F2143–16. 87 FR 39164, 39184. If a buffet table or preparation table cannot be loaded with the specified standard pans, DOE proposed in the June 2022 NOPR to test with pans that are consistent with the manufacturer installation instructions and with dimensions as close to the standard pans as is available, consistent with the ASTM F2143–16 loading instructions. *Id.*

Under the current test procedure, a thermal separation would be required between the buffet table or preparation table and a refrigerated compartment for that compartment to be subject to the testing requirements, which include test simulators and loading requirements. Buffet tables and preparation tables may include refrigerated compartments that are not thermally separated from the open-top refrigerated area, and in the NOPR, DOE considered whether different loads (or no load) would be appropriate for testing such compartments. 87 FR 39164, 39185.

DOE proposed in the June 2022 NOPR that any refrigerated compartment of a buffet table or preparation table (*i.e.,* any refrigerated compartment that is not thermally separated from the open-top refrigerated area) be tested with no load. *Id.* DOE proposed in the June 2022 NOPR to reference the ASTM F2143–16 requirements, which specify placing three thermocouples in specific locations within the empty refrigerated compartment. *Id.* DOE tentatively determined in the June 2022 NOPR that this approach would limit test burden by not requiring additional test simulator preparation or loading of filler materials. *Id.* Additionally, DOE expects that the refrigerated compartments of buffet tables and preparation tables are typically used for short-term storage of items used during food service and food preparation (*i.e.,* with additional pans of prepared food or ingredients for food preparation) rather than long-term storage, and that, therefore, an unloaded cabinet would be more representative of typical usage. This is also consistent with the DOE test procedures for consumer refrigeration products, which measure internal compartment temperatures with no load. *See* 10 CFR part 430, subpart B, appendix A and appendix B.

ASTM F2143–16 does not specify whether the internal compartment thermocouples are weighted or unweighted. For consistency with the NSF 7–2019 approach, DOE proposed in the June 2022 NOPR that the thermocouples be weighted—*i.e.,* in thermal contact with the center of a 1.6-oz (45-g) cylindrical brass slug with a diameter and height of 0.75 in. 87 FR 39164, 39185. The brass slugs shall be placed at least 0.5 in from any heat-conducting surface. *Id.* While ASHRAE 72–2022 with Errata requires internal compartment temperatures to be measured using test simulators, ambient temperature measurements are similarly made by thermocouples in contact with cylindrical brass slugs with the same specifications.

In the June 2022 NOPR, DOE requested comment on the proposed test loads and temperature measurement locations for buffet tables and preparation tables—*i.e.,* distilled water in pans for the open-top refrigerated area and no load in any refrigerated compartment—consistent with the approach in ASTM F2143–16. 87 FR 39164, 39185.

Hoshizaki commented that it agrees with the proposal to use test procedures from ASTM F2143–2016. (Hoshizaki, No. 30, p. 3) Hoshizaki noted that if DOE were to seek changes in the future, those changes should go through the ASTM standards committee. *Id.*

Hillphoenix stated agreement with the proposal to load pans with distilled water, assuming there is no requirement to move the pans (*i.e.,* physically relocating, opening of drawer with pans, etc.), which would cause spillage and splashing. (Hillphoenix, No. 35, p. 4) Hillphoenix also agreed with the temperature measurement location in the center of the pan and recommended a sponge or similar material be used to stabilize the measuring device and maintain consistent placement of the sensor. *Id.* Hillphoenix recommended that DOE approach industry and request updated testing standards that better reflect actual product intent, which would drive consistency within the industry and be less burdensome on manufacturers. *Id.*

AHRI commented that it urged DOE to defer requirements for this issue in the test procedure until the ASTM F2143–16 standard has been updated in an estimated 1 to 2 years. (AHRI, No. 38, p. 7) AHRI stated a number of concerns, including the fact that proposed changes under consideration for test mediums or loading would be subjected to a test revision process. *Id.* AHRI pointed out its concerns with the proposed use of distilled water as a medium because it may have limitations in certain applications, even though it is much less burdensome than alternative mediums, such as glycol, used for testing. *Id.* AHRI noted that manufacturers are concerned that test results using distilled water sent to third-party testing labs may be inconsistent and difficult to replicate, and manufacturers need further testing to determine if distilled water is the decisively preferred testing medium, or if a lack of testing repeatability makes distilled water a less-preferred testing medium. *Id.* AHRI also repeated its concern that ENERGY STAR is not yet ready to employ ASTM F2143–16 and that DOE's adoption may be premature. *Id.*

Hussmann commented that distilled water was less of a burden for testing; however, water may have test limitations due to freezing/slush that could affect test measurements. (Hussmann, No. 32, p. 5) Hussmann recommended that DOE refer this issue to a standards committee to determine how water affected the temperature measurements and to determine the appropriate test medium. *Id.*

Continental commented that it had not performed extensive equipment testing using ASTM F2143–16 to provide comprehensive feedback on any proposed test conditions, and stated support for use of a no-load test for buffet tables or preparation tables that do not have a refrigerated storage compartment that is thermally separated from the open-top pan area. (Continental, No. 29, p. 6) Continental advised that empty pans could be used in the top opening to minimize additional burden, but potential inconsistencies in methods and results would need to be evaluated. *Id.* Continental commented that filling pans in the top with distilled water for testing was significantly less burdensome than alternative product simulator compounds, but that this approach is problematic because distilled water can be subject to partial freezing under certain application conditions, resulting in inconsistent test results. *Id.* Continental added that a mixture of propylene glycol and distilled water

would eliminate potential freezing concerns, but also add cost and potentially result in inconsistencies. *Id.* Continental alluded to another type of testing, a special test media, such as a solution of water, sodium chloride, and methocel as prescribed for ANSI/NSF 7–2019 sanitation testing, which would be extremely burdensome for separate energy testing due to relatively expensive ingredients, significant preparation time, and limited shelf life before the solution must be discarded. *Id.* Continental urged DOE to postpone adoption of a test procedure for refrigerated buffet and preparation tables and address these issues with relevant standards committees, such as ASTM, ASHRAE, and AHRI, as well as stakeholders. *Id.*

In the August 2022 public meeting, True commented that the problem with using distilled water in a cabinet, especially a food preparation table, is the threat of dual freeze; in other words, the distilled water dropping below 32 °F. (Public Meeting Transcript, No. 4, p. 56) True stated that when using water, measurements of the actual temperature of the product cannot be taken because as the water changes state, it will not move from 32 °F. *Id.* True added that the design of food preparation tables and buffet tables results in cold air coming out, or a cold rail either making direct contact or blowing directly on pans. *Id.* True stated that because of this, pans will freeze even though the average may be 38 °F. *Id.* Therefore, True stated that using water only as a test media is irresponsible because it is not producing adequate temperatures. *Id.* True suggested instead filling a pan with 50/50 water and glycol. *Id.*

In response to the Hillphoenix comment, DOE is not requiring pans to be moved during testing (as discussed in a later sub-section of III.C.1.b in this document), therefore limiting any spillage or splashing concerns. DOE has not identified an issue with maintaining thermocouple placement in the center of the pan during its internal testing of buffet tables and preparation tables, and therefore is not requiring the use of a sponge or similar material to stabilize the thermocouple during testing.

In response to AHRI's comment, DOE has determined that distilled water is a repeatable and reproducible test medium that limits test burden. Distilled water provides a consistent, representative basis for testing, limits burden by avoiding the need for test facilities to create solutions or mixtures (*e.g.,* propylene glycol and water solutions, methocel, or sawdust mixtures), and is cost effective. In response to Continental's suggestion that empty pans could be used for testing, DOE has determined that a thermal load in the pans is most representative of actual use and is necessary to allow for temperature measurements of the pan load.

DOE recognizes that water in pans of buffet tables or preparation tables could freeze under certain conditions but that the target pan temperatures are above water's freezing point. Based on DOE's investigative testing, DOE does not expect freezing of water in the pans during the test. If a buffet table or preparation table has a specific design characteristic that results in water freezing in a pan during the DOE test and that prohibits the conduct of the test, manufacturers can petition for a waiver under the provisions in 10 CFR 431.401.

DOE has determined that distilled water represents a consistent test load that represents the thermal load in pans during buffet table or preparation table operation. Therefore, DOE is adopting distilled water as the test medium for pans in buffet tables and preparation tables, and is requiring that any refrigerated compartments in buffet tables and preparation tables be tested with no load using weighted thermocouples, consistent with the June 2022 NOPR approach.

Test Conduct—Defrosts

ASTM F2143–16 does not provide specific instructions for addressing defrost cycles when testing buffet tables and preparation tables, other than indicating in the test report whether a defrost cycle occurred. Section 7.3 of ASHRAE 72–2022 with Errata directs that the test period begins with a defrost cycle. This section also requires that for refrigerators with manual defrost or off-cycle defrost, the test is started at the beginning of a refrigeration system off cycle (if the off-cycle defrost is not identifiable); or, if the refrigeration system never cycles off, the test is started at any point during refrigeration system operation.

Defrost cycles can increase the energy consumption of refrigeration equipment as compared to stable operation; however, DOE has observed that most buffet tables and preparation tables often incorporate off-cycle defrosts, which melt frost accumulation by running the evaporator fan during a compressor off cycle. This method of defrost does not actively introduce heat to melt the accumulated frost and may occur during the compressor's normal cycling operation. With this defrost approach, there may not be an identifiable defrost occurrence in the measured test data.

In the June 2022 NOPR, DOE determined that to the extent buffet tables or preparation tables incorporate automatic electric or hot gas defrosts (*i.e.,* heating the evaporator to melt frost accumulation), or any automatic extended off-cycle defrost (*i.e.,* off-cycle defrost with a duration longer than a compressor off cycle), the energy consumption of these defrosts should be captured in the test period to measure energy use representative of typical use. 87 FR 39164, 39186. DOE observed during investigative testing that automatic extended off-cycle defrost is used in both buffet tables and preparation tables. To incorporate this energy use and ensure consistent testing of buffet tables and preparation tables, DOE proposed in the June 2022 NOPR to require that test periods for buffet tables and preparation tables account for any defrosts consistent with the requirements in ASHRAE 72–2018R. 87 FR 39164, 39186. This would require capturing a defrost at the start of the test period or starting the test period at the beginning of a refrigeration off cycle if there is no identifiable defrost (or at any point during refrigeration system operation if the refrigeration system never cycles off).

In the June 2022 NOPR, DOE requested comment on the proposal to account for defrosts when testing buffet tables and preparation tables, consistent with the approach in ASHRAE 72–2018R. 87 FR 39164, 39186.

AHRI commented that it supports DOE's proposal to account for defrosts for buffet tables and preparation tables in a test period greater than 4 hours, although AHRI cautioned DOE against combining test standards as it is unnecessary and inadvisable and restated the call for DOE to regulate this issue under a singular standard. (AHRI, No. 38, p. 7)

Hillphoenix stated agreement with the proposal to use ASHRAE 72 for defrost requirements pertaining to buffet and preparations tables as this standard already applies to existing CRE. (Hillphoenix, No. 35, p. 4) Hillphoenix recommended referencing ASHRAE 72–202x, which would align with the incorporation of other standards that are being referenced but that are not yet released. *Id.* Hillphoenix recommended this only be applied to units consisting of open tops with pans that incorporate other refrigerated zones. Hillphoenix commented that in reference to the test period duration, a defrost cycle may not be required due to a shortened active refrigeration time. *Id.*

Continental commented it had not sufficiently tested equipment using the proposed methods to provide an adequate response regarding defrost periods. (Continental, No. 29, p. 6) Continental commented that DOE's recognition of this issue is another indication as to why development of a new test procedure should not be attempted within a rulemaking, and why DOE should delay publication of a test procedure for refrigerated buffet and preparation tables, instead working with stakeholders to develop an appropriate standard procedure. *Id.*

Hussmann cautioned DOE on using a hybrid approach to creating a test procedure, but stated support for accounting for defrosts in a test period greater than 4 hours. (Hussmann, No. 32, p. 5)

Hoshizaki commented that it does not agree with proposing the use of one standard but then incorporating parts of other standards without going through the standard review process. (Hoshizaki, No. 30, p. 3) Hoshizaki noted that if DOE feels that starting the test with defrost is the best way to capture energy values, then DOE should make requests to amend ASTM F–2143 for those changes. *Id.*

In response to the comments regarding DOE referencing multiple test standards, refer to the same comments discussed in sections III.B and III.C.1.b of this document.

Because defrost occurrences can impact energy use, DOE is requiring that the test period begin at the start of a defrost occurrence, or at the beginning of a refrigeration off-cycle if there is no identifiable defrost (or at any point during refrigeration system operation if the refrigeration system never cycles off). This approach is consistent with the test period requirements for other CRE and would ensure repeatable and reproducible testing of buffet tables and preparation tables that is representative of actual use.

Test Conduct—Moving Pans

Section 10.5.6 of ASTM F2143–16 specifies that if it is possible to control cooling to the display area independently of the refrigerated cabinet, the cooling to the display area is turned off and all pans are to be moved from the display area to the refrigerated cabinet underneath after the active period. The ability to control cooling in both the display area and the refrigerated cabinet independently of each other suggests that this language applies to units with thermally separated compartments and pan areas.

DOE currently provides test procedures for any refrigerated compartments that are combined with buffet tables and preparation tables and that are thermally separate from the open-top refrigerated area. In the June 2022 NOPR, DOE did not propose to amend the test requirements for such thermally separated refrigerated compartments. 87 FR 39164, 39186.

In the June 2022 NOPR, DOE proposed to reference ASTM F2143–16 rather than NSF 7–2019 as the basis for buffet table and preparation table testing. *Id.* Section 10.5.6 of ASTM F2143–16 specifies moving pans from the display area to the refrigerated cabinet underneath after the active period if it is possible to control cooling to the display area independently of the refrigerated cabinet. As stated, the separate cooling control suggests thermal separation between the open-top area and the refrigerated cabinet. Because DOE did not propose changes to the current test requirements for any thermally separated refrigerated cabinets, DOE proposed that all buffet tables and preparation tables be tested with the pans in the display area for the entire test, including the ''standby period'' specified in section 10.5.6 of ASTM F2143–16. 87 FR 39164, 39186.

DOE determined in the June 2022 NOPR that this proposed approach would limit test burden and variability by avoiding moving pans during the test period, which could introduce varying heat loads depending on how the movement is conducted. *Id.* Additionally, DOE expects that the proposed test procedure is representative of typical buffet table and preparation table use. As previously discussed, DOE expects that buffet tables and preparation tables are used for short-term storage during food service and food preparation. Therefore, it is unlikely that these units would be used for storage in the refrigerated compartment without any pans loaded in the open-top pan area.

In the June 2022 NOPR, DOE requested comment on its proposal to require loading pans in the open-top refrigerated area and not moving them to a refrigerated compartment, if applicable, during testing. 87 FR 39164, 39186–39187.

Hillphoenix stated agreement with the proposal to have open-top pans remain in place once they are loaded and testing begins, which would be consistent with the ASHRAE 72 approach that applies to existing CRE. (Hillphoenix, No. 35, p. 5) Hillphoenix recommended referencing ASHRAE 72–202x, which would align with the incorporation of other standards that are being referenced but that are not yet released. *Id.* Hillphoenix recommended DOE approach industry and request updated testing standards that better reflect actual product intent, an approach intended to drive consistency within the industry while proving less burdensome on manufacturers. *Id.*

Hoshizaki commented agreeing that keeping the pans in and closing the lid would be simpler for the test. (Hoshizaki, No. 30, p. 3) Hoshizaki commented that manufacturers that have a separated rail and compartment temperature zones would have to change their test process. *Id.* Hoshizaki noted that if DOE wants to change this for all manufacturers regardless of design constraints of units, then this process should be updated in the ASTM F2143 standards committee. *Id.*

Continental commented that equipment with the ability to independently turn off the refrigeration system for the pan display area should be classified separately from other refrigerated buffet and prep tables. (Continental, No. 29, p. 6)

Continental added that if the manufacturer's instructions require relocating pans to the storage area at night, moving the pans would more accurately reflect the actual energy consumption of the equipment usage, although Continental had not tested equipment in this manner to thoroughly judge the suitability of moving pans. (Continental, No. 29, p. 6) Continental found making physical changes to equipment setup, such as relocating pans during a test, to be problematic because it could lead to significant differences in results by, for example, skewing measurements by the order in which pans were removed or arranged in the storage compartment, or how long doors or drawers were opened for the relocation of pans, etc. *Id.* Continental commented that this issue is another reason DOE must delay adoption of a test procedure for refrigerated buffet and preparation tables, and instead work with the standards committees and stakeholders to develop a comprehensive industry standard. *Id.*

AHRI recommended that any changes to the ASTM F2143–16 standard should be addressed by the appropriate standards committee. (AHRI, No. 38, p. 7) AHRI advised DOE that manufacturers have not tested equipment to the specifications proposed, and therefore AHRI does not have the knowledge to advise DOE regarding the appropriateness of this change. *Id.* AHRI commented that it supported DOE's proposal and recommended that DOE should not support moving pans during the test procedure, as this might affect test outcomes. *Id.* AHRI repeated that DOE

should not combine test standards and recommended that DOE regulate this issue under a singular standard.

Hussmann again cautioned DOE against combining sections from different standards to create a test procedure and that doing so would result in unsupported results not yet tested and proven by industry. (Hussmann, No. 32, p. 5) Hussmann commented that the method mentioned provides for testing variability and additional burden of testing on the manufacturer and was not recommended. *Id.* Hussmann instead recommended that the matter be taken before the proper standards committee for validation and vetting before being adopted. *Id.*

In response to the comments regarding DOE referencing multiple test standards, refer to the same comments discussed in sections III.B and III.C.1.b of this document.

DOE agrees with the comments indicating that moving pans in the middle of a test period would increase test burden and potentially increase variability. Therefore, DOE is requiring that pans stay in place for the duration of the test period, consistent with the approach proposed in the June 2022 NOPR.

DOE recognizes that typical buffet table and preparation table use may include movement of food pans from the top pan area or maintaining pans in that location depending on end use. However, the function of this equipment is to provide cooling to food loads in the top pan areas. DOE has determined that maintaining pans in the top open storage area allows for representative measures of energy consumption while limiting test burden.

Test Conduct—Operating Periods and Door/Lid Openings

As described, buffet tables and preparation tables temporarily store and display perishable items during food preparation or service. Because buffet tables and preparation tables are used only during food preparation or service, these equipment types may not be used for the same 24-hour duration used to characterize performance for other categories of CRE. Sections 10.5.5 and 10.5.6 of ASTM F2143–16 specify a 24-hour test, with an active period of 8 hours and a standby period of 16 hours. The active period specified in section 10.5.5 contains instructions for a cover, if equipped (open for 2 hours, then closed for 4 hours, then open for 2 hours), and a door opening sequence for any refrigerated compartments (every 30 minutes, each cabinet door or drawer, or both, shall be fully opened sequentially, one at a time, for 6 consecutive seconds; for units with pass-thru doors, only the doors on one side of the unit are opened).

DOE tentatively determined in the June 2022 NOPR that buffet tables and preparation tables are typically used for food service and food preparation rather than longer-term food storage. 87 FR 39164, 39187. In the June 2022 NOPR, DOE proposed to test this equipment with pans loaded into the open-top display areas for the duration of the test, which DOE has tentatively determined represents typical use during food service and food preparation. *Id.*

DOE recognizes that the duration of use per day varies based on the application and installation location for this equipment. In the June 2022 NOPR, DOE identified that buffet tables and preparation tables can be used for up to 24 hours per day. DOE initially determined in the June 2022 NOPR that a 24-hour test period as specified in ASTM F2143–16 incorporates the likely aspects of buffet table and preparation table operation—*i.e.,* an active door-opening period and a period of stable operation. 87 FR 39164, 39187. While the actual durations of use may vary based on end-use application, the measured energy use in kWh/day is representative of the energy use of a unit operated in 24 hours and allows for consistent energy use comparisons among models. *Id.* DOE proposed in the June 2022 NOPR to require a 24-hour test period for buffet tables and preparation tables as specified in ASTM F2143–16. *Id.* The proposed 24-hour test period is consistent with the industry test procedure, the test procedure for other CRE; the 24-hour test period also limits test burden and variability by allowing for stable operation over a longer period and incorporates the door openings while allowing the stable operation expected during typical usage. *Id.*

In the June 2022 NOPR, DOE requested comment on the proposed 24-hour test period, which is consistent with the approach in ASTM F2143–16. *Id.*

Hoshizaki commented that it continues to agree with DOE's proposal to incorporate ASTM F2143–2016, but with revisions. (Hoshizaki, No. 30, p. 3) Hoshizaki stated that any revisions DOE feels necessary to make should be proposed to the ASTM F2143–2016 standards committee. *Id.*

Continental commented it had not thoroughly tested equipment using ASTM F2143–16 to judge the applicability of the 24-hour test period, but generally believed a 24-hour test to be appropriate. (Continental, No. 29, p. 6) Continental stated DOE should address any concerns raised regarding this test method with the appropriate standards committee and delay adoption of a test procedure for refrigerated buffet and preparation tables. *Id.*

Hillphoenix stated partial agreement with the ASTM 24-hour test period and recommended it only apply to buffet and prep units that share a thermostat with another refrigerated portion (*i.e.,* a refrigerated storage box), as these units could be used to maintain product temperatures while the pan section is not in use. (Hillphoenix, No. 35, p. 5) Hillphoenix commented that buffet and preparation units that incorporate only an open top with pans typically operate between 8–12 hours, after which, product was removed and relocated to other storage units. *Id.* Hillphoenix commented that because of this typical use, the test period should be shortened. *Id.*

AHRI recommended that DOE use this procedure within its intended 8- to 12-hour window, rather than the proposed 24-hour test period, because the equipment in question is generally used during store hours only and a 24-hour test period would not be representative of actual use. (AHRI, No. 38, p. 7) AHRI commented that the hours of uncovered time create a strain on the case and product while not reflecting typical use, and that the procedure is burdensome for those conducting the testing. *Id.* AHRI asked DOE for clarification regarding this issue as a 24-hour test period has been part of the test procedure and has already been confirmed by manufacturers. *Id.*

Hussmann commented that a 24-hour use period was not typical use for these types of CRE, which should therefore be tested in an 8- to 12-hour period that more closely resembled typical use. (Hussmann, No. 32, p. 5) Hussmann added that the hours of uncovered time created a strain on the case and on the product and were not reflective of typical use, and that this procedure was also burdensome for those conducting the testing. *Id.* Hussmann recommended this issue be taken before a standards committee to be tested and accepted by the industry instead of combining sections from different standards. *Id.*

The CA IOUs commented that the current proposed test procedure for buffet tables or preparation tables is not representative of average use for this category because pizza and sandwich prep tables almost always have lids, as this equipment is designed for 24-hour operation while many refrigerated rail models are turned off at night and precooled in the morning. (CA IOUs,

No. 36, p. 3) As a result, the CA IOUs recommended that refrigerated rails with a user-accessible on/off switch be tested for a period of 8 hours excluding the precool time (from ambient to below 40 °F), since the 8-hour period would represent two meal periods typical of most food-service establishments serving breakfast and lunch or lunch and dinner. *Id.* The CA IOUs further recommended including precool energy without pans in place in the daily energy use, in addition to the energy used during the 8-hour test, to maintain pans in the refrigerated rail at the target temperature, because refrigerated rails tested for 8 hours typically do not go into defrost mode, as the condensate is wiped down at the end of the day after pan removal and placement into another refrigerator. *Id.* Finally, the CA IOUs recommended testing refrigerated rails that do not have on/off switches or controllers for a period of 24 hours as currently defined in the ASTM F2143 Standard Test Method for Performance of Refrigerated Buffet and Preparation Tables. *Id.*

True commented that buffet tables and food preparation tables are not effective for around-the-clock food storage, and that the suggested test period (*i.e.,* 8 hours active and 16 inactive) does not represent how these units are meant to be used and operated; both model types are designed to be used during meal rush times (breakfast, lunch, dinner) to store perishable, open food during 1-to-3-hour intervals and not during a constant 8-hour period. (True, No. 28, p. 6) True stated that measuring the energy consumption during the NSF/ANSI 7–2021 7.5.2 test method for refrigerated buffet units and refrigerated food preparation would be the most representative measurement of energy consumption, and if a 24-hour number is required, simply multiplying the energy consumption during the 4-hour test by 6 would suffice. *Id.*

DOE notes that ASTM F2143–16 currently includes a 24-hour test period for all units—with an 8-hour active period, and 16-hour standby period. DOE recognizes that duration of usage per day varies depending on application and installation location. However, as noted by commenters, this equipment can be used for 24 hours. A 24-hour test allows for a representative measurement of energy use and allows for a consistent comparison of energy use. Therefore, DOE is adopting a 24-hour test period for buffet tables and preparation tables, consistent with the approach in ASTM F2143–16. As discussed in the following paragraphs, the 24-hour period includes active and standby periods, consistent with ASTM F2143–16, to reflect usage during service and storage periods.

As discussed, ASTM F2143–16 includes an 8-hour ''active period'' that includes instructions for any open-top display area covers (2 hours open, 4 hours closed, and 2 hours open) and any refrigerated compartment doors and/or drawers (fully opened sequentially for 6 seconds every 30 minutes). DOE recognizes that the actual use of buffet tables and preparation tables can vary depending on application. The cover and door opening requirements in ASTM F2143–16 were developed by an industry committee with the intent of evaluating energy performance. While the door openings specified in ASTM F2143–16 are less frequent than those required in ASHRAE 72–2018R, DOE expects that any refrigerated compartments in buffet tables or preparation tables are accessed less frequently than in other CRE because maintaining the refrigerated temperature of food items held in the open-top pan area is the primary function of buffet tables or preparation tables during operation. Additionally, the 8-hour ''active period'' during which door openings occur is consistent with the 8-hour period of door openings required in ASHRAE 72–2022 with Errata. Based on the foregoing, DOE tentatively determined in the June 2022 NOPR that the cover and door opening provisions of ASTM F2143–16 are appropriately representative. 87 FR 39164, 39188.

Accordingly, DOE proposed in the June 2022 NOPR to incorporate the ''active period'' requirements for cover and door and/or drawer openings as specified in section 10.5.5 of ASTM F2143–16. *Id.*

In the June 2022 NOPR, DOE requested comment on the proposed door and cover opening procedures, which are consistent with the approach specified in ASTM F2143–16. DOE requested data and information on representative usage of buffet tables and preparation tables, including door and cover openings. *Id.*

Hoshizaki commented in agreement with DOE that the cover and door opening provisions of ASTM F2143–16 are appropriately representative for energy testing. (Hoshizaki, No. 30, p. 4) Hoshizaki commented that ASTM F2143–2016 should be either accepted in its entirety or changes suggested should be made at the ASTM F2143–2016 standards committee level and await approval before accepting said standard as a test procedure. *Id.*

Hillphoenix stated agreement with the proposal to use the door and cover opening procedures as referenced in ASTM F2143–16, as they are more representative of end use than the door opening procedure referenced in ASHRAE 72. (Hillphoenix, No. 35, p. 5) Hillphoenix commented that the doors on this type of equipment are normally operated by store personnel and are not customer facing, which excludes the intent of the opening procedures specified in ASHRAE 72. *Id.* Hillphoenix recommended that DOE approach industry and request updated testing standards that better reflect actual product intent, an approach that would drive consistency within the industry and be less burdensome on manufacturers. *Id.*

AHRI commented that the issue of proposed door and cover opening procedures consistent with ASTM F2143–16 depend on DOE's ultimate decision regarding use of ASHRAE 72–2018R. (AHRI, No. 38, p. 8) AHRI stated that ambient conditions must be selected in order to select the door type in use for equipment and recommended that changes to this standard be addressed by the appropriate standards committee for review and approval, and that a test procedure should be developed prior to regulating this equipment. *Id.*

Continental commented that it had not performed sufficient testing to ASTM F2143–16 to form a conclusive position on the suitability of utilizing the proposed door and cover opening procedures, but stated concerns with the practicality, burden, and repeatability of the simultaneous door and cover opening method specified in the ASTM test method. (Continental, No. 29, p. 7) Continental stated that results may be significantly skewed by ambient test conditions and the process used, and DOE should delay adoption of a test procedure for refrigerated buffet and preparation tables and address feedback regarding ASTM F2143–16 with the appropriate standards committee. *Id.*

Hussmann commented that due to the uncertainty of DOE selecting sections from both standards, it would be difficult to choose what method would work for a majority of manufacturers. (Hussmann, No. 32, p. 6) Hussmann commented that options determined from this test procedure may include: ASHRAE 72 conditions with ASHRAE 72 door openings; ASHRAE 72 conditions with the ASTM door opening procedure; ASTM conditions with the ASTM door opening procedure; or ASTM conditions with ASHRAE door openings. *Id.* Hussmann requested that DOE select test conditions in order to determine the suitable door opening procedure and cautioned against combining test standards for this reason. *Id.* Hussmann added that overall

measurements and results would have varying effects based on openings, ambient conditions, and test mediums used, and recommended that any changes be brought to the appropriate standards committee for review and approval prior to adoption. *Id.*

DOE agrees that the usage of buffet tables or preparation tables likely varies between high usage and low usage periods over a 24-hour period. The existing ASTM F2143–16 test procedure is representative of field use because it accounts for high and low usage periods with the active and standby periods. Therefore, DOE is adopting the active mode provisions of the ASTM test procedure for pan covers and door openings of any refrigerated compartments. This includes 4 hours total of uncovered pan area (2 hours open, 4 hours closed, 2 hours open for the 8-hour active period) and 8 hours of door openings (occurring every 30 minutes).

DOE is not adopting door openings based on ASHRAE 72–2022 with Errata as the doors are likely opened less frequently for this equipment, consistent with the ASTM F2143–16 requirements.

DOE recognizes that the impact of uncovered pan operation and door openings will vary depending on ambient conditions. As discussed, DOE has determined that the ASHRAE 72–2022 with Errata ambient conditions are appropriate for testing this equipment. DOE expects that any ''strain'' on uncovered operation would be mitigated by the lower ambient temperature of ASHRAE 72–2022 with Errata as compared to the ambient temperature specified in ASTM F2143–16, as well as the use of pan covers when applicable during a portion of the active period and the duration of the standby period.

In response to the comments regarding DOE referencing multiple test standards, refer to the same comments discussed in sections III.B and III.C.1.b of this document.

Test Conduct—Stabilization

Sections 10.3 and 10.4 of ASTM F2143–16 require that the unit be operated with empty pans and open covers for at least 24 hours, that the unit operate with empty pans for at least 2 hours, that water be pre-cooled before being loaded into the pans, and, once the water has been loaded into the pans, that the thermostat be calibrated until the pan temperatures are never outside of 33 °F to 41 °F for any 15-minute period over a 4-hour measurement period. In contrast, the current CRE test procedure, by reference to ASHRAE 72–2005, generally provides that the unit be loaded with test simulators and filler packages prior to pre-cooling, operated to establish steady-state conditions over consecutive 24-hour periods or refrigeration cycles, and, once steady-state conditions have been achieved, continue to operate for at least 12 hours without any adjustment to the controls.

As discussed, DOE proposed in the June 2022 NOPR generally to reference ASTM F2143–16 rather than NSF 7–2019 for buffet table and preparation table testing. 87 FR 39164, 39188. However, the stabilization and thermostat calibration requirements in sections 10.3 and 10.4 of ASTM F2143–16 may require an iterative process of thermostat adjustment and recalibration to achieve stability and then to ensure that appropriate conditions are maintained during the test period. ASHRAE 72–2022 with Errata specifies provisions for other CRE that require stability to be confirmed over two test periods with identical operation in order to avoid the need for an iterative process. In the June 2022 NOPR, DOE proposed to reference sections 7.1 through 7.5 (excluding sections 7.2.1, 7.2.2, 7.3.1, 7.3.2, 7.3.3, and 7.3.4, as those sections would not be applicable to self-contained buffet tables or preparation tables because those sections are intended for CRE with remote condensing units, CRE without doors, CRE with different door opening sequences, and CRE with lighting occupancy sensors and controls) of ASHRAE 72–2018R for determining stabilization and specifying the testing sequence for testing buffet tables and preparation tables. 87 FR 39164, 39188. The preparation period under section 7.2 of ASHRAE 72–2018R would include loading the pans with water and adjusting the necessary controls to maintain the specified temperatures. *Id.* For the purposes of determining stability as specified in section 7.5 of ASHRAE 72–2018R, the average temperatures of measured pans would be used to compare Test A and Test B rather than the temperatures of test simulators. *Id.* DOE tentatively determined in the June 2022 NOPR that this approach would ensure stability over the test period and limit test burden by avoiding an iterative approach to determine stability and test conditions. *Id.* This approach would also maintain consistency with the procedures used for testing other CRE. *Id.*

In the June 2022 NOPR, DOE requested comment on the proposed stabilization approach for buffet table and preparation table testing, which would reference the approach specified in ASHRAE 72–2018R. *Id.*

AHRI commented that it supports DOE's proposed stabilization approach while again recommending that DOE regulate this issue under a single standard, cautioning DOE against combining test standards as unnecessary and inadvisable. (AHRI, No. 38, p. 8)

AHRI further noted that buffet tables have not yet been addressed by ASHRAE Standard 72–2022. (AHRI, No. 38, p. 8)

Hussmann stated its support for adopting the stabilization method for self-contained CRE identified in section 7.4 in ASHRAE 72–2018R, but cautioned that this method does not yet address buffet/prep CRE and as a result, the proposed stabilization approach should be taken to the appropriate standards committee prior to adoption. (Hussmann, No. 32, p. 6)

Hillphoenix stated agreement with the proposal to use the ASHRAE 72 approach for stabilization of buffet table and preparation table testing as ASHRAE 72 followed methods used for other CRE equipment. (Hillphoenix, No. 35, p. 5) Hillphoenix commented that ASTM F2143–16 allowed many factors that could be burdensome when trying to stabilize temperatures. *Id.* Hillphoenix recommended that DOE approach industry and request updated testing standards that better reflect actual product intent, an approach that would drive consistency within the industry and be less burdensome on manufacturers. *Id.*

Hoshizaki commented requesting that if DOE is proposing to reference ASTM F2143–2016 for buffet table and preparation table testing but use the stabilization and thermostat calibration requirements as specified in section 7.5 of ASHRAE 72–2022, then those changes should be proposed to the ASTM F2143–2016 standards committee. (Hoshizaki, No. 30, p. 4) Hoshizaki noted than when DOE is content with a proper test procedure, then DOE can propose use of the test procedure at that time. *Id.*

Continental stated a belief that the stabilization period prescribed in ASHRAE 72–2022 may have applicability for buffet or preparation tables, but had not tested this equipment in the proposed manner to inform a comprehensive opinion. (Continental, No. 29, p. 7) Continental maintained that combining aspects of different test standards was inadvisable and that DOE should delay adoption of a test procedure for refrigerated buffet and preparation tables, and work with the appropriate standards committees and other stakeholders to develop an appropriate standard method that addresses this issue. *Id.*

In response to the comments regarding DOE referencing multiple test standards, refer to the same comments discussed in sections III.B and III.C.1.b of this document.

DOE maintains its determination from the June 2022 NOPR that the ASTM F2143–16 approach is burdensome and requires an iterative approach to determine stability, whereas the approach in ASHRAE 72–2022 with Errata allows for consistent testing while limiting test burden. Therefore, DOE is adopting the relevant sections of ASHRAE 72–2022 with Errata to require that stability be confirmed over two identical test periods.

DOE will continue to monitor industry committee work to update relevant standards and will consider any updated industry standards available during future test procedure rulemakings.

Test Conduct—Target Temperatures

ASTM F2143–16 instructs that if a buffet table or preparation table is equipped with a refrigerated compartment, the compartment air temperature is to be between 33 °F and 41 °F. Likewise, the water temperature in each of the pans placed in the display area also is to be between 33 °F and 41 °F. The DOE test procedure for other CRE requires IATs of 38 °F ±2.0 °F for medium temperature applications.

Through research, DOE found that buffet and preparation tables use a variety of refrigeration methods for cooling the pans in the display area and the refrigerated compartment. In some configurations, units might not be able to maintain all pans and the refrigerated compartment within the specified temperature range. For example, units with a single refrigeration system and thermostat control for temperatures in either the refrigerated compartment or in the pan area would control for temperature in either the pan area or refrigerated compartment, and both may not be within the target range. As a result, certain equipment may maintain only the refrigerated compartment or the pan area, but not both, within a specified temperature range during operation.

As discussed, ASTM F2143–16 and NSF 7–2019 both specify a pan and compartment temperature range of 33 °F to 41 °F for testing. The current DOE test procedure for CRE requires testing to an IAT within 2 °F of the specified target temperature. DOE expects that this smaller allowable temperature range would limit test variability as compared to the 8 °F allowable range specified in ASTM F2143–16 and NSF 7–2019.

The ASTM F2143–16 and NSF 7–2019 temperature ranges apply to all measured pan and compartment temperatures, whereas DOE's current temperature specifications apply to the IAT—*i.e.,* the average of all test simulator temperature measurements over the test period. DOE tentatively determined in the June 2022 NOPR that the temperature specification based on an average temperature rather than individual temperature measurements would limit test burden by limiting the need for retests in the case of individual temperature measurements being outside of the required range. 87 FR 39164, 39189. Additionally, DOE determined that the average temperature approach would allow for testing buffet tables and preparation tables with configurations not capable of maintaining all temperature measurements within the required range. *Id.* For example, if the refrigerated compartment provides cooling to the open-top pan area, the refrigerated compartment temperature measurements may be colder than the pan temperatures and not necessarily within a specified range. *Id.* Additionally, certain temperature measurement locations may be warmer or colder than others depending on proximity to the evaporator or refrigerated areas, resulting in ''hot'' or ''cold'' spots. *Id.* Testing to a specified average temperature would consider the overall average measured temperature and would allow for testing such configurations. *Id.*

Based on these initial determinations, DOE proposed in the June 2022 NOPR to require testing buffet tables and preparation tables to a specified average temperature rather than an allowable range. *Id.* DOE proposed in the June 2022 NOPR that the average temperature be calculated over the test period separately for the pan temperature measurements (*i.e.,* the average of temperatures measured throughout the test period at each pan measurement location specified in ASTM F2143–16) and the temperature measurements in any refrigerated compartment (*i.e.,* the average of temperatures measured throughout the test period at each of the three compartment measurement locations specified in ASTM F2143–16). DOE proposed in the June 2022 NOPR that the average temperature of all refrigerated pans be 38 °F ±2 °F. *Id.* This temperature is consistent with the current DOE test procedure for medium-temperature CRE and is within the allowable range specified in ASTM F2143–16 and NSF 7–2019. In the June 2022 NOPR, DOE similarly proposed that the average temperature of any refrigerated compartment also be 38 °F ±2 °F. 87 FR 39164, 39189. If the buffet table or preparation table configuration does not allow independent control of the refrigerated compartment and both the pan average temperature and refrigerated compartment average temperature cannot be maintained within 38 °F ±2 °F over the test period, DOE proposed that the refrigerated compartment be tested to the average temperature necessary to maintain the pan average temperature within the specified range. *Id.* Similar to the existing LAPT provision in section 2.2 of appendix B, DOE also proposed in the June 2022 NOPR that if a unit is not capable of maintaining average pan temperatures within the specified range, the unit would be tested at the LAPT. *Id.*

In the June 2022 NOPR, DOE requested comment on the proposed approach for testing buffet tables and preparation tables based on separate pan and compartment average temperatures. *Id.* DOE also requested feedback on the proposed target temperature of 38 °F ±2 °F for each average temperature. *Id.*

Hillphoenix stated agreement with the proposed 38 °F ±2 °F IAT for averaging the temperature for each refrigerated compartment when there are no separate refrigeration controls. (Hillphoenix, No. 35, p. 6) Hillphoenix also agreed with the approach to only apply the 38 °F ±2 °F IAT requirement to open-top pans if the other refrigerated compartments must be operated colder in order to achieve these pan temperatures. *Id.* Hillphoenix disagreed with utilizing the LAPT for the open tops with pans in order to maintain 38 °F as required in other compartments, but stated that the open top with pans should be given priority to achieve 38 °F with other compartments allowed to run colder. *Id.*

Continental repeated its response to DOE's early assessment review, supporting use of target temperature ranges and moving box car average temperatures for pans in the open display area, along with maximum and minimum thermocouple temperature measurements in the refrigerated storage compartment, as prescribed in NSF 7 for this equipment. (Continental, No. 29, p. 7) Continental commented that it had not energy tested relevant equipment in the proposed manner to thoroughly evaluate suitability of this approach and reiterated that DOE should postpone publication of a test procedure for refrigerated buffet and preparation tables, and work with the appropriate standards committees and other stakeholders to develop and evaluate an

appropriate single standard method that addresses this and other issues. *Id.*

Hussmann commented that due to the nature of the small refrigerated pans on this type of CRE, removing pan lids and/or entering defrost could have warming effects on the pans and DOE should therefore use an average IAT of below 41 °F for the target temperature. (Hussmann, No. 32, p. 6) Hussmann also cautioned DOE against combining sections from different standards to create a test procedure, stating that the proposed changes should be taken to the appropriate standards committee prior to adoption. *Id.*

AHRI recommended that DOE's target temperature should remain below 41 °F and restated its belief that combining test standards was unnecessary and that a single standard should be used to regulate the issue. (AHRI, No. 38, p. 8)

Hoshizaki commented that if DOE is proposing to reference ASTM F2143–2016 for buffet table and preparation table testing but use a modified target temperature range, then those proposed changes should made to the ASTM F2143–2016 standards committee and await approval before finalizing a test procedure in DOE standards. (Hoshizaki, No. 30, p. 4) Hoshizaki noted that manufacturers would need to be given the opportunity to test with those new constraints and make viable comments after seeing the differences. *Id.*

True recommended recording the energy consumption during the 4-hour NSF/ANSI 7–2021 test method (7.5.2) for refrigerated buffet units and refrigerated food preparation units because for buffet tables or preparation tables, the average of the pan temperatures is not a food-safe measurement. (True, No. 28, p. 3) True added that this test procedure is the industry standard and that all original equipment manufacturers (''OEMs'') should be able to supply energy consumption data for all equipment already manufactured and certified to NSF Standard 7. True asked DOE if such information had been requested from manufacturers. *Id.*

The 38 °F ±2 °F average pan temperature is generally consistent with the recommended approach for IAT below 41 °F and would allow for consistent comparisons across models by including a target temperature rather than a wide allowable range of IATs. For example, the energy use of a unit maintaining a pan IAT of 34 °F would be expected to be higher than a unit with an IAT of 41 °F. Additionally, testing significantly below the 38 °F ±2 °F range may introduce concerns of the distilled water freezing during testing.

DOE is maintaining pan and compartment target temperatures consistent with June 2022 NOPR and test procedure for other medium temperature CRE. To clarify, achieving the target pan temperature always takes priority over achieving the compartment temperature. LAPT is only allowed if a model cannot achieve the required pan temperature target range.

The boxcar pan temperature averaging approach in NSF 7 is for a test method serving a different purpose—ensuring food safety. For the DOE test procedure, the average pan temperature over the entire test duration is needed to ensure energy consumption corresponds to the maintained pan temperatures. DOE recognizes that an average pan temperature does not necessarily represent food safe temperatures (*i.e.,* each pan temperature may not be at 38 °F), but the DOE test procedure is intended to provide a representative basis for measuring energy consumption while not being unduly burdensome to conduct rather than ensuring food safety or sanitation. DOE has determined that the pan temperature averaging approach as proposed in the June 2022 NOPR satisfies the EPCA requirements.

Test Conduct—Capacity Metrics

ASTM F2143–16 specifies the reporting of ''production capacity,'' which is defined as the total volume of the pans when each pan is filled within 0.5 in. of the rim. Energy consumption of refrigerated buffet and preparation tables likely varies with pan volume as well as the volume of any closed refrigerated compartments. Therefore, both values are of interest when considering metrics that define energy performance. Pan surface area could be another possible metric for evaluating energy performance, similar to TDA for horizontal open equipment classes. Reliance on pan surface area may eliminate the variability with different test pan dimensions.

In the June 2022 NOPR, DOE tentatively determined that pan storage volume, pan display area, and refrigerated volume may all contribute to the capacity and energy consumption of a buffet table or preparation table; therefore, DOE proposed that the test procedure include measures of these three metrics. 87 FR 39164, 39190. DOE proposed in the June 2022 NOPR to define and measure ''pan volume'' consistent with the production capacity specified in ASTM F2143–16. *Id.* DOE proposed to refer to pan volume rather than production capacity to avoid confusion with the other relevant capacity metrics. *Id.*

In the June 2022 NOPR, DOE proposed that the refrigerated volume of buffet table and preparation table refrigerated compartments be tested in accordance with AHRI 1200–202X, consistent with the method proposed for use with other CRE. *Id.* To avoid double counting of refrigerated pan volumes, DOE proposed that the refrigerated compartment volume would not include any volume occupied by the pans loaded in the open-top display area for testing. *Id.*

DOE proposed in the June 2022 NOPR that pan display area be defined and measured as the surface area of the test pan when filled to within 0.5 in. of the rim. *Id.* This surface area measurement would ensure that the pan display area would be consistent with the pan storage volume (*i.e.,* both measurements would be based on the pans as filled for testing). *Id.* Additionally, the measurement based on the surface area of the water as loaded for testing would ensure that the surface area measurement accounts for the actual food storage area and excludes any areas not providing refrigerated storage for food service or food preparation. *Id.*

In the June 2022 NOPR, DOE requested comment on the proposed capacity metrics of pan storage volume, compartment volume, and pan display area. *Id.* DOE requested feedback on the proposed methods for measuring each and the extent to which these metrics are relevant capacity metrics for buffet tables and preparation tables. *Id.*

Hillphoenix stated agreement with DOE's intent to only measure volumes and TDAs for the referenced products. (Hillphoenix, No. 35, p. 6) Hillphoenix commented that the method as presented in the NOPR was not clearly written and needed to be better defined. *Id.* Hillphoenix recommended that DOE approach industry and request updated testing standards that better reflect actual product intent, an approach that would drive consistency within the industry and be less burdensome on manufacturers. *Id.*

AHRI recommended that the proposed changes to capacity metrics of pan storage volume, compartment volume, and pan display area need to be updated in tandem with the standard for consistency and alignment with the referenced standard. (AHRI, No. 38, p. 8)

Hussmann commented that the issue of proposed capacity metrics of pan storage volume, compartment volume, and pan display area should be taken to the appropriate standards committee due to the importance of consistency within standards. (Hussmann, No. 32, p. 6)

Continental commented that DOE's proposed use of surface area of the water as loaded for testing would present a confusing and potentially inconsistent method of rating equipment because it deviates from other industry standards. (Continental, No. 29, p. 7) Continental added that DOE should delay adoption of a test procedure for these products and work with the appropriate standards committees and other stakeholders to develop a suitable standard method that sufficiently addresses concerns with capacity measurements, which have significant impact on potential new energy standards in the future. *Id.*

The CA IOUs recommended for the prep table test procedure using 1/8-pan capacity as a size (and energy normalization) metric for prep tables instead of pan display area because prep table energy consumption depends mostly on the top pan capacity instead of bottom compartment volume. (CA IOUs, No. 36, p. 4) The CA IOUs pointed out that using total volume in the top pans and bottom compartment as a normalization metric will favor units with fewer top pans and larger bottom compartments compared to units with more top pan capacity. *Id.*

Hoshizaki commented that pan display area is not currently used as a metric in ASTM F2143–2016. (Hoshizaki, No. 30, p. 4) Hoshizaki commented that if DOE wants to add an additional metric for measurement, this should be proposed to the ASTM F2143 standards committee, and that such proposals should give manufacturers and third-party testing agencies the opportunity to do analysis and feedback in the standards committee process. *Id.* Hoshizaki stated that only after all revisions are finalized should the standard be officially proposed as a test procedure for product. *Id.*

DOE maintains that pan display area, pan volume, and refrigerated compartment volume can all impact energy use and provide information regarding usable capacity to end users. Because ASTM F2143–16 includes ''production capacity,'' which represents a measure of pan storage volume, DOE is adopting additional capacity metrics. These metrics reflect the capacity of buffet tables and preparation tables to store refrigerated items and display or allow access to refrigerated items.

Regarding the CA IOUs recommendation, the measured pan area rather than a number of standard pans would ensure a consistent basis for measuring unit capacity regardless of pan configuration for a given unit.

Regarding confusion and need for test standard updates, the measurements of compartment volume and pan volume are consistent with the existing industry methods (AHRI 1200–2023 and ASTM F2143–16, respectively). Pan area is the surface area of the water in the pans which represents the refrigerated area in contact with the ambient test conditions, which ensures a representative and comparable measurement of the usable capacity that contributes to energy consumption. Commenters did not provide specific information regarding what aspects of the June 2022 NOPR approach were unclear. DOE has reviewed the test instructions as proposed and determined they provide sufficient clarity regarding measuring each of the capacity metrics. Therefore, DOE is adopting the capacity metrics as proposed in the June 2022 NOPR.

2. Pull-Down Temperature Applications

As defined, CRE is equipment that is designed for holding temperature applications [20] or pull-down temperature applications. 10 CFR 431.62 (*see also* 42 U.S.C. 6311(9)(A)(vi)). ''Pull-down temperature application'' is a commercial refrigerator with doors that, when fully loaded with 12-ounce beverage cans at 90 °F, can cool those beverages to an average stable temperature of 38 °F in 12 hours or less. 10 CFR 431.62 (42 U.S.C. 6311(9)(D)). CRE within this definition are typically known as beverage merchandisers or beverage coolers because of their use in displaying individually packaged beverages for sale, and their ability to pull down temperatures of such beverages. Pull-down temperature applications with transparent doors and a self-contained condensing unit are the only pull-down temperature applications currently subject to DOE's energy conservation standards specified at 10 CFR 431.66(e).

DOE's current CRE test procedure does not include specific provisions related to the performance criteria in the pull-down temperature application definition. For example, the test procedure does not provide instructions for the starting conditions of the equipment (*e.g.,* whether the equipment begins the test in a pre-cooled state or at ambient temperature conditions), loading of the cans (*e.g.,* whether the equipment must be loaded to full within a certain amount of time), or a method to measure the temperature of the cans to confirm cooling to 38 °F. The current CRE test procedure specifies that commercial refrigerators designed for pull-down applications be tested at steady state (*see* 10 CFR 431.64(b) and appendix B section 2.1), consistent with testing other covered CRE categories.

While DOE defines ''pull-down temperature application'' and has established energy conservation standards for self-contained commercial refrigerators with transparent doors for pull-down temperature applications, no models are currently certified to DOE in this equipment class.[21] DOE has not established energy conservation standards for other categories of CRE for pull-down temperature applications.

DOE recognizes that manufacturers may represent their models as for use in pull-down temperature applications rather than holding temperature applications. To ensure appropriate application of DOE's definitions, DOE proposed in the June 2022 NOPR a method to determine whether a model meets the definition of ''pull-down temperature application.'' 87 FR 39164, 39191. Specifically, DOE proposed to include product-specific enforcement provisions for CRE, and proposed to include a section to specify how DOE would confirm whether a commercial refrigerator meets the definition of ''pull-down temperature application.'' *Id.*

As stated, the pull-down temperature application definition requires that a model be capable of cooling a full load of 12-ounce beverage cans from 90 °F to an average stable temperature of 38 °F in 12 hours or less. To confirm this capability, DOE proposed in the June 2022 NOPR to specify in 10 CFR 429.134 that a classification as pull-down temperature application is valid based on meeting the pull-down temperature application definition by:

(1) Measuring the temperatures of 12-ounce beverage cans loaded into the commercial refrigerator at locations consistent with those specified in ASHRAE 72–2018R (*i.e.,* those temperature measurement locations required for test simulators during DOE testing of other commercial refrigerators);

(2) Operating the commercial refrigerator under the required commercial refrigerator test conditions (*e.g.,* 75.2 °F ±1.8 °F dry-bulb temperature) and at the control setting necessary to achieve a stable integrated average temperature of 38 °F prior to loading;

(3) Fully loading the commercial refrigerator with 12-ounce beverage cans maintained at 90 °F ±2 °F;

[20] ''Holding temperature application'' means a use of commercial refrigeration equipment other than a pull-down temperature application, except a blast chiller or freezer. 10 CFR 431.62 (*see also* 42 U.S.C. 6311(9)(B)).

(4) Determining the duration of pull down (which must be 12 hours or less) starting from closing the commercial refrigerator door after completing the 12-ounce beverage can loading until the integrated average temperature reaches 38 °F ±2 °F; and

(5) Determining an average stable temperature of 38 °F by operating the commercial refrigerator for an additional 12 hours after initially reaching 38 °F ±2 °F with no changes to control settings, and determining an integrated average temperature of 38 °F ±2 °F at the end of the 12-hour stability period. 87 FR 39164, 39191.

The proposed product-specific enforcement provisions are consistent with the existing definition of ''pull-down temperature application,'' but would provide additional clarity regarding how DOE would determine whether a commercial refrigerator could be classified as such. *Id.*

In the June 2022 NOPR, DOE requested comment on the proposed product-specific enforcement provisions regarding how DOE would determine whether a model meets the pull-down temperature application definition. 87 FR 39164, 39191. DOE also requested data and comment on whether the proposed product-specific enforcement provisions sufficiently differentiate pull-down temperature applications from holding temperature applications. *Id.*

AHRI commented that detailed information regarding pull down of ''full load'' wasn't available. (AHRI, No. 38, p. 9) As a result, AHRI believed this proposal is in conflict with NSF requirements. *Id.* AHRI cited DOE's slide deck used in an August 1, 2022, webinar for the CRE test procedure, noting two concerns with pull-down temperature and enforcement actions. *Id.*

AHRI commented by citing issue 24 (a question on the request for comment for pull-down temperature applications) to ask whether DOE is referring only to the category of pull-down CRE, or if DOE is adding pull down to all categories for enforcement. AHRI also asked if this would allow for the randomized placement of bottles during a legitimate test procedure. *Id.* AHRI referred to issue 56 related to certified volume versus volume measurement to ask if this will allow manufacturers to use their discretion. *Id.*

The Joint Commenters stated their support for the proposed test procedure to verify pull-down temperature performance. (Joint Commenters, No. 31, p. 3) The Joint Commenters noted they had expressed previous support for eliminating the pull-down temperature CRE class. As discussed in their comments to the preliminary TSD for CRE standards, the Joint Commenters now supported the proposed NOPR amendment maintaining the pull-down class as it would clarify how DOE would determine whether a model is appropriately certified as a pull-down unit. *Id.*

NAMA expressed concern about the pull-down temperature provision because of the lack of specificity and asked if the provision related only to those products for which DOE had pull-down requirements or whether the provision referred to all CRE equipment that stored and cooled beverage cans/bottles. (NAMA, No. 33, p. 2) NAMA noted that large beverage companies had requirements for pull down, based on customer preference and sanitary conditions for food items that must reach 38 °F in 16 hours, not 12 hours. *Id.* NAMA commented that the DOE proposal would set up a conflicting set of requirements as more and more bottle coolers were used to store food in addition to beverages, making 12 hours a much shorter pull-down time. *Id.* NAMA suggested that DOE harmonize at 16 hours since the customers of its manufacturers already had specifications on pull down, adding that manufacturers already must test to determine pull down in 16 hours, and additional testing to show an arbitrary pull down at 12 hours was unnecessary and unduly burdensome. *Id.*

NAMA additionally requested that DOE develop specific test procedures for placing cans/bottles into the cooler, stating it was possible to obtain different results with a cooler packed with every conceivable space used and shelves removed versus cans/bottles packed as in a retail store; different results could also be obtained with cans versus bottles. (NAMA, No. 33, p. 2) NAMA recommended that DOE use a glycol liquid, as with the beverage vending machine (BVM) test procedure. *Id.*

In the August 2022 public meeting, True commented that the subject of 12-ounce cans will lead to some serious discussions on loading them. (Public Meeting Transcript, No. 41, p. 53) True stated these cans are very convenient to load two or three high per shelf, and if they are not single-loaded on a shelf, there could be a situation in which the middle cans are getting far less surface area and are more difficult to cool down. *Id.* True commented that some specification is needed on how to load these cans so this situation doesn't happen, stating that if someone put one shelf in the bottom and stacked it to the ceiling with cans, they would never pass this test. *Id.*

The CA IOUs urged DOE to amend the definition for ''pull-down temperature application'' to specify ''a blast chiller or freezer'' and exclude beverage merchandisers, which in practice are used in holding-temperature applications. (CA IOUs, No. 36, p. 6) The CA IOUs commented that in the CRE industry, pull-down refrigeration specifically means equipment capable of rapidly lowering food temperature in a food-safe manner and that only blast chillers/freezers are considered to have pull-down applications by industry while beverage merchandizers are rated as Vertical Closed Transparent Medium Temperature (''VCT.M'') CRE and designed for holding-temperature applications. *Id.* The CA IOUs pointed out that there will be no need to establish a ''pull-down'' refrigeration test method for VCT.M equipment if DOE updates the definition for ''pull-down temperature application'' in accordance with industry practice. *Id.* The CA IOUs added that if DOE retains the current definition for ''pull-down temperature applications,'' DOE should share data on what percentage of operating hours are spent in ''pull down'' versus ''holding mode'' operation compared to other CRE considered ''holding temperature applications'' and recommends that the daily energy usage for these ''pull-down temperature applications'' be weighted by the percentage of time spent in each mode. *Id.*

To clarify, the provisions proposed in the June 2022 NOPR related to pull-down temperature applications are specific to the procedures DOE would follow for verifying claims of pull-down temperature applications as defined in EPCA and by DOE. DOE currently only specifies standards for pull-down temperature application equipment with self-contained condensing units and transparent doors. Manufacturers may claim their equipment is for pull-down temperature applications rather than holding temperature applications. The intent of the provisions proposed in the June 2022 NOPR for pull-down temperature applications is to ensure appropriate application of DOE's definitions. Such testing would not be necessary to verify claims of equipment for holding temperature applications. Blast chiller and blast freezer testing is addressed separately in section III.C.3 of this document.

In the June 2022 NOPR, DOE proposed loading instructions consistent with ASHRAE 72–2018R. Additional instructions are not necessary because these provisions outline the process DOE will use to determine appropriate equipment

category (*i.e.,* manufacturers are not required to conduct testing in accordance with these provisions, but may choose to do so to ensure appropriate application of DOE's definitions).

In response to AHRI's comment regarding placement of bottles during a test procedure and certified volume versus volume measurement, this pull-down verification procedure would be separate from the DOE test procedure in appendix B and only represents the process DOE would follow to verify claims of pull-down temperature applications.

Based on the definition of pull-down temperature applications specified in EPCA (42 U.S.C. 6311(9)(D)) and replicated in 10 CFR 431.62, loading is for 12 ounce beverage cans only. The EPCA definition specifies 12 hours or less of pull-down time, so DOE is maintaining that requirement in the verification approach rather than harmonizing with any 16-hour periods used by manufacturers.

DOE is not requiring propylene glycol to be used in the cans—such a solution is not necessary because the operating temperatures will not result in potential freezing for other can solutions, like water. DOE notes that DOE's test procedure for BVMs [21] does not require propylene glycol solution either.

DOE recognizes that these provisions do not follow NSF or standard industry terminology; however, DOE is maintaining the June 2022 NOPR verification provisions for pull-down temperature applications based on the EPCA definition. The other provisions regarding blast chillers and blast freezers established in this final rule clarify DOE consideration of equipment in that category.

3. Blast Chillers and Blast Freezers

As stated, CRE is equipment that, in part, is designed for holding temperature applications. (42 U.S.C. 6311(9)(A)(vi)) EPCA defines ''holding temperature application'' as use of commercial refrigeration equipment other than a pull-down temperature application, except a blast chiller or freezer. (42 U.S.C. 6311(9)(B)) Per the definition, ''holding temperature application'' includes blast chillers and blast freezers, even if such equipment meets the criteria of ''pull-down temperature application.''

In general, blast chillers and blast freezers are CRE with solid doors intended for the rapid temperature pull down of hot-food products.

Blast chiller and blast freezer operation is typically characterized by three cycles. The first cycle pulls the air temperature within the unit down until it reaches a target air temperature set by the manufacturer (*e.g.,* 0 °F for blast chillers and −28 °F for blast freezers). This target air temperature within the unit is maintained until the food reaches a certain temperature, set by the manufacturer, as measured by the unit's temperature probe. Once the food reaches a certain temperature, the second cycle begins by allowing the air temperature within the unit to drift up until it reaches the same temperature as the target food temperature (*e.g.,* 38 °F for blast chillers and 0 °F for blast freezers). Once the food reaches the target food temperature, the last cycle begins by proceeding to a holding pattern during which the blast chiller or blast freezer behaves similarly to a typical CRE—*i.e.,* cycling the refrigeration system to maintain a target temperature.

Within the general sequence of operations, many blast chillers and blast freezers provide users with options to alter the specific pull-down profile based on the food load. For example, a ''soft chill'' mode may provide a slower temperature pull down intended for more delicate food, as compared to a ''hard chill'' mode that cools food as quickly as possible.

ASHRAE has established a standard project committee (''SPC'') to consider the development of an industry test standard for this equipment: SPC 220P, *Method of Testing for Rating Small Commercial Blast Chillers, Chiller-Freezers, and Freezers* (''ASHRAE 220'').[22] DOE is participating in this process and is aware of a draft test standard underway that contains certain definitions, requirements, and procedure. DOE will consider the final version of the SPC 220P standard if available during future test procedure rulemakings.

a. Definitions

DOE does not define blast chiller or blast freezer. The California Code of Regulations provides the following definition for a blast chiller:

- *Blast chiller*—a refrigerator designed to cool food products from 140 °F to 40 °F within four hours. (CCR, Title 20, section 1602)

The SPC for ASHRAE 220 has provided the following tentative definitions for blast chiller and blast freezer, and a related term:

- *Blast chiller*—a rapid pull-down cooler designed to cool food to a safe refrigerated temperature (typically between 32 °F and 41 °F), but not freeze it.
- *Blast chiller-freezer:* a rapid pull-down cooler designed to function as both a blast chiller and blast freezer depending on user inputs.
- *Blast freezer*—a rapid pull-down cooler designed to freeze food.
- *Rapid pull-down cooler*—commercial refrigeration equipment intended for the rapid intermediate chilling or freezing of hot food products within a specified time period and holding the food at a safe temperature when not engaged in the chilling or freezing process.

NSF 7–2019 provides the following performance specification for rapid pull-down refrigerators and freezers:

- *Rapid pull-down refrigerators and freezers*—capable of reducing the internal temperature of their contents from 135 °F to 40 °F within a period of 4 hours or in the time specified by the manufacturer, whichever is less.

Based on the comments from interested parties and DOE's review of existing State definitions, tentative and established industry definitions, and equipment available on the market, DOE tentatively determined in the June 2022 NOPR that the characteristic of blast chillers and blast freezers that differentiate this equipment from other categories of CRE are the oversized refrigeration systems that allow for the rapid temperature pull-down of hot food products within a specified time period. 87 FR 39164, 39192. Blast chillers and blast freezers specifically differ from other types of CRE intended for pull-down temperature applications because of the intended product (hot food product for blast chillers and blast freezers versus 12-ounce beverage cans for pull-down temperature applications), initial product temperature (minimum 135 °F for blast chillers and blast freezers versus 90 °F for pull-down temperature applications), and intended product storage duration (minimal storage duration for blast chillers and blast freezers versus long-term storage duration for pull-down temperature applications).

As discussed, blast chillers and blast freezers provide rapid cooling to ensure hot food is quickly pulled down to safe refrigerated storage temperatures. In the June 2022 NOPR, DOE tentatively identified the capability to pull down hot food from 135 °F to 40 °F within 4 hours as the primary operating characteristic of blast chillers and blast freezers. 87 FR 39164, 39192. This is

[21] *See* appendix B to subpart Q of 10 CFR part 431.

[22] See *www.ashrae.org/technical-resources/standards-and-guidelines/project-committee-interim-meetings.*

consistent with the performance specification for rapid pull-down refrigerators and freezers specified in NSF 7–2019, the California definition, and tentative definitions provided by the SPC for ASHRAE 220. Although DOE did not propose to test blast chillers and blast freezers according to NSF 7–2019, as discussed in the following section, DOE expects that any blast chiller or blast freezer meeting the NSF 7–2019 performance specification would be capable of pulling down hot food from 135 °F to 40 °F within 4 hours when tested as proposed in the NOPR. 87 FR 39164, 39192. As discussed in section III.C.1.b, DOE is proposing a lower ambient temperature condition than the ambient temperature condition specified in NSF 7–2019.

To delineate blast chillers and blast freezers from other categories of CRE, including from CRE designed for pull-down temperature applications, DOE proposed in the NOPR to define the terms ''blast chiller'' and ''blast freezer.'' 87 FR 39164, 39192. DOE proposed definitions for these terms that combine parts of existing definitions, add language for consistency with DOE's existing CRE definitions, and include further specificity regarding the characteristics of this equipment. *Id.* Specifically, DOE proposed to add the following definitions to 10 CFR 431.62: ''Blast chiller'' means commercial refrigeration equipment, other than a blast freezer, that is capable of the rapid temperature pull-down of hot food products from 135 °F to 40 °F within a period of 4 hours, when measured according to the DOE test procedure. *Id.* ''Blast freezer'' means commercial refrigeration equipment that is capable of the rapid temperature pull down of hot food products from 135 °F to 40 °F within a period of 4 hours and capable of achieving a final product temperature of less than 32 °F when measured according to the DOE test procedure. *Id.*

In the June 2022 NOPR, DOE sought comment on the proposed definitions of ''blast chiller'' and ''blast freezer.'' 87 FR 39164, 39192.

NEEA commented that it supports the new definitions DOE proposed for ''blast chiller'' and ''blast freezer,'' stating that these equipment types have unique applications compared to other CRE, and these definitions allowed consideration (potential standards), categorization (equipment classes), and testing of this equipment separate from other CRE. (NEEA, No. 39, p. 2)

AHRI commented to recommend that DOE align its definitions of ''blast chiller'' and ''blast freezer'' with the SPC language for ASHRAE 220 (''Method of Testing for Rating Small Commercial Blast Chillers, Chiller Freezers, and Freezers'') for the proposed definitions of ''blast chiller'' and ''blast freezer'' (*see* bulleted language). (AHRI, No. 38, p. 9)

- ''Blast chiller—a rapid pull-down cooler designed to cool food to a safe refrigerated temperature (typically between 32 °F and 41 °F), but not freeze it.
- Blast freezer—a rapid pull-down cooler designed to freeze food.
- Rapid pull-down cooler—commercial refrigeration equipment intended for the rapid intermediate chilling or freezing of hot food products within a specified time period and holding the food at a safe temperature when not engaged in the chilling or freezing process.'' *Id.*

AHRI commented that alignment with ASTM, ASHRAE, or other established standards would also be acceptable. *Id.* AHRI further urged DOE to go through the standard review process and not attempt to address this through either an amendment to the DOE test procedure or development of a new standard. *Id.*

DOE considered available industry definitions when developing the proposals in the June 2022 NOPR, including the definitions in the draft version of ASHRAE 220. ASHRAE 220 has not published a public review draft and is still in draft form and DOE is not aware of any updates to the definitions considered in developing the proposal in the June 2022 NOPR. Therefore, DOE is adopting the definitions proposed in the June 2022 NOPR. DOE will consider any published standard when available during any future test procedure rulemakings.

b. Test Methods

In the June 2022 NOPR, DOE reviewed the ASHRAE 220 test method in development to determine the suitability of the test method for a DOE test procedure. The draft ASHRAE 220 test method determines the pull-down energy consumption per pound of food product, hot food product temperature pull-down performance, and other performance factors for self-contained commercial blast chillers and blast freezers that have a refrigerated volume of up to 500 ft^3. DOE acknowledges that the ASHRAE 220 test method has certain deviations from DOE's current CRE test procedures and ASHRAE 72–2022 with Errata.

DOE tentatively determined in the June 2022 NOPR that test procedures that account for the pull-down operation of blast chillers and blast freezers are appropriate. 87 FR 39164, 39193. The primary function of blast chillers and blast freezers is the rapid cooling of hot food product and minimal storage duration rather than long-term storage duration. DOE has considered the draft ASHRAE 220 standard as the basis for many of the test procedure proposals.

DOE has also reviewed the ISO 22042:2021 test standard. Many of the provisions in the ISO 22042:2021 method are similar to those included in the draft ASHRAE 220 (*e.g.,* ambient temperature, starting food load temperature, final blast freezer temperature). DOE tentatively determined in the June 2022 NOPR that the provisions in draft ASHRAE 220 provide a more representative basis for testing *(e.g.,* blast chiller target temperature of 38 °F rather than 50 °F) and would limit test variability as compared to ISO 22042:2021 (*e.g.,* using a well-defined food simulator test load rather than actual food and defining door openings for pan loading). 87 FR 39164, 39193. DOE also participated in ENERGY STAR's specification review process to establish version 5.0 Eligibility Criteria for commercial refrigerators and freezers. ENERGY STAR considered including blast chillers and blast freezers as part of the version 5.0 Eligibility Criteria,[23] but did not include them in the specification due to the lack of a standardized test procedure.

Consistent with the tentative scope of ASHRAE 220, DOE proposed in the June 2022 NOPR test procedures for self-contained commercial blast chillers and blast freezers that have a refrigerated volume of up to 500 ft^3. 87 FR 39164, 39193. DOE proposed to incorporate certain provisions from draft ASHRAE 220 and certain deviations, as discussed in the following sections. *Id.* DOE acknowledged that, to the extent feasible, ASHRAE 220 will likely harmonize with requirements included in ASHRAE 72–2018R. *Id.* For this reason, DOE proposed in the June 2022 NOPR to refer ASHRAE 72–2018R for certain test requirements rather than using the approach in the ongoing draft ASHRAE 220. *Id.* The intent of these proposals was to harmonize with the eventual ASHRAE 220 final test standard approach.

To avoid confusion regarding testing of other CRE, DOE also proposed in the June 2022 NOPR to establish the test procedure for blast chillers and blast freezers as a new appendix D to subpart C of 10 CFR part 431. 87 FR 39164,

[23] *See* the Version 5.0 Specification and Test Method Discussion Guide, December 2020, at *www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20Commercial%20Refrigerators%20and%20Freezers%20V5.0%20Discussion%20Guide_0.pdf.*

39193. DOE also proposed to refer to the proposed appendix D as the test procedure for blast chillers and blast freezers in 10 CFR 431.64. *Id.*

In the June 2022 NOPR, DOE sought comment on the proposal to establish test procedures for self-contained commercial blast chillers and blast freezers that have a refrigerated volume of up to 500 ft^3.

The Joint Commenters stated their support for establishing test procedures for blast chillers and freezers, noting that DOE had tentatively identified the capability to pull down hot food from 135 °F to 40 °F within 4 hours as the primary operating characteristic of blast chillers and blast freezers. (Joint Commenters, No. 31, p. 3)

NEEA stated its support for DOE's proposal to establish test procedures for new and newly defined categories of CRE, and restated its recommendation from the 2021 CRE TP RFI that DOE establish test methods for new CRE product types, including blast chillers and blast freezers. (NEEA, No. 39, p. 2)

Continental commented that it supports the NOPR proposal to add new test procedures for product categories such as blast chillers and blast freezers. (Continental, No. 29, p. 1) Continental noted, however, that attempting to develop test procedures that combine aspects of different existing industry standards and introduce significant modifications is not sufficient or appropriate for this type of rulemaking. *Id.* Continental recommended that DOE work with ASHRAE, AHRI, ASTM, and other stakeholders to develop suitable test procedures for any additional product categories so that new or modified industry standards are comprehensive, reliable, and repeatable for many equipment types, with minimal additional testing burden. *Id.*

The Joint Commenters stated that DOE proposed to add test procedures only for self-contained commercial blast chillers and freezers with a refrigerated volume of up to 500 ft^3, and that while the Joint Commenters understood that most of the blast chillers/freezers market consists of self-contained equipment, remote condensing blast chillers/freezers are available on the market; thus, the Joint Commenters encouraged DOE to consider establishing test procedures for remote condensing blast chillers/freezers as part of a future rulemaking. (Joint Commenters, No. 31, p. 3)

The CA IOUs also stated their support for DOE's decision to limit scope to self-contained blast chillers/freezers, which represents the vast majority of the market. (CA IOUs, No. 36, p. 6). In the August 2022 public meeting, the CA IOUs commented that ASHRAE 220 was developed for blast chillers up to 500 ft^3, but that self-contained blast chillers would be significantly smaller than that and most likely would have the volume to accommodate a single rolling rack. (Public Meeting Transcript, No. 41, p. 48)

Consistent with draft version of ASHRAE 220 and the June 2022 NOPR, DOE is establishing a test procedure for self-contained blast chillers and blast freezers only. In response to Continental's comment, DOE has harmonized the June 2022 NOPR and the test procedure established in this final rule with the expected industry test method to the extent possible. DOE will consider harmonizing with any available industry test method, including regarding expanded scope, in future test procedure rulemakings.

In the June 2022 NOPR, DOE sought comment on the proposal to incorporate certain provisions from the draft ASHRAE 220 and certain deviations for the blast chillers and blast freezers test procedures. 87 FR 39164, 39193.

The Joint Commenters commented that they support DOE's proposed changes regarding the proposed test methods for additional equipment categories, including blast chillers and freezers. (Joint Commenters, No. 31, p. 1)

The Joint Commenters added that they support the proposed test methods that are consistent with ASHRAE 220 and include pre-cooling the blast chiller's or blast freezer's cabinet to a pre-set or controlled operating temperature, loading of hot food pans into the blast chiller or blast freezer, and pull down of the hot food pans to the target temperature. (Joint Commenters, No. 31, p. 3) The Joint Commenters stated that this method captured energy usage during pull-down operation, as a representative method for estimating the energy usage of blast chillers/freezers. *Id.*

True commented that DOE should not reinvent the wheel by referencing NSF or ASHRAE for blast chiller and freezer cabinets for professional use. (True, No. 28, p. 7) True commented that the reference standard for blast chillers and blast freezers should be ISO 22042:2021 since these products were developed in Europe and are being evaluated for the EU EcoDirective energy labeling program. *Id.*

As discussed in the June 2022 NOPR, DOE has reviewed ISO 22042:2021. Many provisions are similar to those included in the draft version of ASHRAE 220 (*e.g.,* ambient temperature, starting food load temperature, final blast freezer temperature). However, DOE has determined that other provisions included in the draft ASHRAE 220 and proposed in the June 2022 NOPR are more representative of blast chiller and blast freezer operation (*e.g.,* blast chiller target temperature of 38 °F rather than 50 °F) and would limit test variability as compared to ISO 22042:2021 (*e.g.,* using a well-defined food simulator test load rather than actual food and defining door openings for pan loading). Therefore, DOE is establishing the test procedure for blast chillers and blast freezers based on the draft of ASHRAE 220, and as included in appendix D to subpart C of 10 CFR part 431.

Instruments

DOE reviewed the latest version of the draft ASHRAE 220 standard and compared it to ASHRAE 72–2022 with Errata, as shown in Table III.2, to determine appropriate instrument requirements for blast chiller and blast freezer testing.

TABLE III.2—INSTRUMENTATION REQUIREMENTS COMPARISON BETWEEN ASHRAE 220 AND ASHRAE 72–2022 WITH ERRATA

	ASHRAE 220	ASHRAE 72–2022 with errata
Calibration	Instruments shall be calibrated traceable to National Institute of Standards and Technology ("NIST") standards annually..	Measurements from the instruments shall be traceable to primary or secondary standards calibrated by NIST (or other rating standards). Instruments shall be recalibrated on regular intervals that do not exceed the intervals prescribed by the instrument manufacturer, and with an interval no longer than 1 year.

TABLE III.2—INSTRUMENTATION REQUIREMENTS COMPARISON BETWEEN ASHRAE 220 AND ASHRAE 72–2022 WITH ERRATA—Continued

	ASHRAE 220	ASHRAE 72–2022 with errata
Temperature	Accuracy of temperature measurements shall be within ±1.4 °F. Accuracy of temperature-difference measurements shall be within ±0.2 °F. Temperature measurements not specified shall be made per ANSI/ASHRAE Standard 41.1.2.	Required Accuracy: ±1.4 °F. Temperature measurement methods and instruments shall be applied and used in accordance with ASHRAE Standard 41.1–2020.
Time	Time measurements shall be made with an accuracy of ±0.5% of the time period being measured.	Required Accuracy: ±0.5% of time period measured.
Energy	Electrical energy measurements shall be made with instruments accurate to ±2% of the quantity measured..	Required Accuracy: must be measured with an integrating watt-hour meter with accuracy ±2.0% of the quantity measured and graduated to 0.01 kWh.
Electrical supply potential and supply frequency.	None specified	Required Accuracy: ±2.0% of the quantity measured.

Generally, ASHRAE 72–2022 with Errata has the same instrumentation requirements as draft ASHRAE 220. DOE acknowledges that ASHRAE 220 intends to harmonize with ASHRAE 72–2022 with Errata to the extent possible to maintain consistent test requirements across similar equipment types. Because ASHRAE 72–2022 with Errata provides greater detail on the instrumentation requirements, and DOE expects that the final ASHRAE 220 standard will likely adopt the ASHRAE 72–2022 with Errata requirements, DOE proposed in the June 2022 NOPR to reference section 4 and the relevant portions of appendix A of ASHRAE 72–2018R for blast chiller and blast freezer instrumentation requirements. ASHRAE 72–2022 with Errata provides additional requirements for instruments that are not necessary for testing blast chillers and blast freezers (*e.g.,* air velocity, radiant heat, dry-bulb temperature gradient, and test chamber illuminance). DOE proposed in the June 2022 NOPR to incorporate requirements only for instruments necessary to test blast chillers and blast freezers (*i.e.,* those listed in Table III.2).

In the June 2022 NOPR, DOE sought comment on the proposal to reference section 4 and the relevant portions of appendix A of ASHRAE 72–2018R for instrumentation requirements for the blast chiller and blast freezer test procedures. 87 FR 39164, 39194.

AHRI commented cautioning DOE against referencing the ASHRAE 220 standard with this test procedure, as it would create inconsistencies to reference ASHRAE 220 and ASHRAE 72–2022 simultaneously. (AHRI, No. 38, p. 9)

DOE is maintaining the approach proposed in the June 2022 NOPR, based on the draft version of ASHRAE 220. As ASHRAE 220 is not yet available, DOE is not incorporating that standard by reference. DOE is adopting the test procedure for blast chillers and blast freezers in appendix D and incorporating by reference the relevant sections of ASHRAE 72–2022 with Errata. DOE recognizes that certain additional requirements are pulled from other standards, but including multiple incorporations by reference as appropriate ensures consistent testing and clarifies where test requirements are harmonized across test procedures.

Test Conditions

Blast chillers and blast freezers are typically intended for use only in commercial kitchens, as compared to other categories of CRE, which are typically used in either commercial kitchens or in customer-facing environments.

ASHRAE 220 specifies different test conditions for testing blast chillers and blast freezers compared to the current DOE CRE test procedures, as illustrated in Table III.3.

TABLE III.3—AMBIENT TEMPERATURE AND HUMIDITY TEST CONDITIONS COMPARISON

	ASHRAE 220	DOE's current CRE test procedure
Dry Bulb	Measured at point T_A; Average: 86.0 °F ±1.8°F Individual: 86.0 °F ±3.6°F	Measured at point T_A for open CRE and T_B for closed CRE; Average: 75.2 °F ±1.8°F Individual: 75.2 °F ±3.6°F.
Humidity	No test condition specified	*Wet Bulb* measured at point T_A for open CRE and T_B for closed CRE; Average: 64.4 °F ±1.8 °F Individual: 64.4 °F ±3.6 °F

The dry bulb is required to be measured in ASHRAE 220 at the same point (TA) as specified in section 6.1 of ASHRAE 72–2022 with Errata. ASHRAE 220 does not specify the type of thermocouple to be used when taking dry-bulb measurements. ASHRAE 72–2022 with Errata specifies that the thermocouples used to measure dry-bulb temperatures shall be in thermal contact with the center of 1.6 oz. cylindrical brass slug with a diameter and height of 0.75 in. The brass slugs shall be placed at least 0.50 in. from any heat-conducting surface.

DOE tentatively determined in the June 2022 NOPR that the test conditions specified in ASHRAE 220 are more representative of actual blast chiller and blast freezer operation as compared to the existing CRE test procedure conditions. 87 FR 39164, 39194. As stated, blast chillers are typically only used in commercial kitchens, whereas other conventional CRE are used in a range of environments.

DOE recognizes that harmonizing test conditions across different CRE categories may provide users with measures of energy use that can be

compared on a consistent basis. However, given the particular application of blast chillers and blast freezers in rapidly lowering the temperature of hot food products, it is not expected that other CRE would serve as a substitute for blast chillers and blast freezers (and vice versa). Moreover, as indicated by a 2012 ASHRAE report,[24] the test conditions in the draft ASHRAE 220 are more representative for blast chillers and blast freezers than the test conditions applicable to CRE generally.

Because blast chillers and blast freezers experience different ambient conditions than other types of CRE, and because the proposed test procedures for blast chillers and blast freezers would use a different energy use and capacity metric, DOE proposed in the June 2022 NOPR to require the representative dry-bulb temperatures specified in the tentative ASHRAE 220 draft. 87 FR 39164, 39194. DOE also proposed in the June 2022 NOPR to incorporate section 6.1 and Figure 6 of ASHRAE 72–2018R to specify the point T_A where the dry-bulb temperatures are to be measured and to specify the dry-bulb thermocouple setup. *Id.*

In the June 2022 NOPR, DOE sought comment on the proposal to require the dry-bulb temperatures specified in the tentative ASHRAE 220 draft and incorporate section 6.1 and Figure 6 of ASHRAE 72–2018R to specify the point T_A where the dry-bulb temperatures are to be measured and the type of thermocouple to use when measuring dry bulb in the blast chillers and blast freezers test procedures. *Id.*

AHRI commented that it would be appropriate to measure dry-bulb temperatures in blast chiller and blast freezer test procedures using ASHRAE Standard 220 where necessary. (AHRI, No. 38, p. 10)

The CA IOUs stated their support for DOE's proposal to test blast chillers/freezers at an ambient temperature of 86 °F where other CRE categories are tested at 75 °F because blast chillers and freezers are typically only used in commercial kitchens, and as such, 86 °F is more representative than 75 °F for blast chiller/freezer operation. (CA IOUs, No. 36, p. 6)

DOE is maintaining the ambient test conditions of 86 °F based on the draft version of ASHRAE 220 and as supported in comments. DOE recognizes that this ambient condition is different from the condition used for testing other CRE categories, and that DOE has intended to harmonize conditions when possible to ensure consistent testing across CRE categories. However, the metrics for blast chiller and blast freezer testing are sufficiently different from other CRE testing (*i.e.,* kWh/day) that comparisons of energy use cannot be made across these CRE categories, so there is little benefit in harmonizing the ambient test conditions for blast chillers and blast freezers.

ASHRAE 220 specifies the same requirements for the power supply, voltage, and frequency as ASHRAE 72–2022 with Errata. Specifically, ASHRAE 220 specifies that the rated voltage be maintained at an average of ±2.0 percent over the duration of the test and individual recorded voltages be within ±4.0 percent of the rated voltage. ASHRAE 220 specifies that the rated frequency be maintained within ±1.0 percent. Because ASHRAE 72–2022 with Errata specifies the same requirements for voltage and frequency, DOE proposed in the June 2022 NOPR to incorporate the portions of appendix A in ASHRAE 72–2018R, which specify the requirements for voltage and frequency.

In the June 2022 NOPR, DOE sought comment on the proposal to incorporate the portions of appendix A in ASHRAE 72–2018R that specify the requirements for voltage and frequency in the blast chillers and blast freezers test procedures. 87 FR 39164, 39194.

AHRI recommended that the matter of adopting portions of ASHRAE 72–2018R concerning voltage and frequency requirements in blast chiller and blast freezer test procedures should be taken to the ASHRAE 220 committee for review and approval. (AHRI, No. 38, p. 10)

As stated in the June 2022 NOPR, the proposed conditions were consistent with those considered for the draft of ASHRAE 220. Therefore, DOE is maintaining the reference to ASHRAE 72–2022 with Errata, consistent with the June 2022 NOPR.

ASHRAE 72–2022 with Errata specifies additional test conditions that ASHRAE 220 does not specify. These include requirements for air currents, radiant heat, dry-bulb temperature gradient, and test chamber illuminance. DOE expects that these requirements in ASHRAE 72–2022 with Errata are primarily intended to limit variability of testing for CRE without doors or with transparent doors. DOE is only aware of blast chillers and blast freezers with solid doors, and therefore tentatively determined in the June 2022 NOPR that the additional test conditions in ASHRAE 72–2018R are not necessary for blast chiller and blast freezer testing, consistent with the draft of ASHRAE 220. 87 FR 39164, 39194, 39195.

In the June 2022 NOPR, DOE sought comment on whether any additional test conditions are appropriate for blast chiller and blast freezer testing, including those specified in sections 6.2 and 6.3 and appendix A in ASHRAE 72–2018R. 87 FR 39164, 39195.

DOE received no additional comments on this topic in response to the June 2022 NOPR, and therefore is establishing the test conditions as proposed.

Test Setup

The ASHRAE 220 draft specifies certain test unit setup instructions for components and accessories, electrical loads, condensate pan heaters and pumps, and crankcase heaters that are based on sections 5.3, 5.3.1, 5.3.5, and 5.3.15 in ASHRAE 72–2022 with Errata. DOE notes that sections 5.3 and 5.3.5 of ASHRAE 72–2022 with Errata contain minor differences from the draft ASHRAE 220. Section 5.3 of ASHRAE 72–2022 with Errata refers to installing all necessary components and accessories prior to loading the storage and display areas with test simulators and filler material, whereas ASHRAE 220 does not use test simulators and filler material. Section 5.3.5 of ASHRAE 72–2022 with Errata refers to a self-contained refrigerator instead of a blast chiller or blast freezer and does not specify that the condensate pan shall be emptied before testing (this instruction is provided in section 7.2.3 of ASRHAE 72–2022 with Errata) and that if a condensate heater is used during the test, it shall be recorded.

ASHRAE 220 specifies that the manufacturer's recommendation on clearances shall be followed on all sides with a minimum of 3 feet on the door(s) opening sides. The current DOE CRE test procedures do not specify any clearance requirements. Section 5.2 and appendix A of ASHRAE 72–2022 with Errata specify that there must be greater than or equal to 59.1 in. ±1.0 in. of clearance from the front of the unit under test and a vertical partition or wall shall be located at the minimum clearance, ±0.5 in., as specified in the installation instructions. Section 5.2 also provides that if the installation instructions do not provide a minimum clearance, the vertical partition or wall shall be located 4.0 ±0.5 in. from the sides or rear of the cabinet and extend at least 12.0 ±0.5 in. beyond each side of the cabinet from the floor to not less than 12.0 ±0.5 in. above the top of the cabinet.

DOE tentatively determined in the June 2022 NOPR that because ASHRAE

[24] ASHRAE RP–1469, ''Thermal Comfort in Commercial Kitchens,'' Final Report, January 6, 2012, page 24.

72–2018R provides similar, equal, or greater detail on the installation and settings, clearance, and components and accessories requirements as compared to the draft of ASHRAE 220, the ASHRAE 72–2018R instructions are appropriate for DOE testing. 87 FR 39164, 39195. DOE also acknowledges that, to the extent feasible, ASHRAE 220 intends to harmonize with ASHRAE 72–2022 with Errata requirements, and therefore will likely adopt similar instructions in the final version of the standard. DOE proposed in the June 2022 NOPR to incorporate sections 5.1, 5.2, 5.3 (including sub-sections 5.3.1 to 5.3.17), and the relevant portions of appendix A of ASHRAE 72–2018R for testing blast chillers and blast freezers with the following deviations:

- The term ''refrigerator'' shall instead refer to ''blast chiller'' or ''blast freezer,'' as applicable. 87 FR 39164, 39195.
- For section 5.3 of ASHRAE 72–2018R, replace ''all necessary components and accessories shall be installed prior to loading the storage and display areas with test simulators and filler material'' with ''all necessary components and accessories shall be installed prior to precooling the unit under test.'' *Id.*
- Section 5.3.5 would be included with the additional requirement that the condensate pan be emptied before precooling the unit under test. *Id.*

In the June 2022 NOPR, DOE sought comment on the proposal to incorporate sections 5.1, 5.2, 5.3 (including subsections 5.3.1 to 5.3.17), and the relevant portions of appendix A of ASHRAE 72–2018R, with the proposed deviations, for the blast chillers and blast freezers test procedures. *Id.*

AHRI commented that it recommended the matter of adopting portions of ASHRAE 72–2018R concerning blast chiller and blast freezer test procedures should be taken to the ASHRAE 220 committee for review and approval. (AHRI, No. 38, p. 10)

As stated, DOE expects that ASHRAE 220 will harmonize with the ASHRAE 72–2022 with Errata requirements for test setup when appropriate, and is adopting the ASHRE 72–2022 with Errata requirements, with deviations, as proposed in the June 2022 NOPR.

Appendix A of ASHRAE 72–2022 with Errata specifies electrical measurements at the equipment terminals. ASHRAE 220 specifies the following electrical measurement locations: at the plug-in location for units with a standard wall plug, or at the terminal box for units that are hard wired to the building electrical system. Because the electrical measurement location in appendix A of ASHRAE 72–2022 with Errata is similar to ASHRAE 220, DOE expects that the ASHRAE 72–2022 with Errata approach is the likely final approach to be used in the eventual final ASHRAE 220 standard. For that reason, DOE proposed in the June 2022 NOPR to incorporate the relevant portions of appendix A of ASHRAE 72–2018R for the electrical measurement locations. 87 FR 39164, 39195.

In the June 2022 NOPR, DOE sought comment on the proposal to incorporate the relevant portions of appendix A of ASHRAE 72–2018R for the electrical measurement locations for the blast chillers and blast freezers test procedures. *Id.*

AHRI commented that it recommended the matter of adopting portions of ASHRAE 72–2018R concerning electrical measurement locations in blast chiller and blast freezer test procedures should be taken to the ASHRAE 220 committee for review and approval. (AHRI, No. 38, p. 10)

As stated, DOE expects that ASHRAE 220 will harmonize with the ASHRAE 72–2022 with Errata requirements for electrical measurement locations, and is therefore adopting the ASHRE 72–2022 with Errata requirements, as proposed in the June 2022 NOPR.

Capacity and Loading

ASHRAE 220 provides instructions for measuring the gross refrigerated volume of blast chillers and blast freezers. The gross refrigerated volume is calculated by multiplying the internal length, width, and height of the cabinet excluding panels and space occupied by the evaporator or evaporator fan. Appendix C of AHRI 1200–2023 specifies instructions for determining the refrigerated volume of display merchandisers and storage cabinets. DOE reviewed the instructions in AHRI 1200–2023 for determining refrigerated volume and determined that the instructions can be applied to blast chillers and blast freezers because of the similar construction of these CRE. DOE proposed in the June 2022 NOPR to refer to AHRI 1200–202X for measuring the refrigerated volume of blast chillers and blast freezers. 87 FR 39164, 39195.

In the June 2022 NOPR, DOE sought comment on the proposal to reference AHRI 1200–202X for measuring the refrigerated volume of blast chillers and blast freezers. *Id.*

AHRI stated its support for the proposal to reference AHRI 1200–202X for measuring the refrigerated volume of blast chillers and freezers. (AHRI, No. 38, p. 10)

DOE is maintaining the measurement of volume per AHRI 1200–2023 consistent with the June 2022 NOPR.

ASHRAE 220 specifies that the standard product vessel shall be a 12 in. by 20 in. by 2.5 in. 22 gauge or heavier and 300 series stainless steel pan. ASHRAE 220 states that if the test unit is not capable of holding the standard product pan, the manufacturer's recommended pan size is used, conforming as closely as possible to the standard product load. Based on a review of blast chillers and blast freezers available on the market, DOE observed that all units are intended for use with food pans, and nearly all units available can accommodate the specified standard pan sizes. DOE tentatively determined in the June 2022 NOPR that the pans as specified in ASHRAE 220 are representative of typical use and DOE proposed to incorporate the standard product pan specifications included in the draft of ASHRAE 220. 87 FR 39164, 39195.

In the June 2022 NOPR, DOE sought comment on the proposal to incorporate the standard product pan specifications in ASHRAE 220 for the blast chillers and blast freezers test procedures. *Id.*

AHRI stated its support for the proposal to incorporate the standard product pan specification in ASHRAE 220 for the blast chillers and blast freezers test procedures. (AHRI, No. 38, p. 11)

DOE is maintaining the standard product pan specifications as proposed in the June 2022 NOPR.

ASHRAE 220 specifies that the manufacturer's recommended maximum 12 in. by 20 in. by 2.5 in. pan capacity should be used for testing. DOE has reviewed the ASHRAE 220 specifications and equipment available on the market. Based on DOE's review, it was determined in the NOPR that additional specifications may be needed to determine how many standard product pans are used in the test unit. 87 FR 39164, 39195. The number of standard product pans that would be used for testing is dependent on the specified product capacity of the test unit based on food weight. The ASHRAE 220 committee tentatively determined that having a uniform food simulator thickness across all standard product pans is important for repeatable and comparable results, manufacturer design parameters, and consistency with European blast chiller and blast freezer testing requirements.[25] The ASHRAE 220 committee tentatively concluded that a uniform food simulator thickness of 2 in. in the standard product pan (*i.e.,*

[25] *See* ISO 22042:2021.

filled to within 0.5 in. of the top of the pan) is appropriate. Based on this conclusion, the number of pans required for testing blast chillers and blast freezers would be determined by the number of standard product pans filled with the standard food simulator load to 2 in. deep that can fit in the blast chiller or blast freezer without exceeding the manufacturer's recommended capacity. Because this approach could potentially require the tested capacity to be smaller than the manufacturer's stated capacity, if the stated capacity is not evenly divisible by the number of pans, the ASHRAE 220 committee considered allowing for one additional pan that has a thickness less than 2 in., which would make up the difference to meet the manufacturer's rated capacity, but that this additional pan would not require temperature measurement. Based on the ASHRAE 220 committee approach, DOE proposed in the June 2022 NOPR that the number of pans required for testing blast chillers and blast freezers be determined by the number of standard product pans filled to 2 in. deep with food simulator product that can be loaded into the blast chiller or blast freezer without exceeding the manufacturer's stated food load capacity by weight, plus one additional standard product pan, if needed, to meet the manufacturer's stated food load capacity.

In the June 2022 NOPR, DOE sought comment on the proposed method to determine the number of pans required for testing blast chillers and blast freezers. 87 FR 39164, 39196.

AHRI recommended that the matter of using ASHRAE 72–2018R to determine the number of pans required for testing blast chillers and blast freezers should be taken to the ASHRAE 220 committee for review and approval. (AHRI, No. 38, p. 11)

DOE notes that ASHRAE 72–2022 with Errata is not used to determine the number of pans required for testing blast chillers and blast freezers. DOE is adopting the approach proposed in the June 2022 NOPR, which is consistent with the expected ASHRAE 220 approach.

ASHRAE 220 specifies that the tested product capacity is determined based on loading the test unit with the maximum number of pans with food product up to the manufacturer's recommended maximum food product weight capacity. The food product weight does not include the weight of the pans.

The ASHRAE 220 committee determined that blast chiller and blast freezer capacity based on food product weight is relevant in addition to refrigerated volume because the throughput of food product by weight is the primary function provided to users, as compared to long-term refrigerated storage volume for typical CRE. Blast chillers and blast freezers with the same volume may have different pull-down capacities by weight depending on the design of the cooling system.

DOE expects that manufacturers specify capacity by food weight based on the maximum food load that can be loaded into the blast chiller or blast freezer while meeting the performance requirement of NSF 7–2019. DOE reviewed the ASHRAE 220 specifications and equipment available on the market and tentatively determined in the June 2022 NOPR that additional specifications may be needed to determine the product capacity used during the test. DOE proposed in the June 2022 NOPR that when determining the product capacity, all manufacturer literature that is included with the unit would be reviewed, and the largest product capacity stated in the literature would be used. 87 FR 39164, 39196. If the unit is able to operate as both a blast chiller and a blast freezer in different operating modes and the literature specifies different product capacities for blast chilling and blast freezing, the largest capacity stated for the respective operating mode during the test would be used.

If no product capacity is stated in the manufacturer literature, DOE proposed in the June 2022 NOPR that the product capacity be represented by the maximum number of standard pans that can fit in the test unit with each pan filled 2 in. deep with product, consistent with the ASHRAE 220 approach, with capacity determined as the sum of the food weights within the individual pans loaded for testing. 87 FR 39164, 39196. As discussed further in a subsequent section, DOE proposed use of a food simulator. *Id.* The tested capacity would not include the weight of the pans, temperature sensors, or wires. If, upon testing, a blast chiller or blast freezer with no stated product capacity is not capable of pulling down temperatures from 135 °F to 40 °F within a period of 4 hours with the load specified in the proposed test procedure, DOE proposed in the June 2022 NOPR that one pan be removed until the unit achieves the specified pull-down operation. 87 FR 39164, 39196.

To ensure repeatability of testing, DOE proposed in the June 2022 NOPR that the tested capacity (determined as the sum of the food weights for individual pans loaded for testing) be within ±5 percent or ±2 lb of the rated capacity, whichever is less. 87 FR 39164, 39196. DOE acknowledged that the actual weight of food simulator may be slightly different in each pan because each pan may not be loaded with food simulator to the exact same specified thickness. Specifying a tolerance on the overall tested capacity would ensure that the total food load by weight is consistent from test to test.

In the June 2022 NOPR, DOE sought comment on the proposal to determine the tested product capacity for the blast chillers and blast freezers test procedures. 87 FR 39164, 39196.

AHRI recommended that any proposed changes be brought to the ASHRAE 220 committee for review and approval. (AHRI, No. 38, p. 11)

As stated, a final version of ASHRAE 220 has not been published. DOE has harmonized with the expected ASHRAE 220 requirements to the extent feasible. Therefore, DOE has adopted the provisions as proposed in the June 2022 NOPR regarding determining blast chiller and blast freezer capacity.

ASHRAE 220 specifies where to place the standard product pans in the blast chiller or blast freezer if a full load of pans is not needed to meet the manufacturer's stated capacity. ASHRAE 220 specifies that if there are fewer pans than there are rack spaces in the unit, the pans shall be placed evenly in the unit with top and bottom shelves occupied. If not all shelves are occupied by pans, the pan locations shall be recorded. The ASHRAE 220 committee has also discussed specifying that pans would be loaded without pans nesting on each other and without touching the top and the bottom of the cabinet.

DOE reviewed the ASHRAE 220 specifications and equipment available on the market. Based on DOE's review, DOE tentatively determined that additional specifications may be needed to determine where to place the standard product pans. DOE proposed in the June 2022 NOPR that once the number of standard product pans needed for the test has been determined, the pans should be spaced evenly throughout each vertical column of rack positions in the test unit without the pans touching any other pans and without the pans touching the top and the bottom of the cabinet. 87 FR 39164, 39196. For test units that have an additional pan with a product thickness of less than 2 in., DOE proposed in the June 2022 NOPR to require placing the additional pan as close to the middle rack position as possible while maintaining an even distribution of all pans. *Id.* DOE also proposed in the June 2022 NOPR that if not all rack positions are occupied by pans, the pan locations shall be recorded. *Id.*

In the June 2022 NOPR, DOE sought comment on the proposed method for distributing the pans within the test unit's cabinet for testing blast chillers and blast freezers. *Id.*

AHRI commented advising DOE to reference ASTM 26 testing standards as a method for distributing pans within the test unit's cabinet. (AHRI, No. 38, p. 11)

DOE expects that the requirements in the ASTM standard will be harmonized with those in the ASHRAE 220 standard. DOE understands that the ASTM standard is intended to assess blast chiller and blast freezer operating performance whereas the ASHRAE 220 standard is intended to measure energy consumption. Therefore, DOE has determined that ASHRAE 220 is the appropriate basis for the DOE test procedure.

ASHRAE 220 specifies that if multiple pans are used per level (*i.e.,* pans can be loaded side-by-side at the same level), only one pan needs to be measured with product temperature sensors per level. ASHRAE 220 provides a figure illustrating an example for test units with multiple pans per level, indicating which pans would include thermocouples. In the figure, each level includes two side-by-side pans, and the thermocouple location is staggered such that it alternates between the left and right pan at each level, and such that each vertical column does not have two measured pans in sequential levels.

DOE reviewed the draft ASHRAE 220 pan loading approach and tentatively determined in the June 2022 NOPR that it provides a representative measure of food load temperature within the blast chiller or blast freezer while limiting test burden. 87 FR 39164, 39197. DOE acknowledged that food temperatures within the cabinet may vary depending on proximity to the evaporator or airflow pathway through the cabinet but expects that measuring one pan per level and staggering the measured pans would ensure a representative food temperature average would be measured during testing. *Id.* DOE also determined that this approach would limit test burden by avoiding the need for every pan to include a thermocouple, thereby avoiding the setup of the thermocouple within the pan and the routing of additional thermocouple wires from inside the cabinet. *Id.*

Based on the review of ASHRAE 220, DOE proposed in the June 2022 NOPR to incorporate the ASHRAE 220 approach with additional instructions. *Id.* DOE proposed that if multiple standard product pans are used per level, only one pan per level be measured with a temperature sensor. *Id.* DOE proposed to specify that the pan measured should alternate vertical columns so that each vertical column does not have two measured pans in sequential levels and that if a test unit uses an additional pan that has a thickness less than 2 in., this additional pan would not be measured for product temperature. *Id.*

In the June 2022 NOPR, DOE sought comment on the proposed method to determine which standard product pans would include temperature measurement sensors for the blast chillers and blast freezers test procedures. *Id.*

AHRI commented that the ASHRAE 220 committee is in the process of adding a requirement to determine which standard product pans would include temperature measurement sensors for blast chillers and blast freezers test procedures; consequently, AHRI added, for DOE to create a similar requirement would be redundant and unnecessary. (AHRI, No. 38, p. 11)

As stated, ASHRAE 220 has not had a public review period and is still in draft form. DOE developed the proposal in the June 2022 NOPR to be consistent with the ASHRAE 220 approach, with additional specificity where needed. Therefore, DOE is adopting the provisions as proposed in the June 2022 NOPR regarding pan temperature measurements.

ASHRAE 220 specifies measuring the product temperature in the geometric center of any measured pans and provides an example figure illustrating the temperature sensor location in a measured pan and, in particular, showing the unweighted thermocouple as being placed 5⁄8 in. above the bottom of the pan. ASHRAE 220 provides that temperature sensor leads must allow for the transfer of pans from the heating compartment to the test unit cabinet.

In the June 2022 NOPR, DOE proposed to incorporate this approach with additional instruction to specify explicitly details that are shown visually in the example figure in ASHRAE 220. 87 FR 39164, 39197. DOE proposed that product temperature shall be measured in the geometric center of the product pan, 5⁄8 in. above the bottom of the pan, that the temperature sensor shall be unweighted, and that the temperature sensor leads shall be secured to the bottom of the pan while also allowing for the transfer of the pan from the heating source into the test unit's cabinet. *Id.*

In the June 2022 NOPR, DOE sought comment on the proposed method of measuring the product temperature in the measured pans for the blast chillers and blast freezers test procedures. *Id.*

AHRI commented recommending that any proposed changes to measurement of the product temperature in the measured pans for the blast chillers and blast freezers test procedures be taken to the ASHRAE 220 committee for review and approval. (AHRI, No. 38, p. 11)

As stated, DOE developed the proposal in the June 2022 NOPR to be consistent with the ASHRAE 220 approach, with additional specificity where needed. A public review draft of ASHRAE 220 has not yet been published; therefore, DOE is adopting the provisions as proposed in the June 2022 NOPR regarding temperature measurements within individual pans.

ASHRAE 220 specifies instructions to prepare the product medium mixture to be placed in the standard product pans as follows:

(a) Determine the manufacturer's recommended maximum food product weight capacity.

(b) Prepare a 20-percent-by-volume propylene glycol (1,2-Propanediol) mixture in water.

(c) In each pan, pour the propylene glycol mixture over #20 mesh southern yellow pine sawdust to create a 22-percent-to-78-percent-by-mass slurry. Mixture must be pre-portioned for each individual pan to avoid large batch component separation.

(d) Mix until the sawdust becomes completely saturated and leave uncovered in the pan. The weight of the mixture shall correspond with the determined weight. Record the weight of each pan, weight of the mixture, and number of pans to be loaded. Weight of the thermocouples shall be omitted.

Note: Acceptable Sawdust Specification Example: American Wood Fibers brand, #20 Mesh Pine Sawdust (50 lb bags), Item # 30020205018.

(e) Verify that the pan thermocouple is fully submerged in the mixture, reposition the thermocouple in the geometric center of the mixture if it is not.

The ASHRAE 220 committee developed the food simulator specifications based on the food load specified in NSF 7–2019 for rapid pull-down refrigerators and freezers. Because this test load is already in use for this equipment, and because its heat transfer characteristics are similar to actual food loads, DOE tentatively determined in the June 2022 NOPR that the food simulator load specified in the ASHRAE 220 draft is representative for testing blast chillers and blast freezers. 87 FR 39164, 39197.

In the June 2022 NOPR, DOE proposed to incorporate the ASHRAE 220 approach with additional

specifications to ensure repeatability. *Id.* As stated, each pan would be loaded to 2 in. of food load thickness (*i.e.,* depth) within the pan and an additional pan would be loaded as needed to meet the manufacturer's stated capacity. *Id.* DOE proposed that each pan shall be weighed prior to heating, before and after the food product simulator is added. *Id.* A cumulative total of the product weight shall be calculated and the pans shall continue to be loaded with the product mixture until the cumulative total reaches the manufacturer's stated capacity (the total product weight shall be within ±5 percent or ±2 lbs of the manufacturer's stated capacity, whichever is less). *Id.*

In the June 2022 NOPR, DOE sought comment on the proposed method for preparing the product medium mixture to be placed in the standard product pans for the blast chillers and blast freezers test procedures. *Id.*

AHRI commented recommending that any proposed changes to the method for preparing the product medium mixture to be placed in the standard product pans for the blast chillers and blast freezers test procedures be taken to the ASHRAE 220 committee for review and approval. (AHRI, No. 38, p. 11)

As stated, DOE developed the proposal in the June 2022 NOPR to be consistent with the ASHRAE 220 approach, with additional specificity where needed. A public review draft of ASHRAE 220 has not yet been published; therefore, DOE is adopting the provisions as proposed in the June 2022 NOPR regarding test medium preparation.

Test Conduct

The overall test approach in the ASHRAE 220 draft includes pre-cooling the blast chiller's or blast freezer's cabinet to a pre-set or controlled operating temperature, loading of hot food pans into the blast chiller or blast freezer, and pull down of the hot food pans to the target temperature. The ASHRAE 220 committee also considered including an operating period in which the blast chiller or blast freezer would maintain the food load at the target temperature (*i.e.,* a ''holding period''). However the ASHRAE 220 committee determined that the primary function of the blast chiller or blast freezer is to pull down hot food temperatures and that the prioritization of throughput through the blast chiller or blast freezer would result in less operation in holding periods. DOE tentatively determined in the June 2022 NOPR that the ASHRAE 220 approach is appropriate for blast chiller and blast freezer testing and proposed in the June 2022 NOPR to only include pre-cooling and pull-down operation within the test. 87 FR 39164, 39197.

In the June 2022 NOPR, DOE sought comment on the proposal to include pre-cooling and pull-down operation in the blast chiller and blast freezer test procedure and to not include any holding periods during testing. *Id.*

The CA IOUs recommended that the blast chiller and blast freezer test procedure include equipment pre-cool energy as well as a triplicate testing to ensure repeatability. (CA IOUs, No. 36, p. 5) The CA IOUs noted that different blast chiller and blast freezer models may pre-cool to different cabinet and evaporator temperatures prior to the start of the test, affecting blast cooling energy consumption. *Id.* The CA IOUs stated support for DOE's proposal to record pre-cool energy along with pull-down energy and requested that DOE require reporting of the recorded pre-cool energy. *Id.* The CA IOUs also stated support for DOE's proposal to exclude ''holding energy'' needed to maintain the food load at a target temperature after completion of the blast chilling cycle. *Id.* The CA IOUs further recommended normalizing energy usage by initial measured weight of the product to be cooled down (excluding pan weight) instead of by blast chiller and blast freezer volume or the manufacturer's rating and suggested reporting blast chiller and blast freezer energy by either kWh/cycle/lb or kWh/day/lb. *Id.*

See the following Calculations subsection for discussion regarding triplicate testing. DOE is not adopting reporting requirements as part of this final rule, but is requiring that both pre-cool and blast chilling or blast freezing cycle energy be recorded during testing. DOE is not requiring any measurement of holding energy. As recommended by the CA IOUs and proposed in the June 2022 NOPR, DOE is adopting a calculation of energy consumption normalized by the total weight of product loaded into the blast chiller or blast freezer for testing.

ASHRAE 220 specifies that all measurements shall be continuously recorded during the test in intervals no greater than 10 seconds. The current DOE CRE test procedures require that measurement intervals do not exceed 3 minutes and ASHRAE 72–2022 with Errata requires certain measurements at 1-minute intervals. Because the blast chiller and blast freezer test procedure is not conducted at stable cabinet temperature conditions, as is the case for other CRE testing, DOE tentatively determined in the June 2022 NOPR that a shorter measurement interval is appropriate to accurately identify unit performance (*e.g.,* determining when all pans reach the target temperatures). 87 FR 39164, 39198. Therefore, in the June 2022 NOPR, DOE proposed to incorporate the ASHRAE 220 approach requiring data acquisition at 10-second intervals. *Id.*

ASHRAE 220 specifies that data would be recorded once a steady-state condition is established. ASHRAE 220 specifies that the test unit stabilize at ambient temperatures for at least 24 hours before pre-cooling and that the prepared product be heated for a minimum of 8 hours in the standard product pans at the required temperature prior to loading into the blast chiller or blast freezer. Consistent with these requirements, DOE proposed in the June 2022 NOPR that the test unit stabilize at ambient temperatures for at least 24 hours, and then data acquisition would be recorded prior to the pre-cool period. 87 FR 39164, 39198. For the prepared product in the standard product pans, DOE proposed that data acquisition begin prior to the minimum 8-hour heating period. *Id.*

ASHRAE 220 specifies a procedure for pre-cooling the test unit from ambient conditions prior to pull-down operation. The test unit is to remain in the required ambient conditions for at least 24 hours before pre-cooling. The test unit's pre-cooling cycle is used, if available. For test units with more than one pre-cool cycle, the cycle used is recorded. For units without a pre-cooling cycle, an empty blast cycle should be run in its entirety. During the pre-cool cycle, the test unit's sensing probe will remain in its default or holstered position. Pre-cool is deemed complete when the test unit's pre-cool notification reports. If the test unit does not have a pre-cool cycle or pre-cool completion notification, the pre-cool is deemed complete when the compressor first cycles off. The pre-cool data to be recorded is the selected cycle name, pre-cool duration, temperature, and energy consumed.

Because the main function of a blast chiller or blast freezer is to pull down the product temperature of hot food, DOE tentatively determined in the June 2022 NOPR that measuring performance during the pre-cool period is not necessary, other than to determine when pre-cooling is complete. 87 FR 39164, 39198. However, because pull-down testing is initiated after the completion of pre-cooling, operation during pre-cooling may impact pull-down performance. Based on DOE's review of ASHRAE 220, additional specifications regarding pre-cooling may be needed.

DOE proposed in the June 2022 NOPR that the pre-cool cycle may be initiated on blast chillers and blast freezers once the test unit has been maintained at ambient temperatures without operating for at least 24 hours. 87 FR 39164, 39198. Rather than selecting and recording any pre-cooling cycle, DOE proposed in the June 2022 NOPR that the fastest pre-cooling cycle be selected. DOE proposed to specify that the pre-cool cycle is complete when the test unit notifies the user that the pre-cool is complete, consistent with ASHRAE 220, but that if the test unit does not notify the user that the pre-cool cycle is complete, the pre-cool will be deemed complete when the test unit reaches 40 °F or 2 °F based on the test unit's sensing probe for blast chillers and blast freezers, respectively. DOE tentatively determined in the June 2022 NOPR that this approach would ensure a consistent starting point for pull-down testing from unit to unit rather than the first compressor off cycle. 87 FR 39164, 39198.

For test units without any defined pre-cooling cycles, DOE proposed in the June 2022 NOPR that the fastest blast chilling or blast freezing cycle shall be run with an empty cabinet until the test unit reaches 40 °F ±2 °F based on the test unit's sensing probe. Consistent with ASHRAE 220, during the pre-cool cycle, the test unit's sensing probe will remain in its default or holstered position. The pre-cool test data to be recorded are the ambient conditions, pre-cool cycle selected, pre-cool duration, and final pre-cool cabinet temperature based on the test unit's sensing probe.

As stated, DOE proposed in the June 2022 NOPR that test procedures for blast chillers and blast freezers are to measure the energy consumed by the product temperature pull-down operation. 87 FR 39164, 39198. Additionally, blast chillers and blast freezers may run multiple pull-down cycles consecutively without the need for individual pre-cooling cycles. However, DOE acknowledges that the energy consumed during the pre-cool period may be relevant to the overall energy consumption of blast chillers and blast freezers and requests comment on whether pre-cooling energy use should be measured and considered in the overall energy consumption metric for blast chillers and blast freezers.

ASHRAE 220 specifies instructions for loading the prepared standard product pans into the test unit. Measured standard product pans are maintained at an average temperature of 160.0 °F ±1.8 °F and an individual pan temperature tolerance of 160 °F ±10 °F for a minimum of 8 hours prior to being loaded into the test unit. Non-measured pans are also required to be heated for a minimum of 8 hours. The test unit door is opened for loading at 4.0 ±1.0 minutes after the test unit completes its pre-cool cycle. ASHRAE 220 specifies that the door remain open to load all of the standard product pans for the entirety of the loading procedure. ASHRAE 220 further specifies that the door is open for 20 seconds per roll-in rack and 15 seconds per pan for roll-in and standard test units, respectively. The test unit's sensing probe is inserted into the geometric center of a standard product pan in the center level of the cabinet. If the center level has capacity for multiple pans, the probed pan should be furthest away from the evaporator. The probe must not touch the bottom of the pan or be exposed to the air. The location of the pan with the probe is recorded. The factory probe is placed so that it does not interfere with the test thermocouple measurement. The door remains closed for the remainder of the test.

DOE proposed in the June 2022 NOPR to adopt ASHRAE 220's approach with additional specifications and certain deviations to ensure consistent testing. 87 FR 39164, 39198. DOE proposed that while maintaining the temperature of the measured standard product pans prior to loading into the blast chiller or blast freezer, the non-measured standard product pans shall be placed in alternating positions with the measured standard product pans in the heating device for a minimum of 8 hours prior to being loaded into the test unit to ensure consistent product temperatures. *Id.* The test unit door would be opened for loading at the specified time in ASHRAE 220, but DOE proposed to specify more precise values (*i.e.,* 4.0 ±1.0 minutes). *Id.* DOE proposed in the June 2022 NOPR that the total door-open period for loading pans would have a tolerance of ±5 seconds to account for different test lab operation. *Id.* DOE proposed in the June 2022 NOPR that the door would be fully open, based on the definition of ''fully open'' in ASHRAE 72–2018R, for the duration specified in ASHRAE 220, to ensure test repeatability. 87 FR 39164, 39199. DOE proposed in the June 2022 NOPR that the test unit's sensing probe would be inserted into the geometric center of the standard product pan approximately 1-in. deep in the product mixture at the median pan level in the test unit, which adds greater specificity for test repeatability. *Id.* If the standard product pan at the median level is the additional pan with less than 2 in. of product thickness, DOE proposed in the June 2022 NOPR to specify that the closest pan or pan level that is farthest away from the evaporator fan would be used to insert the test unit's sensing probe, consistent with the ASHRAE 220 approach. *Id.* DOE proposed in the June 2022 NOPR to add that the product temperature sensor wiring not affect energy performance, consistent with section 5.4.9 of ASHRAE 72–2018R. *Id.*

ASHRAE 220 specifies instructions to operate the blast chilling or blast freezing cycle. A blast chilling or blast freezing cycle is selected for blast chilling and blast freezing tests, respectively. ASHRAE 220 specifies that the cycle selected should provide the most rapid product cool down designed for the densest food product as stated in manufacturer literature. ASHRAE 220 provides that a manufacturer may provide additional clarification on cycle selection. ASHRAE 220 specifies that the selected cycle name and settings are recorded.

ASHRAE 220 further specifies the following: Temperature and energy measurement starts once the first pan is loaded in the unit; the selected cycle continues until all individual measured pan temperatures are below the final temperatures of 40 °F and 2 °F for blast chilling and blast freezing tests, respectively; if the selected cycle program terminates prior to all product temperatures reaching below the test's prescribed final temperature, the standard product pans remain in the unit until it does so; if the temperature does not reach below the test's prescribed temperature after two additional hours, unit temperature settings are adjusted to achieve the desired final temperature; temperature and energy measurements end once the door is opened to remove the standard product pans; and energy consumption, temperature, and time is reported starting with the first pan loaded in the unit and ending with the final pan reaching the prescribed final temperature.

Based on DOE's review of ASHRAE 220, DOE determined in the June 2022 NOPR that additional specifications and certain deviations may be needed to improve test repeatability and reproducibility. 87 FR 39164, 39199. Consistent with the integrated average temperature requirements from the current DOE CRE test procedures, DOE proposed that a blast chilling cycle with a target temperature of 38 °F and a blast freezing cycle with a target temperature of 0 °F be selected for blast chilling and blast freezing tests, respectively. *Id.* Consistent with ASHRAE 220, the cycle selected would be the cycle with the most rapid product temperature pull

down that is designed for the densest food product, as stated in the test unit's manufacturer literature. Ambient conditions and time measurements would be recorded from the pre-cool cycle. Product temperature measurements from the measured standard product pans would be recorded from the 8-hour period of heating prior to being loaded into the test unit to ensure that pull-down performance data is recorded. Voltage, frequency, and energy consumed would start to be recorded as soon as the test unit door is opened to load the standard product pans so that blast chiller and blast freezer tests are started at a consistent point across all tests. Once the test unit door is closed, the blast chilling or blast freezing cycle would be selected and initiated as soon as is practicable. The blast chilling or blast freezing cycle selected would be recorded. The blast chilling or blast freezing test period would continue from the door opening until all individual measured pan temperatures are at or below 40.0 °F or 2.0 °F for blast chiller and blast freezer tests, respectively, regardless of whether the selected cycle program has terminated. If all individual measured pan temperatures do not reach 40.0 °F or 2.0 °F for blast chiller and blast freezer tests, respectively, 2 hours after the selected cycle program has terminated, the test would be repeated and the target temperature would be lowered by 1.0 °F until all individual measured pan temperatures are at or below 40.0 °F or 2.0 °F for blast chiller and blast freezer tests, respectively, at the conclusion of the test. The duration of the blast chiller or blast freezer test would be recorded.

In the June 2022 NOPR, DOE sought comment on the proposed method to conduct the blast chilling or blast freezing test, including data recording rates, data collection periods, pre-cooling cycles, product loading, and selecting and running the test cycle. 87 FR 39164, 39198–39199.

AHRI commented that the method to conduct testing for blast chillers and blast freezers is reflected in ASTM 26 testing standards and advised DOE to reference this standard. Specifically, AHRI recommended referencing ASTM 26 for data recording rates, data collection periods, pre-cooling cycles, pan loading, and test conduct. (AHRI, No. 38, p. 12)

The CA IOUs suggested that in the case where the blast chiller/freezer cannot pull down the initial load to the specified temperature, the unit should be retested with one less pan instead of the NOPR's proposal to retest with the temperature lowered by 1 °F, because requiring a retest with a lower temperature setpoint may not be feasible for some equipment and will likely result in excessive test burden. (CA IOUs, No. 36, p. 5)

As discussed in the previous sub-section, DOE expects that the requirements in the ASTM 26 standard will be harmonized with those in the ASHRAE 220 standard. Because the ASHRAE 220 standard is intended for measuring blast chiller and blast freezer energy use, DOE has determined that ASHRAE 220 is the appropriate basis for the DOE test procedure and is maintaining the test conduct provisions as proposed in the June 2022 NOPR.

DOE recognizes that the approach of lowering the set point temperature if the final temperatures are not met may require multiple test runs, but DOE expects that end users will operate the blast chiller fully loaded and would adjust temperature to meet their needs. DOE maintains the proposed approach in the June 2022 NOPR of decreasing the temperature setting if all individual pan temperatures do not reach the specified temperatures. DOE is not adopting the provision of removing test pans until the unit can achieve temperatures except for units that have no specified product capacity (in weight). The definition of blast chiller is based on the unit pulling down product temperature within the specified time. If a unit is not capable of that operation at the specified loading, it would not meet the definition of blast chiller or blast freezer.

Calculations

ASHRAE 220 specifies calculations used to report the energy consumed during the test. The measured energy consumption is divided by the test product capacity in pounds, averaged for three repeated tests. DOE proposed in the June 2022 NOPR to incorporate the ASHRAE 220 approach (and to specify that the measured energy consumption is reported in kilowatt-hours) except that only one test would be needed in order to limit test burden. 87 FR 39164, 39199. ASHRAE test standards do not generally provide requirements for multiple tests, as sampling plans are typically established by the rating programs that reference the ASHRAE test standard. However, DOE already provides sampling plans for the determination of CRE represented energy or efficiency values at 10 CFR 429.42(a). Accordingly, DOE determined that the three tests considered for the ASHRAE 220 standard are not necessary for representations, and DOE is not planning to incorporate ASHRAE's method of averaging over three tests. 87 FR 39164, 39199.

In the June 2022 NOPR, DOE sought comment on the proposed method for calculating the reported energy use metric for blast chillers and blast freezers. *Id.*

The CA IOUs commented that they were concerned with the proposal in the NOPR to use ASHRAE 220 with a single test for blast chillers/freezers instead of the three repeated tests specified by ASHRAE 220, stating that the need for accuracy outweighs DOE's goal of limiting test burden. (CA IOUs, No. 36, p. 5) The CA IOUs commented that the blast chiller/freezer test method is complex and there is room for user or test product consistency error. *Id.* The CA IOUs requested that DOE share further data illustrating the reduction in accuracy of energy consumption and product weight calculation of using a single test compared with triplicate tests. *Id.*

DOE recognizes the need for accurate and repeatable results. However, DOE's test procedures themselves typically do not include repeat runs; DOE addresses the need for a data sample in making representations of energy use or energy efficiency by establishing sampling plans in 10 CFR part 429. DOE is adopting the requirement as proposed in the June 2022 NOPR that the test only be conducted once. For any representations, manufacturers would be required to apply the sampling provisions in 10 CFR 429.42, which require multiple test units.

For these reasons, DOE is maintaining the approach as proposed in the June 2022 NOPR, which includes a single calculation of measured energy use divided by test product capacity in pounds.

4. Chef Bases and Griddle Stands

DOE defines ''chef base or griddle stand'' as CRE that is designed and marketed for the express purpose of having a griddle or other cooking appliance placed on top of it that is capable of reaching temperatures hot enough to cook food. 10 CFR 431.62.

As discussed in the April 2014 Final Rule, the explicit categorization of griddle stands covers equipment that experiences temperatures exceeding 200 °F. 79 FR 22277, 22282. As explained, this was to distinguish between equipment that experiences cooking temperatures and equipment that experiences temperatures at which food is kept warm. *Id.* However, DOE notes that the current definition for chef bases and griddle stands does not specify a quantitative temperature and

instead states ''hot enough to cook food.''

DOE stated in the April 2014 Final Rule that chef bases and griddle stands are able to be tested according to the DOE test procedure, but that their refrigeration systems require larger compressors to provide more cooling capacity per storage volume than equipment with compressors that are appropriately sized for conventional CRE and more typical room temperature conditions. 79 FR 22277, 22281–22282. However, the definition does not include specifications for the refrigeration systems to differentiate this equipment from typical CRE.

ENERGY STAR has published a Final Draft Version 5.0 Eligibility Criteria for the ENERGY STAR program for commercial refrigerators and freezers.[26] This final draft specification includes a definition for ''chef base or griddle stand'' consistent with DOE's current definition and would require testing according to the existing DOE test procedure in place for CRE.

DOE has considered whether additional detail regarding the characteristics of chef bases or griddle stands would better differentiate it from other CRE. As discussed, chef bases or griddle stands are designed for use with cooking equipment placed on top of the unit. Typical chef bases or griddle stands may include oversized refrigeration systems and additional cabinet insulation to ensure the unit can maintain cold storage temperatures with the additional heat load from the cooking equipment. However, these characteristics may not be readily identifiable in a given chef base or griddle stand. For example, manufacturers may not offer CRE in a different CRE equipment class with similar designs to any chef base or griddle stand, in which case there would not be a point of comparison available to determine whether the chef base or griddle stand includes more insulation or an oversized refrigeration system.

While ENERGY STAR's Final Draft Version 5.0 Eligibility Criteria includes a definition of ''chef base or griddle stand'' consistent with DOE's definition, it also includes definitions for similar equipment types (*i.e.,* worktop and undercounter [27] CRE). Both of these definitions include a minimum height requirement of 32 in. Chef bases or griddle stands have similar construction to worktop and undercounter equipment but are typically shorter to allow for installing cooking equipment above the refrigerated cabinet at a normal working height. Consistent with the ENERGY STAR definitions for worktop and undercounter, DOE proposed in the June 2022 NOPR to amend the definition for chef base or griddle stand to specify that the equipment has a maximum height of 32 in., including any legs or casters. 87 FR 39164, 39201.

In the June 2022 NOPR, DOE requested comment on the proposed amendment to the definition for a chef base or griddle stand, which specifies a maximum height of 32 in. for this equipment. DOE requested information on any other identifiable equipment characteristics that may differentiate chef bases and griddle stands from other similar CRE. *Id.*

Hoshizaki commented agreeing with the proposal to add a maximum height of 32 in. for chef bases or griddle stands. (Hoshizaki, No. 30, p. 5)

AHRI commenting stating that it has no objection to the proposed height characteristic and recommended that DOE examine ENERGY STAR Version 5.0 for griddle stands. (AHRI, No. 38, p. 12) AHRI commented that in light of ENERGY STAR's target where ~20 percent of the market is listed with ENERGY STAR, DOE should examine having a higher kWh allowance than ENERGY STAR, taking into consideration mandatory versus optional compliance. *Id.*

Hillphoenix stated agreement with the proposed definition for chef bases and griddle stands, but found it unclear why the 32-in. limit would be added. (Hillphoenix, No. 35, p. 6) Hillphoenix recommended clearly defining these products to not include CRE or hybrid CRE in which a food warmer or such can be placed on a section of the CRE unit. *Id.*

Continental commented a belief that DOE's current definition of ''chef bases or griddle stands'' was sufficient, and the proposed additional specification of equipment having a maximum height of 32 in., including any legs or casters, is unnecessary and could cause confusion as some specialized, low-profile, undercounter models of CRE are available with an overall height less than 32 in., but they are not designed or intended to be used with cooking equipment on the top. (Continental, No. 29, p. 8) Continental disagreed with DOE's statement that chef bases or griddle stands have similar construction to worktop and undercounter equipment, but are typically shorter to allow for installing cooking equipment above the refrigerated cabinet at a normal working height. *Id.* Continental pointed out that commenters noted, and DOE acknowledged, that chef bases or griddle stands include oversized refrigeration systems and additional cabinet insulation to ensure the unit can maintain cold storage temperatures with the additional heat load from the cooking equipment. *Id.* Continental added that this type of equipment is also provided with heavy-duty cabinet construction to support excessive weight loads, and may have specialized insulation to protect against damage from exposure to very high temperatures. *Id.* Continental concluded by stating that characteristics such as larger evaporator coils, fans, and upsized compressors may not be readily identifiable in a given chef base or griddle stand, yet still represent distinct features that impact energy consumption and separate these products from other types of CRE. *Id.*

True commented that chef bases and griddle stands are intended to be used in conjunction with cooking equipment installed on top (of the counter) of the refrigerated unit, with temperatures easily exceeding 500 °F, and the refrigeration systems are usually larger than a standard storage refrigeration system due to the very high ambient temperature and conditions they are subjected to. (True, No. 28, p. 3) True commented that the 32-in. height may be excessive as the top of the griddle (or other cooking equipment) should be at about a 36-in. height, making a 28-in. height or less recommended as more appropriate. *Id.* True added that the ADA requires a working height of 34-in. or less, that the smallest griddles are more than 6 in. high, and that most grills are more than 15 in. high. *Id.*

The definition proposed in the June 2022 NOPR is largely consistent with the existing definition, with the additional height requirement. DOE has determined this height limit is appropriate as it harmonizes with ENERGY STAR definitions and because any units taller than 32″ would not have cooking equipment at appropriate working height.

[26] For information on the Version 5.0 specification development, see *www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20Version%205.0%20Commercial%20Refrigerators%20and%20Freezers%20Final%20Draft%20Specification_0.pdf.*

[27] Undercounter: A vertical closed commercial refrigerator or freezer that has no surface intended for food preparation. The equipment is intended for installation under a separate counter or workspace. This equipment may have doors or drawers and shall have a minimum height of 32 in., including legs or casters. Worktop: A vertical closed commercial refrigerator or freezer that has a surface intended for food preparation that is incapable of supporting cooking equipment. This equipment may have doors or drawers and shall have a minimum height of 32 in., including legs or casters.

The current definition of chef bases or griddle stands specifically refers to cooking equipment capable of reaching temperatures hot enough to cook food. Therefore, no exclusions of other types of equipment that can be placed on top of the equipment are necessary.

DOE recognizes that chef bases may be shorter to allow for taller cooking equipment, as indicated in True's comment, but DOE set the height limit at a level that would be inclusive of all chef bases or griddle stands, not an average or typical height.

DOE recognizes that there are other CRE that are not chef bases or griddle stands with heights under 32'' (*e.g.,* undercounter models). These CRE would not be included in the definition despite their height because the definition would maintain that the equipment is designed to have cooking equipment placed on top of the unit.

DOE agrees with the characteristics identified for chef bases (*i.e.,* oversized refrigeration, insulation, cabinets capable of supporting weight) but has not determined identifiable aspects of these characteristics for inclusion in the definition. To the extent that these characteristics impact energy consumption, DOE will consider these impacts when evaluating potential energy conservation standards for this equipment.

For these reasons and those discussed in the June 2022 NOPR, DOE is maintaining the definition of chef bases and griddle stands as proposed in the June 2022 NOPR.

Regarding testing for chef bases or griddle stands, DOE determined in the June 2022 NOPR that the existing DOE test procedure provides an appropriate basis for measuring the energy consumption of this equipment. 87 FR 39164, 39201. DOE recognized that chef bases or griddle stands can be installed and used in ambient environments that are different from other CRE, but DOE proposed to test this equipment in the same conditions because DOE tentatively determined that the additional heat loads of cooking equipment do not affect measured energy use. *Id.*

Additionally, DOE conducted testing similar to the PG&E and SCE testing [28] to investigate whether cooking equipment operation would impact chef base or griddle stand energy use during typical operation, as illustrated in Table III.4. DOE tested chef base or griddle stand refrigerators and freezers to the current DOE CRE test procedure with and without an active griddle installed on top of the test unit. During the tests with an active griddle installed, the griddle was turned on 3 hours after the start of the defrost period and maintained a target griddle surface temperature of 185 °F for 8 hours, concurrent with the door opening period. After the 8-hour period of griddle operation, the griddle was turned off for the remainder of the test.

TABLE III.4—CHEF BASE OR GRIDDLE STAND ENERGY CONSUMPTION COMPARISON WITH AND WITHOUT AN ACTIVE GRIDDLE

Test unit	Refrigerated volume (ft^3)	Energy consumption with griddle installed (kWh/day)	Energy consumption without griddle installed (kWh/day)	Energy consumption difference (percent)
Refrigerator #1	5.21	0.97	0.96	−0.5
Refrigerator #2	9.17	1.04	1.03	−0.5
Refrigerator #3	9.72	1.59	1.58	−0.1
Freezer #1	6.56	7.28	7.29	+0.2
Freezer #2	11.31	8.58	8.70	+1.4

* DOE tested an additional freezer that is not shown in the table due to inconsistent issues with the evaporator icing during testing.

Consistent with the findings in the PG&E and SCE report, DOE observed that chef bases or griddle stands consumed similar amounts of energy with and without cooking equipment operating above the unit. DOE has been unable to determine why Freezer #2 consumed slightly more energy without a griddle installed. For these reasons, DOE proposed in the June 2022 NOPR to maintain the existing CRE test procedure for testing chef bases or griddle stands (with the additional proposals as discussed in this NOPR). 87 FR 39164, 39202.

In the June 2022 NOPR, DOE requested comment on its proposal to test chef bases and griddle stands according to the test procedure used for other CRE. *Id.*

The CA IOUs recommended standardizing chef base internal volume measurements by defining standardized pans as full-size, 4-in.-deep hotel pans (12 by 20 by 4 in.) since this is a standard pan size that all units can accommodate. (CA IOUs, No. 36, p. 7) The CA IOUs added that for chef bases able to hold 6-in.-deep pans, the volume calculation should account for the extra 2 in. of depth. *Id.* The CA IOUs pointed out that some 36-in.-wide chef bases only accommodate one pan per drawer, but have extra room to accommodate a 4- or 6-in.-deep, 1/6-size pan measuring 6 by 6 in.; for such bases that cannot fit 12-by-20-in. hotel pans, the CA IOUs recommended adding 1/6-size pans to its volume and suggested that any refrigerated volume that cannot accommodate a 1/6 pan should not be counted as usable volume. *Id.*

The Joint Commenters supported DOE's proposed changes regarding the test methods for additional equipment categories, including chef bases and griddle stands. (Joint Commenters, No. 31, p. 1)

The Joint Commenters stated their support for establishing test procedures for chef bases and griddle stands, citing a 2016 report that found significant variation in energy performance of chef bases,[29] suggesting there is opportunity for efficiency improvements. (Joint Commenters, No. 31, p. 3). The Joint Commenters expressed a belief that it was reasonable to test chef bases or griddle stands according to the same test procedure as other CRE, which would allow end users to compare energy consumption with other currently covered equipment. *Id.*

NEEA stated its support for DOE's proposal to establish test procedures for new and/or newly defined categories of

[28] See *www.caetrm.com/media/reference-documents/ET15SCE1010_Chef_Bases_Report_final2.pdf.*

[29] See ''Chef Bases for Foodservice Applications,'' p. 9. *www.caetrm.com/media/referencedocuments/ET15SCE1010_Chef_Bases_Report_final2.pdf.*

CRE, and restated its recommendation from the 2021 CRE TP RFI that DOE establish test methods for new CRE product types, including chef bases or griddle stands. (NEEA, No. 39, p. 2)

Hillphoenix commented that it agreed with using the test conditions and test setup as required for CRE equipment, but disagreed with utilizing the standard door opening procedure as documented in ASHRAE 72, as the door openings of this equipment would be better represented by a reduced opening procedure. (Hillphoenix, No. 35, p. 7) Hillphoenix commented that the doors on this type of equipment are normally operated by store personnel and are not customer facing, which excludes the intent of the opening procedures in ASHRAE 72. *Id.*

Continental commented that it supports DOE's proposal in the NOPR to add new test procedures for product categories such as griddle stands and chef bases. (Continental, No. 29, p. 1) Continental agreed with DOE's desire to develop test procedures for additional product types, including chef bases and griddle stands, but added that new test methods should only be introduced after suitable industry-accepted standards have been adequately vetted with stakeholder feedback and approved for publication. (Continental, No. 29, p. 8) Continental commented that DOE should clarify that any test procedure proposed for chef bases or griddle stands would only apply to self-contained equipment. *Id.* Continental stated disagreement with DOE's recommendation to test chef bases and griddle stands in the same manner as other CRE—using ASHRAE Standard 72—because, as DOE recognizes, this equipment is designed to operate with higher heat loads than other types of CRE and that as stated in the NOPR, an ASHRAE research project found that average temperatures in commercial kitchen preparation areas are typically 72 °F to 79 °F, while cooking areas are typically 79 °F to 93 °F. *Id.* Continental commented that testing at an ambient temperature of 75 °F would not represent how chef bases and griddle stands are used in real-world conditions and that higher ambient conditions should be used to even come close to simulating representative conditions for chef bases and griddle stands located in the midst of commercial kitchen cooking areas, with high-temperature cooking equipment on the top, as well as adjacent to them in most situations. *Id.* Continental commented that energy consumption at the elevated ambient temperature conditions would need to be evaluated thoroughly as part of any future rulemaking regarding potential energy standards for this equipment. *Id.* Continental pointed out that DOE provided a summary of some limited energy testing performed on five chef base models as justification that energy consumption does not vary significantly when tested with a griddle placed on the top and operated for a limited time, and yet little information about this testing was offered and the procedure and results had not been widely vetted by stakeholders. *Id.* Continental requested that DOE share details and data from this testing, while maintaining any needed confidentiality, for thorough assessment and feedback. *Id.* Continental cited an analysis by Southern California Edison (ET15SCE1010) from August 2016, which evaluated chef bases for energy consumption of six different units using ASHRAE Standard 72–2014 test conditions. *Id.* Continental pointed out that an additional heat load was not included because when an electric griddle was placed on top of a chef base, there was reportedly insignificant variation in energy test results. *Id.* Continental believed this conclusion was based on insufficient data and lack of a thorough understanding of the application, as refrigerated chef bases are subject to extreme heat loads from high-temperature cooking equipment adjacent to and on top of the unit, and a variety of heavy-duty gas and electric cooking equipment is typically used in this application. *Id.* Continental commented that as a result, standardizing to one piece of equipment could lead to varied results in the field, and the Southern California Edison study also found an extremely wide variation in energy consumption of the six units tested. *Id.* Continental urged a thorough review and evaluation of prior studies used by DOE to evaluate the appropriateness of the proposed test method to ensure reliability and confidence, and it repeated its statement that DOE should continue to work with ASHRAE and allow time for completion of an industry-accepted procedure before incorporating a test procedure for chef bases and griddle stands. *Id.*

AHRI recommended that DOE provide more information on the size of chef bases and griddle stands that are tested, as well as more information about the size and heat load for griddles, noting there is no current test standard specific to chef bases. (AHRI, No. 38, p. 12) AHRI commented that if DOE incorporates standard ASHRAE 72, AHRI would like to work with the committee to craft an energy test for chef bases. *Id.* AHRI stated concerns with DOE's proposal to test chef bases and griddle stands, and with how DOE proposed testing be conducted in the NOPR. *Id.* AHRI stated that chef bases and griddle stands are primarily drawer units designed for higher ambient conditions, which renders the temperature standard for CRE inapplicable and is the reason chef bases are currently exempt. *Id.*

Hoshizaki stated that it would need additional information to comment on this proposal. (Hoshizaki, No. 30, p. 5) In particular, Hoshizaki stated that it would need to know the size of the equipment used in DOE's testing method (*i.e.,* the condensing unit size for the refrigerators and freezers; the griddle size). *Id.* Also, Hoshizaki stated that it would be helpful to know whether the griddle was at a stable temperature or actively recreating a cooking environment during the testing period. *Id.* Hoshizaki recommended that this matter be proposed to the ASHRAE 72 standards committee for input regarding changes needed to test chef bases along with specifying the test criteria with heat loads. *Id.*

Regarding capacity measurements, DOE is maintaining the proposal in the June 2022 NOPR to measure the refrigerated volume according to AHRI 1200–2023. Most chef bases or griddle stands use drawers for storing pans. The definition does not require drawers or pans, so other configurations are possible. This is also true of other CRE categories (*e.g.,* undercounter units may be configured with drawers for storing pans). To allow for consistent comparisons across such equipment, DOE is maintaining the same volume metric as the relevant capacity metric for chef bases or griddle stands.

Regarding the test data presented in the June 2022 NOPR, during the tests with an active griddle installed, the griddle was turned on three hours after the start of the defrost period and maintained a target griddle surface temperature of 185 °F for 8 hours, concurrent with the door opening period, and after the 8-hour period of griddle operation, the griddle was turned off for the remainder of the test. 87 FR 39164, 39201. The griddles for testing were appropriately sized to meet the dimensions of the various chef bases or griddle stands, which ranged in volume from 5.2 to 11.3 cubic feet.

DOE expects the specific installation conditions and door openings to vary among CRE depending on actual end use. DOE has determined that ASHRAE 72–2022 with Errata door openings are representative of CRE intended to be used in commercial kitchens. However, DOE agrees that chef bases or griddle stands would be used in cooking areas

with ambient temperatures higher than those specified in ASHRAE 72–2022 with Errata. DOE stated in the April 2014 Final Rule that chef bases and griddle stands are able to be tested according to the DOE test procedure, but that their refrigeration systems require larger compressors to provide more cooling capacity per storage volume than conventional CRE used in more typical room temperature conditions. 79 FR 22277, 22281–22282. In the June 2022 NOPR, DOE recognized that chef bases or griddle stands can be installed and used in ambient environments that are different from other CRE, but DOE proposed to test this equipment in the same conditions because DOE tentatively determined that the additional heat loads of cooking equipment do not affect measured energy use. 87 FR 39164, 39201. Based on DOE's testing in support of this rulemaking, as presented in Table III.4, DOE has determined that chef bases or griddle stands consume similar amounts of energy with and without cooking equipment operating above the unit and is therefore not adopting any test provisions to directly account for operation of cooking equipment. However, based on the comments received in response to the June 2022 NOPR as well as previous comments received in response to the June 2021 RFI, as summarized in the following paragraphs, DOE recognizes that the cooking areas of commercial kitchens would typically have higher ambient temperatures than those specified in ASHRAE 72–2022 with Errata, and is adopting amended test conditions for chef bases or griddle stands.

Ambient Conditions

DOE initially requested comment in the June 2021 RFI on whether modifications to the current CRE test procedure would be appropriate for testing chef bases and griddle stands to better represent real-world use conditions. 86 FR 31182, 31189. DOE received limited feedback regarding ambient conditions in response to the June 2021 RFI. The CA IOUs and Joint Commenters commented that DOE should establish higher ambient temperature and relative humidity conditions for evaluating the performance of chef bases. (CA IOUs, No. 10, p. 2–3; Joint Commenters, No. 8, p. 2) The CA IOUs recommended adopting conditions from ASTM F2143–16 or the emerging ASHRAE Standard 220, which have an ambient temperature of 86 °F ±2 °F and relative humidity of 35 percent ±5 percent. (CA IOUs, No. 10, p. 2–3) The CA IOUs commented that these elevated kitchen temperatures are supported by a 2012 ASHRAE research project benchmarking the thermal conditions in 100 commercial kitchens in the United States, which found that the average temperature in preparation areas ranged from 72 °F to 79 °F, while the average temperature in cooking areas ranged from 79 °F to 93 °F. (*Id.*) AHRI did not provide detailed information on ambient temperature, but noted that the current test procedure does not account for the high ambient conditions for chef bases or griddle stands. (AHRI, No. 3, p. 10)

Although not specific to ambient conditions, DOE received comments in response to the June 2021 RFI from ITW, True, Hoshizaki, NEEA, and the CA IOUs stating that the test procedure should not change to limit burden. (ITW, No. 2, p. 8; True, No. 4, p. 15–16; Hoshizaki, No. 13, p. 3; NEEA, No. 5, p. 2; CA IOUs, No. 10, p. 1–2)

As discussed earlier in this section, DOE tentatively determined in the June 2022 NOPR that the existing test procedure provides an appropriate basis for measuring the energy consumption of chef bases or griddle stands. 87 FR 39164, 39201.

In response to the June 2022 NOPR, Continental referred to the same ASHRAE research project as the CA IOUs referenced in response to the June 2021 RFI, noting that average temperatures in commercial kitchen preparation areas are typically 72 °F to 79 °F, while cooking areas are typically 79 °F to 93 °F. (Continental, No. 29, p. 8) Continental commented that testing at an ambient temperature of 75 °F would not represent how chef bases and griddle stands are used in real-world conditions and that higher ambient conditions should be used. (*Id.*) In response to the June 2022 NOPR, AHRI stated that chef bases and griddle stands are primarily drawer units designed for higher ambient conditions, which renders the temperature standard for CRE inapplicable. (AHRI, No. 38, p. 12) Both AHRI and Hoshizaki recommended that the industry test standard committee should evaluate appropriate testing for chef bases or griddle stands. (AHRI, No. 38, p. 12; Hoshizaki, No. 30, p. 5)

Hillphoenix commented that it agreed with using the test conditions and test setup as required for CRE equipment. (Hillphoenix, No. 35, p. 7) The Joint Commenters and NEEA supported DOE's approach from the June 2022 NOPR, but did not specifically refer to ambient conditions. (Joint Commenters, No. 31, p. 3) (NEEA, No. 39, p. 2)

After evaluating these comments received regarding chef base or griddle stand ambient test conditions, DOE acknowledges that multiple interested parties representing a range of viewpoints (*i.e.,* efficiency advocates, utilities, and industry) have supported the use of higher ambient temperatures for testing chef bases or griddle stands. DOE also recognizes that chef bases or griddle stands are uniquely used only in the cooking areas of commercial kitchens, as compared to other conventional CRE that may be installed in a range of locations. Based on the referenced ASHRAE study, DOE has determined that 86 °F is the ambient condition most representative of chef base or griddle stand operation, as that is the mid-point of the 79 °F to 93 °F range identified for cooking areas. This ambient condition is also consistent with the 86.0 °F ambient condition established in this final rule for blast chillers and blast freezers, equipment that is also used in the cooking areas of commercial kitchens. Consistent with this higher ambient dry-bulb temperature, DOE is also amending test conditions for wet-bulb temperature to require testing at 73.7 °F (*i.e.,* maintaining the same ambient relative humidity at the higher ambient dry-bulb temperature), and radiant heat temperature to require testing at greater than or equal to 81.0 °F. For both dry-bulb and wet-bulb temperature, DOE is maintaining the tolerances for ambient temperature measurements: tolerance for the average over the test period of ±1.8 °F, and a tolerance for the individual measurements of ±3.6 °F.

For the reasons discussed in this section, the June 2022 NOPR, and the April 2014 Final Rule, DOE is maintaining that chef bases or griddle stands do not require separate test provisions, except that the dry-bulb temperature, wet-bulb temperature, and radiant heat temperature will require higher temperatures during the test. Therefore, the test procedure in appendix B, as established in this final rule, is the test procedure applicable to chef bases or griddle stands.

5. Mobile Refrigerated Cabinets

DOE does not currently define or specify test procedure provisions specific to other categories of refrigerated holding and serving equipment, such as certain mobile refrigerated cabinets. Specifically, mobile refrigerated cabinets chill the refrigerated compartment before being unplugged from power and taken to a remote location to hold food products while maintaining cooling. Such equipment meets the definition of CRE as defined at 10 CFR 431.62; however, unlike typical CRE, mobile refrigerated

cabinets are not continuously connected to a power supply. As discussed in the April 2014 Final Rule, DOE determined that such other categories of refrigerated holding and serving equipment meet the definition of CRE and could be subject to future test procedures and energy conservation standards. 79 FR 22277, 22281. To better distinguish mobile refrigerated cabinets from other defined categories of CRE, DOE considered developing a definition for this equipment in the June 2022 NOPR. 87 FR 39164, 39202.

Based on a review of mobile refrigerated cabinets available on the market, the operation and use of this equipment is subject to varied end-use applications, which may be specific to individual models. DOE did not identify data or information that would inform development of representative test conditions for such equipment. As such, DOE did not propose to establish test procedures for mobile refrigerated cabinets in the June 2022 NOPR. 87 FR 39164, 39202.

To better distinguish mobile refrigerated cabinets from other defined categories of CRE, DOE proposed in the NOPR to add the following definition to 10 CFR 431.62 for mobile refrigerated cabinets:

A ''mobile refrigerated cabinet'' means commercial refrigeration equipment that is designed and marketed to operate only without a continuous power supply. *Id.*

CRE that allow the user to choose whether to operate with or without a continuous power supply do not meet the definition of a mobile refrigerated cabinet.

Although DOE did not propose in the June 2022 NOPR to establish test procedure provisions specific to mobile refrigerated cabinets, CRE that do not meet the definition of mobile refrigerated cabinets are subject to DOE's test procedure at appendix B and energy conservation standards under the applicable CRE equipment class. 87 FR 39164, 39202.

In the June 2022 NOPR, DOE requested comment on the proposed definition for ''mobile refrigerated cabinet.'' DOE also requested comment on the proposal not to establish test procedures for mobile refrigerated cabinets. 87 FR 39164, 39202–39203.

Hillphoenix agreed with DOE's proposed definition of ''mobile refrigerated cabinet'' and also agreed with not establishing test procedures since the unit's operation and use were subject to varied end-use applications and did not represent a significant portion of the CRE market. (Hillphoenix, No. 35, p. 7) Hillphoenix assumed no energy conservation category would be developed since no test procedure is being developed. *Id.*

True commented that the proposed definition for ''mobile refrigerated cabinet'' needs to be more specific, as mobile refrigeration normally refers to DC voltage (12V DC) for applications in vehicles. (True, No. 28, p. 5) True requested the following information from DOE: Since some units require a power converter (12V DC to 120V AC) does ''mobile refrigerated cabinet'' refer to both AC and DC power supplies? *Id.*

AHRI stated its assumption that if no test procedure is developed for mobile refrigerated cabinets, no energy conservation standard will be developed either. (AHRI, No. 38, p. 13)

The CA IOUs urged that the product definition for ''mobile refrigerated cabinets'' proposed in the NOPR be based on technical specifications rather than on end use, and recommended refining the proposed definition to explicitly exclude vertical self-contained CRE. (CA IOUs, No. 36, p. 9) The CA IOUs commented that the following options should be added to distinguish mobile refrigerated cabinets from other types of CRE: solid doors, minimum insulation thickness (1-in. diameter minimum, presence of handles designed to move the equipment, a bumper guard around the bottom perimeter, heavy-duty wheels or casters (5 percent diameter minimum), a power switch and analog or digital external temperature display, a door latch, and the presence of a cord wrap. *Id.* The CA IOUs recommended adding ''for temporary storage and transport of prepared food products and not for retail sale of merchandise'' to the definition if DOE decides to retain language based on end use. *Id.* The CA IOUs stated that because this category represents limited sales volume and consumer utility is dependent on minimizing thermal losses, the test method should be excluded. *Id.*

DOE agrees that definitions should be based on technical specifications and characteristics where possible, however, for mobile refrigerated cabinets, DOE cannot identify a single characteristic for this equipment at issue other than its use without the ability to use a continuous power supply. DOE notes that none of characteristics identified by the CA IOUs are specific to mobile refrigerated cabinets. DOE has determined that the operation of the equipment without a continuous power supply is sufficiently different than other CRE intended for holding temperature applications or pull-down temperature applications, which are used with continuous power supplies, that equipment meeting the mobile refrigerated cabinet definition will be identifiable.

In response to True's comments, the term mobile in this context does not mean for use in vehicles; rather it is intended to address equipment that is used without a continuous connection to a power supply (*i.e.,* can be moved away from the power supply location). The definition as proposed reflects this and so DOE is maintaining it as proposed in the June 2022 NOPR.

In response to comments regarding test procedures and applicability of energy conservation standards, equipment without a test procedure would not be subject to energy conservation standards as DOE would have no basis on which to evaluate potential standards. As DOE is not establishing a test procedure for this equipment category, other CRE energy conservation standards would not apply. DOE may consider test procedures and corresponding energy conservation standards for mobile refrigerated cabinets as part of future rulemakings.

6. Additional Covered Equipment

DOE provided examples of potential CRE that may require additional test procedure provisions in the June 2021 RFI. 86 FR 31182, 31190. DOE determined in the June 2022 NOPR that additional test procedure provisions to account for what is likely unique equipment operation or usage are not needed at this time. 87 FR 39164, 39203. The existing DOE test procedure is reasonably designed to produce test results which reflect energy efficiency and energy use of the CRE subject to the test procedure during a representative average use cycle, and is not unduly burdensome to conduct. Because the test procedure provides a representative average use cycle, DOE is unable to account for every combination of operating conditions and usage without the resulting test procedures being unduly burdensome. If the test procedure cannot be conducted for certain equipment, or if the test procedure results in measures of energy consumption so unrepresentative of the equipment's true energy consumption characteristics as to provide materially inaccurate comparative data, manufacturers may petition DOE for a test procedure waiver under the provisions of 10 CFR 431.401.

DOE did not receive any comments and is therefore maintaining the June 2022 NOPR approach and not adopting additional provisions for other categories of CRE.

D. Harmonization of Efficiency Standards and Testing With NSF 7–2019 Food Safety

NSF 7–2019 establishes minimum food protection and sanitation specifications for the materials, design, manufacture, and performance of commercial refrigerators and freezers and their related components. Section 2.3 of appendix B in the CRE test procedure states that for CRE that is also tested in accordance with NSF test procedures (Type I and Type II),[30] integrated average temperatures and ambient conditions used for NSF testing may be used in place of the DOE-prescribed integrated average temperatures and ambient conditions provided they result in a more stringent test. To that end, the ambient temperature may be higher, but not lower than the DOE test condition, and the IAT may be lower, but not higher, than that measured at the DOE ambient test condition. *Id.* The test conditions and possible different thermostat settings under NSF 7–2019 may result in measured energy use that is more representative of average use in applications for which users prioritize food safety over energy efficiency. Permitting the use of NSF 7–2019 test conditions may also reduce testing burden for manufacturers.

In the June 2022 NOPR, DOE did not propose any additional amendments to the test procedures to further reference or harmonize with NSF 7–2019 testing. 87 FR 39164, 39203.

DOE did not receive any additional comments on this topic in response to the June 2022 NOPR. Therefore, DOE is not adopting any additional amendments regarding harmonizing with NSF 7 testing. The existing test procedure instructions in section 2.3 of appendix B allow for the use of NSF 7–2019 test data to be used for DOE testing subject to certain requirements. DOE recognizes that NSF 7–2019 testing is not applicable or appropriate for all equipment types. For those equipment types, the DOE test procedure provides the required test instructions—including additional IAT rating temperatures—and reference to NSF 7–2019 is not needed. DOE maintains that the amended DOE test procedure, by reference to AHRI 1200–2023 and ASHRAE 72–2022 with Errata for conventional CRE, provides a measure of energy use of CRE during a representative average use cycle and is not unduly burdensome to conduct. The optional NSF 7–2019 test provides a means to further reduce test burden in certain instances, but it is not required for DOE testing.

E. Dedicated Remote Condensing Units

DOE is aware of remote condensing CRE models for which specific dedicated condensing units are intended for use with specific refrigerated cases. For some of these models, the remote condensing units are intended to be installed on or near the refrigerated case within the same conditioned space. For other models, the remote condensing units are intended to be installed outdoors, but the refrigerated case is intended to be used specifically with the designated remote condensing unit.

For this equipment, the combined refrigerated case and condensing unit refrigeration system would effectively operate as if it were CRE with a self-contained condensing unit. Under the current DOE test procedure, remote CRE energy consumption is determined from the energy use of components in the refrigerated case plus a calculated compressor energy consumption based on the enthalpy change of refrigerant supplied to the case at specified conditions. The compressor energy use calculation is based on typical reciprocating compressor energy efficiency ratios (''EERs'') at a range of operating conditions. *See* Table 1 in AHRI 1200–2010. For CRE used with dedicated condensing units, the actual compressor used during normal operation is known (*i.e.,* the compressor in the dedicated condensing unit). Accordingly, testing the whole system using the same approach as required for a self-contained CRE unit may produce energy use results that are more representative of how this equipment actually operates in the field. Additionally, testing such a system as a complete system rather than using the test procedures for remote condensing units may be less burdensome, because it would not require the use of a test facility capable of maintaining the required liquid and suction line refrigerant conditions as currently required for testing remote CRE (*i.e.,* the refrigerant conditions consistent with ASHRAE 72–2005 requirements and at the conditions necessary to maintain the appropriate case temperature for testing).

DOE understands that remote CRE are most commonly installed with rack condensing systems, and that installations with dedicated condensing units represent a very small portion of the remote CRE market. Additionally, DOE has not identified a method to determine whether a remote CRE unit would be installed with a dedicated condensing unit rather than a rack condensing system. DOE is not aware of any remote CRE that are capable of installations only with a dedicated remote condensing unit (*i.e.,* DOE expects that all remote CRE may be installed with rack condensing systems).

DOE tentatively determined in the June 2022 NOPR that an amended test procedure to account for remote CRE installed with dedicated remote condensing units is not appropriate. 87 FR 39164, 39205.

In the June 2022 NOPR, DOE requested comment on its tentative determination not to propose amended test procedures for dedicated remote condensing units. *Id.*

AHRI stated its support for DOE's tentative determination to not propose amended test procedures for dedicated remote condensing units and thanked DOE for this determination. (AHRI, No. 38, p. 13)

Hillphoenix commented that it agreed with not proposing a test procedure for dedicated remote condensing units, as the customization of each unit would create an unreasonable burden on manufacturers while not resulting in reasonable energy savings. (Hillphoenix, No. 35, p. 7)

DOE is maintaining the June 2022 NOPR approach and not adopting test provisions for dedicated remote condensing units at this time.

F. Test Procedure Clarifications and Modifications

1. Defrost Cycles

The test period requirements in ASHRAE 72–2005, incorporated by reference in the current CRE test procedure, and in ASHRAE 72–2018 require a 24-hour test period, which begins with a defrost after steady-state conditions are achieved.[31] Use of a fixed 24-hour test period can provide for a degree of variability in the measured energy consumption, depending on when additional defrost cycles occur after the initial defrost cycle (*e.g.,* the test period may capture only a portion of a defrost cycle at the end of the test period rather than a complete number of defrost cycles). Typically, if multiple complete defrost cycles occur within the 24-hour period, the impact of capturing partial defrost cycles would be small. Similarly, if the defrost cycle duration is slightly greater than 24 hours, the impact of capturing a partial defrost

[30] Type I equipment is designed to operate in 75 °F ambient conditions and Type II equipment is designed to operate in 80 °F ambient conditions.

[31] ASHRAE 72–2005 and ASHRAE 72–2018 define ''steady state'' as the condition in which the average temperature of all test simulators changes less than 0.4 °F from one 24-hour period or refrigeration cycle to the next.

cycle would be small. However, the impact may be more substantial if the defrost cycle duration is very long (*i.e.,* multiple days between defrost) or if the defrost cycle is slightly less than 24 hours (*i.e.,* the test period would capture two defrost occurrences but only one period of ''normal'' operation between defrosts). DOE also notes that ASHRAE 72–2005 does not have any specific provisions for CRE with variable defrost control schemes (*i.e.,* defrosts that may be triggered based on conditions or other parameters rather than only a timer) and does not account for CRE with no automatic defrost (*i.e.,* manual defrost).

DOE has addressed similar issues in the test procedures for consumer refrigeration products. The test procedures for those products apply a two-part test period (one period for steady-state operation and one period to capture events related to the defrost cycle) to account for defrost energy consumption for products with long defrost cycle durations or with variable defrost control. The energy use calculations then weigh the performance from each test period based on the known compressor runtime between defrosts or on a calculated average time between defrosts in field operation that is based on the control parameters for variable defrosts. *See* appendices A and B to subpart B of 10 CFR part 430.

Additionally, DOE has addressed testing of certain CRE models that do not have automatic defrost in a waiver granted to AHT published on October 30, 2018. 83 FR 54581 (''October 2018 Waiver''). For the basic models subject to the waiver, the test period begins after steady-state conditions occur (instead of beginning with a defrost cycle) and the door-opening period begins 3 hours after the start of the test (instead of 3 hours after a defrost cycle). 83 FR 54581, 54583. DOE also granted AHT an interim waiver for testing certain models with defrost cycles longer than 24 hours. 82 FR 24330 (May 26, 2017; ''May 2017 Interim Waiver'').[32] The interim waiver required that AHT test the specified models using a two-part test method similar to the method for consumer refrigerators, with the first part capturing normal compressor operation between defrosts, including an 8-hour period of door openings, and the second part capturing all operation associated with a defrost, including any pre-cooling or temperature recovery following the defrost. 82 FR 24330, 24332–24333.

For testing CRE with no automatic defrost, ASHRAE 72–2022 with Errata incorporates instructions for starting the test period and door openings that are consistent with those provided in the October 2018 Waiver (*i.e.,* the instructions do not require a defrost occurrence). Therefore, DOE incorporating by reference ASHRAE 72–2022 with Errata addresses this test issue.

For testing CRE with variable defrost, DOE tentatively determined in the June 2022 NOPR that the existing 24-hour test period represents typical operation during a day, including a period of door openings and a period of closed-door operation, and did not propose any additional test requirements. 87 FR 39164, 39206. Units with variable defrost controls may initiate more frequent defrosts in response to door openings, which is captured by the current test procedure.

The 24-hour test period specified in ASHRAE 72–2022 with Errata provides a representative basis for measuring energy consumption of most CRE, capturing the defrost occurrences and door opening periods expected for a 24-hour period. Most CRE include multiple defrosts during a 24-hour test period, and any incomplete defrost cycle captured in the test period does not significantly impact measured energy consumption. DOE is not proposing to amend the 24-hour test to require that the test procedure capture complete defrost cycles in situations where the defrost interval is less than 24 hours.

DOE tentatively determined in the June 2022 NOPR that for CRE with defrost cycles longer than 24 hours, the 24-hour test period would overestimate the actual average defrost energy contribution during a day. 87 FR 39164, 39206. Therefore, DOE proposed in the June 2022 NOPR to allow the use of a two-part test for CRE with defrost cycles longer than 24 hours. *Id.* DOE proposed the two-part test approach, consistent with the approach in the May 2017 Interim Waiver, for such equipment—rather than extending the existing test period in 24-hour increments—in order to limit test burden. *Id.* For the basic models addressed in the May 2017 Interim Waiver, testing in 24-hour increments would require three 24-hour periods (*e.g.,* the duration between defrosts is 3.5 days, and introducing a fourth 24-hour period would result in the test period capturing two defrosts). Additionally, the 24-hour increment approach would continue to overestimate energy consumption associated with defrosts, albeit to a lesser extent, for defrost intervals that are not exact multiples of 24 hours (as is the case with the basic models covered by the May 2017 Interim Waiver). The two-part test approach eliminates the need for multiple door opening periods and may allow for much shorter overall test durations while accounting for defrost occurrences based on actual defrost interval durations.

Also consistent with the May 2017 Interim Waiver, DOE proposed in the June 2022 NOPR that the two-part test would be optional because it would increase test duration compared to the existing approach (by requiring both a 24-hour test plus a defrost test), and manufacturers may determine that the existing test procedure may be more appropriate their models, even if the models incorporate defrost intervals longer than 24 hours. 87 FR 39164, 39206. Specifically, DOE proposed to allow for testing equipment with defrost intervals greater than 24 hours using a two-part test in which the first part is a 24-hour period of stable operation, including door openings as specified in ASHRAE 72–2018R, but without any defrost operation. *Id.* Stability for the first part of the test would be determined according to section 7.5 in ASHRAE 72–2022 with Errata, by comparing temperatures determined during Test A and Test B. A defrost may occur during the test alignment period, as defined in section 7.4 of ASHRAE 72–2022 with Errata, between Test A and Test B. The second part of the test would capture a defrost cycle, including any pre-cooling and temperature recovery associated with a defrost. Rather than referencing the consumer refrigeration product test procedures (as done in the May 2017 Interim Waiver approach), DOE proposed to require that the start and end of the test period be determined as, respectively, the last time before and first time after a defrost occurrence, when the measured average simulator temperature (*i.e.,* the instantaneous average of all test simulator temperature measurements) is within 0.5 °F of the IAT as measured during the first part of the test. 87 FR 39164, 39206, 39207. This would ensure that the defrost part of the test captures any pre-cooling operation and temperature recovery following a defrost while limiting the overall duration of the second part of the test.

The May 2017 Interim Waiver includes certain parameters specific to the models covered by the waiver, namely the duration between defrosts. DOE granted the interim waiver based on the minimum defrost interval possible for the equipment (*i.e.,* 3.5

[32] On June 2, 2021, AHT sent a letter to DOE requesting that this interim waiver be withdrawn. See *www.regulations.gov/document/EERE-2017-BT-WAV-0027-0015.*

days). To generalize the May 2017 Interim Waiver approach for other CRE models, DOE proposed in the June 2022 NOPR that the two-part calculation be applied based on the minimum duration between defrosts permitted by the unit's controls as shown in the following equation. 87 FR 39164, 39207.

$$DEC = ET1 \times \frac{(1{,}440 - t_{NDI})}{1{,}440} + \frac{ET2}{t_{DC}}$$

$$t_{NDI} = \frac{t_{DI}}{t_{DC}}$$

Where DEC is the daily energy consumption in kWh/day; ET1 is the energy consumed during the first part of the test, in kWh/day; ET2 is the energy consumed during the second part of the test, in kWh; t_{NDI} is the normalized length of defrosting time per day, in minutes; t_{DI} is the length of time of the defrosting test period, in minutes; t_{DC} is the minimum time between defrost occurrences, in days; and 1,440 is a conversion factor, in minutes per day. DOE recognizes that the two-part test approach could result in slightly less door-opening energy contribution as the first part of the test, with no defrost and 8 hours of door openings, would be combined with the defrost portion of the test by a calculation. To investigate this impact, DOE conducted testing on equipment with defrost intervals longer than 24 hours and compared results of the existing test procedure (24-hour test period, starting with a defrost), the May 2017 Interim Waiver approach (two-part test, as proposed in the June 2022 NOPR), and a full-duration approach (multiple 24-hour periods, each with door opening periods, through a complete defrost cycle) as illustrated in Table III.5.

TABLE III.5—MAY 2017 INTERIM WAIVER APPROACH INVESTIGATIVE TESTING

HCT.SC.I	Total display area (ft^2)	Current DOE CRE test procedure (kWh/day)	May 2017 interim waiver approach (kWh/day)	Full defrost cycle duration approach (kWh/day)
Unit #1	12.72	7.12	6.66	6.66
Unit #2	14.84	6.12	5.61	5.62

DOE's testing showed that the two-part waiver test approach provides an accurate representation of energy consumption when measured over a full defrost cycle (and is therefore representative of average use). Additionally, the testing showed that the existing test procedure approach can overestimate measured energy use for CRE with defrost cycles longer than 24 hours.

Based on DOE's investigative testing, DOE tentatively determined in the June 2022 NOPR that the May 2017 Interim Waiver approach, and the approach proposed in the June 2022 NOPR, is representative of a full defrost cycle duration approach for equipment with defrost intervals greater than 24 hours. 87 FR 39164, 39207.

With regard to CRE models with multiple evaporators (and, therefore, potentially multiple defrosts) connected to a single- or multi-stage condensing unit, ASHRAE 72–2005 does not specify which evaporator should be used to determine the defrost cycle that initiates the test. Additionally, if the defrost cycles for multiple evaporators do not activate at the same time during the test, ASHRAE 72–2005 does not specify which defrost cycle should be used to determine the start of the 24-hour test period. ASHRAE 72–2005 also does not explicitly address the treatment of defrost cycles for multi-compartment CRE models (*i.e.,* hybrid CRE) with different evaporator temperatures and defrost sequences.

As discussed earlier in this section, CRE with automatic defrost typically include multiple defrost occurrences per day. DOE expects that any multi-evaporator CRE with multiple unique defrost cycle durations would similarly defrost multiple times per day, and therefore no change to the existing test procedure is necessary. However, to ensure that the 24-hour test period captures a representative number of defrosts for each evaporator's defrost, DOE proposed in the June 2022 NOPR to specify that for CRE with multiple unique defrost intervals for multiple evaporators, the test period as specified in ASHRAE 72–2018R would start with a defrost occurrence for the evaporator defrost having the longest interval between defrosts. 87 FR 39164, 39208.

In the June 2022 NOPR, DOE requested comment on the proposed approach to account for long-duration defrost cycles using an optional two-part test procedure consistent with the existing waiver approach granted for such models. *Id.* DOE also requested comment on whether any additional provisions are necessary to account for different defrost operation or controls, and on DOE's proposed approach in which the test period would start with the defrost occurrence having the longest interval between defrosts. *Id.*

AHRI stated its support for DOE's proposed approach to account for long-duration defrost cycles using an optional two-part test procedure, and further recommended that DOE bring this approach to the ASHRAE 72 committee for review. (AHRI, No. 38, p. 13)

The Joint Commenters commented that they support DOE's proposals regarding testing equipment with long defrost cycles. (Joint Commenters, No. 31, p. 1)

AHT stated its support for the proposed approach to account for long-duration defrost cycles using the

optional two-part test procedure consistent with the existing waiver. (AHT, No. 38, p. 1)

Hillphoenix agreed with the proposed long defrost duration approach for determining energy on CRE equipment that incorporate a defrost interval longer than 24 hours. (Hillphoenix, No. 35, p. 7) Hillphoenix recommended that DOE approach ASHRAE and request this approach be evaluated for inclusion in ASHRAE 72. *Id.*

The Joint Commenters supported DOE's proposal for testing equipment with defrost cycles greater than 24 hours. (Joint Commenters, No. 31, p. 4) The Joint Commenters stated that as DOE discussed in the NOPR, use of a fixed 24-hour test period might provide a degree of variability in measured energy consumption based on additional defrost cycles, which DOE proposed to address through an optional two-part test procedure, based on an existing test waiver, wherein the first part captured energy usage during a 24-hour operating period and the second part captured a single defrost cycle. *Id.* The Joint Commenters stated that this approach mirrored that used to address a similar issue for consumer refrigeration equipment, and they supported this approach because it provides a more representative estimate of energy usage for CRE with defrost periods lasting longer than 24 hours. *Id.*

As discussed, the current industry test procedures do not include provisions to specifically account for defrost cycles longer than 24 hours. DOE has determined such test provisions are appropriate to ensure representative testing of such equipment. To the extent that future industry standards incorporate updated provisions to address defrosts, DOE would consider those standards as part of a future test procedure rulemaking.

For these reasons and consistent with the comments received, DOE is adopting the approach for accounting for defrosts as proposed in the June 2022 NOPR.

2. Total Display Area

Section 3.2 of appendix B provides instructions regarding the measurement of TDA, specifying that TDA is the sum of the projected area(s) of visible product, expressed in square feet (''ft^2'') (*i.e.,* portions through which product can be viewed from an angle normal, or perpendicular, to the transparent area).

For certain CRE configurations, merchandise is not necessarily located at an angle directly normal, or perpendicular, to the transparent area despite this area being intended for customer viewing. For example, for service over counter ice-cream freezers, the ice-cream containers may be placed within the chest portion of the refrigerated case, with a glass display panel on the front and glass rear doors located above the merchandise storage area. If the glass display areas are nearly vertical, the ice-cream containers may be positioned low enough in the case that they are not at a viewing angle perpendicular to the glass. However, during typical use, customers would stand close enough to the display glass that the ice-cream would be visible from other angles not perpendicular to the glass.

AHRI 1200–2023 maintains the existing definition and approach for TDA, which is based on the visibility of merchandise at a location normal to the display surface, but includes additional diagrams to clarify the determination of TDA. *See* appendix D to AHRI 1200–2023. Figure 10 in AHRI 1200–2023 appendix D shows a service over counter unit similar to the example described earlier in this section. The food load is included only in the lowest portion of the refrigerated cabinet, and as a result, only portions of the transparent areas are considered for the TDA (*i.e.,* the portions through which the food load is visible at an angle normal to the transparent area).

Consistent with the updated version of AHRI 1200–202X, DOE did not propose revisions to the current TDA in the June 2022 NOPR. 87 FR 39164, 39208. As discussed, DOE proposed in the June 2022 NOPR to incorporate by reference AHRI 1200–202X, which includes the new appendix D to provide clarification on how to apply the current TDA approach to different CRE configurations. 87 FR 39164, 39208.

DOE is aware that the current DOE test procedure includes conflicting instructions regarding the calculation of TDA for CRE with transparent and non-transparent areas over the length of the case. The instructions in section 3.1 of appendix B specify determining the length of the display area as the interior length of the CRE model, provided no more than 5 in. of that length consists of non-transparent material; or, for those cases with greater than 5 in. of non-transparent area, the length shall be determined as the projected linear dimension(s) of visible product plus 5 in. Figures A3.4 and A3.5 of appendix B show a similar approach, but instead reference 10 percent of the total length as the threshold of non-transparent area rather than 5 in. The captions for these figures reference 5 in., consistent with section 3.1. The April 2014 Final Rule established these TDA provisions in appendix B. 79 FR 22277, 22300–22301. In the April 2014 Final Rule, DOE stated that the 10-percent approach rather than the 5-in. approach would allow for more consistent application of the TDA requirements across CRE models. *Id.*

In addition, DOE incorrectly applied the 10-percent threshold approach as shown in Figures A3.4 and A3.5 of appendix B. As discussed, DOE intended to provide a consistent TDA approach for cases with transparent and non-transparent areas. The equation for length shown in Figure A3.5 shows that length equals the total transparent dimension, multiplied by 1.10. As a result, the non-transparent area would represent 10 percent of the transparent dimension, not 10 percent of the total length. The correct application would have length equal to the transparent dimension divided by 0.9—resulting in a non-transparent area representing 10 percent of the total length.

Section D.1.1.1 of AHRI 1200–202X appendix D includes correct equations regarding TDA and case length as intended in the April 2014 Final Rule. Specifically, AHRI 1200–202X applies the 10-percent threshold approach for non-transparent area and correctly calculates the length of the CRE for cases with non-transparent areas greater than 10 percent of the length of the case. As discussed, DOE proposed in the NOPR to incorporate by reference AHRI 1200–202X, which would correct the errors regarding TDA calculations currently included in appendix B.

DOE did not receive any comments in response to the June 2022 NOPR regarding the TDA instructions, and is adopting the provisions as proposed by referencing AHRI 1200–2023.

G. Alternative Refrigerants

DOE's current test procedure for remote condensing CRE requires the estimation of compressor EER from Table 1 of AHRI 1200–2010. The EER ratings in the table are based on performance of reciprocating compressors and were developed based on refrigerants that historically have been commonly used for CRE (*i.e.,* R–404A).

Certain remote CRE installations can use R–744; however, the existing remote CRE test procedure does not address the unique operation for these systems. For example, the current DOE test procedure requires an inlet refrigerant liquid temperature of 80 °F with a saturated liquid pressure corresponding to a condensing temperature of 89.6 °F to 120.2 °F. *See* ASHRAE 72–2005, sections 4.3.2 and 4.3.3. R–744 has a critical point of 87.8 °F and 1,070 pounds per square inch (''psi''), above which it is a supercritical fluid. Accordingly, R–744 cannot be a liquid

at the specified condensing temperature conditions (*i.e.,* it would either be a gas or supercritical fluid, depending on pressure). Additionally, R–744 systems typically include multiple stages of compression and cooling, resulting in liquid supplied to the refrigerant cases at conditions not necessarily defined by the typical condensing unit conditions. DOE has recently granted a waiver for specific models of CRE to address R–744 operating conditions for testing walk-in cooler and walk-in freezer unit coolers. 86 FR 14887 (March 19, 2021; ''March 2021 Waiver''). For testing of the specified basic models, the March 2021 Waiver requires liquid inlet saturation temperature and liquid inlet subcooling of 38 °F and 5 °F, respectively. 86 FR 14887, 14889. The March 2021 Waiver also maintains the existing compressor energy consumption determination based on an approach consistent with the CRE remote calculations using AHRI 1200–2010 (the walk-in requirements instead refer to the walk-ins rating standard, AHRI 1250–2009, which includes the same EER table as AHRI 1200–2010). *Id.*

For all remote CRE, the DOE test procedure requires measuring energy consumption of the refrigerated case and the heat gain of the refrigerant providing cooling to the remote case. AHRI 1200–2010 specifies a calculation of compressor energy consumption based on the heat gain measured for the test refrigerant. DOE is aware that manufacturers may specify the use of multiple refrigerants for a single remote CRE cabinet and that the current test procedure allows for consistent testing of such equipment regardless of refrigerant used for testing. Manufacturers are already testing and rating systems that can use R–744, likely by testing with non- R–744 refrigerants under the existing test conditions, according to the existing approach, which references AHRI 1200–2010. DOE expects that any ratings for current R–744 systems are based on testing with another refrigerant capable of maintaining the conditions specified in ASHRAE 72–2005.

Based on a review of CRE that are capable of using R–744, DOE observed that many of these models also may be installed for use with other refrigerants that can be tested under the existing approach. However, any remote CRE that are intended for use only with R–744 would not be able to be tested according to the current DOE test procedure due to the specified liquid conditions specified in ASHRAE 72–2005. To allow for testing remote CRE with R–744, DOE proposed in the June 2022 NOPR to adopt alternate refrigerant conditions consistent with those granted in the March 2021 Waiver for walk-in cooler and walk-in freezer unit coolers with CO_2 refrigerant. 87 FR 39164, 39209. DOE proposed that for remote CRE tested with direct expansion CO_2, the liquid inlet saturation temperature be 38 °F with liquid inlet subcooling of 5 °F. 87 FR 39164, 39209, 39210.

DOE research into the performance of different configurations of R–744 booster systems indicates that enhanced R–744 cycles can match conventional refrigerants in average efficiency. Even though the EER values included in AHRI 1200–202X for remote compressors were initially established for conventional refrigerants, DOE tentatively determined in the June 2022 NOPR that they are also appropriate for determining compressor energy consumption of CO_2 remote systems. 87 FR 39164, 39210. DOE recognizes that the actual compressor energy consumption of a specific remote system will vary based on a number of parameters (*e.g.,* ambient conditions, refrigerant conditions necessary for the remote cases), but tentatively determined in the June 2022 NOPR that the values included in AHRI 1200–202X are appropriate for determining the energy consumption of an average use cycle for all remote CRE as tested under the proposed test procedure. *Id.*

In addition to R–744, in this final rule, DOE has determined that the EER table in AHRI 1200–2023 is appropriate for other alternative refrigerants. DOE similarly researched compressor EERs at a range of operating conditions for refrigerants other than R–404A, including R–407A, R–407F, and R–507A, and found the existing EERs to be representative based on expected operating conditions. Additionally, AHRI 1200–2023 further improves the consistency of the EER approach by including additional instructions regarding the use of high-glide refrigerants. DOE did not propose additional amendments to address alternative refrigerants other than CO_2 in the June 2022 NOPR. 87 FR 39164, 39210.

In the June 2022 NOPR, DOE requested comment on the proposed alternate refrigerant conditions to be used for testing remote CRE with CO_2 refrigerant. *Id.* DOE requested comment on whether any other aspects of the current test procedure require amendment to allow for testing with CO_2 or any other alternative refrigerants. *Id.*

AHRI commented that regarding testing with CO_2 (*i.e.,* R–744) or any other alternate refrigerants, it is not aware of any alternative refrigerants, nor is it aware of any aspects of the current test procedure that would require amendments to the test procedure. (AHRI, No. 38, p. 13) AHRI stated that manufacturers are still working to determine which refrigerants they will use to comply with the AIM Act, and advised DOE to consider that there may be additional refrigerants and properties to those refrigerants that are currently unknown and will need to be taken under consideration. *Id.* AHRI tentatively agreed with the proposed alternate condition for testing CRE with CO_2 refrigerant as specified by DOE, that ''the liquid inlet saturation temperature be 38 °F with liquid inlet subcooling of 5 °F.'' *Id.* AHRI stipulated that it would be necessary to add tolerances to both liquid temperature and subcooling values and recommended DOE wait for the ASHRAE 72 committee to address typical conditions for CO_2 remote CRE in its ASHRAE 72 update. *Id.*

The Joint Commenters commented that they support DOE's proposals regarding the use of a CO_2 refrigerant (*i.e.,* R–744). (Joint Commenters, No. 31, p. 1) The Joint Commenters also stated their support for DOE's proposed specifications regarding CO_2 refrigerant in remote condensing CRE. (Joint Commenters, No. 31, p. 4) The Joint Commenters noted that DOE's current test procedure did not account for the unique operating conditions of CO_2-charged systems and that DOE proposed in the NOPR to adopt alternate refrigerant conditions consistent with those granted in a March 2021 waiver for walk-in cooler and walk-in freezer unit coolers using CO_2 refrigerant.[33] *Id.* The Joint Commenters expressed support for this change, stating it would result in more representative energy usage for CRE utilizing CO_2 refrigerant. *Id.*

Hillphoenix tentatively agreed with the proposed alternate condition for testing CRE with CO_2 refrigerant (*i.e.,* R–744) as specified by DOE: ''the liquid inlet saturation temperature be 38 °F with liquid inlet subcooling of 5 °F''; however, Hillphoenix stated that it would be necessary to add tolerances to both liquid temperature and subcooling values. (Hillphoenix, No. 35, p. 7) Hillphoenix recommended that DOE should wait for an update to ASHRAE 72 because the committee is addressing typical conditions for CO_2 remote CRE testing. *Id.*

In the August 2022 public meeting, Arneg commented that if regarding the proposal for the liquid inlet saturation temperature to be 38 °F and a 5 °F sub-

[33] 87 FR 39209, 39210.

cooling, or bottom-line 33 °F liquid, there would be an operational problem at the medium-temperature CO_2 (*i.e.,* R–744) application. (Public Meeting Transcript, No. 41, p. 48) Arneg stated that it is not sure what that 38 °F and 5 °F are representing. *Id.* Arneg commented that at this rate, for 33 °F liquid inlet temperature, there is an issue with medium-temperature application. *Id.* When prompted as to whether there was any temperature it considers more appropriate or representative, Arneg stated that 36 °F to 38 °F seems to be a reasonable temperature range. *Id.*

Zero Zone commented that the proposed temperatures for testing CO_2 (*i.e.,* R–744) are appropriate but recommended that DOE utilize tolerances similar to those stated for liquid refrigerant temperature in the current draft of ASHRAE 72. (Zero Zone, No. 37, p. 9) Zero Zone commented that CO_2 systems have a certain degree of operational instability and recommended that there should be a tolerance for the average and a tolerance for individual measurement. *Id.* Zero Zone recommended these tolerances should be applied to the refrigerant temperature and the saturated refrigerant temperature of CO_2. *Id.* Zero Zone further urged that this issue should be addressed by the ASHRAE 72 working group. *Id.*

DOE agrees with commenters that revisions to certain liquid refrigerant test conditions and tolerances are appropriate for the liquid refrigerant test conditions. DOE recognizes that remote CRE using R–744 are currently available and that a future version of ASHRAE 72 may include liquid refrigerant test conditions for CRE connected to a direct expansion remote condensing unit with R–744, however an updated version of ASHRAE 72 with such conditions is not yet available.

ASHRAE 72–2022 with Errata specifies liquid refrigerant temperature, liquid refrigerant pressure, and liquid refrigerant subcooling for liquid refrigerant test conditions for direct-expansion remote units. In the June 2022 NOPR, DOE proposed a liquid inlet saturation temperature of 38 °F with a liquid inlet subcooling of 5 °F for R–744, which together would require a liquid refrigerant temperature of 33 °F, which is consistent with Arneg's comment in the August 2022 public meeting.

As stated, Arneg also suggested a different liquid refrigerant temperature of between 36 °F to 38 °F (mid-point temperature is 37 °F).

Commenters agreed with the liquid inlet saturation temperature (specified as the liquid refrigerant pressure or the saturated liquid pressure corresponding to a condensing temperature in ASHRAE 72–2022 with Errata) of 38 °F and, consistent with feedback from commenters, DOE is maintaining that test condition in this final rule. However, as suggested by comments received in response to the June 2022 NOPR, DOE considered tolerances for the liquid refrigerant temperature, saturation temperature, and subcooling requirements.

ASHRAE 72–2022 with Errata specifies the liquid refrigerant temperature to be 80.0 °F with a tolerance for the average over the test period of ±5.0 °F and a tolerance for the individual measurements of ±10.0 °F. Also, ASHRAE 72–2022 with Errata specifies the saturated liquid pressure corresponding to a condensing temperature in the range of 89.6 °F to 120.2 °F (*e.g.,* roughly a ±15 °F range) for the average over test period. These liquid conditions and tolerances are based on operation in a single-compressor-stage system rejecting heat to outdoor ambient conditions. Because the liquid entering display cases in CO_2 booster systems is at an intermediate temperature and pressure (*i.e.,* at a level between the high-side outdoor heat rejection conditions and the low-side display case evaporating conditions), it is not expected that the potential range of its temperature or pressure could be as large. In order to maintain test condition flexibility while addressing these differences for CO_2, DOE is selecting reduced allowable ranges for the saturated temperature and temperature conditions, specifically ±6 °F for the average saturation temperature, and ±3 °F for the average liquid temperature. Therefore, for commercial refrigerators, freezers, and refrigerator-freezers connected to a direct expansion remote condensing unit with R–744, DOE is requiring in this final rule that, instead of the saturated liquid pressure corresponding to a condensing temperature range specified in appendix A to ASHRAE 72–2022 with Errata, the saturated liquid pressure corresponding to a condensing temperature range shall be 38.0 °F ±6.0 °F or 32.0 °F to 44.0 °F for the average over test period.

DOE notes that, during operation, liquid temperature must remain below saturation temperature to prevent formation of bubbles in the liquid line, which can cause flow instability through the refrigerant expansion device. Hence, DOE is reducing the specified liquid temperature from the 33 °F level adopted in the Hussmann waiver to 30 °F. This would not completely eliminate crossover of these temperature with the selected tolerances, but would limit the potential for such crossover (*i.e.,* maximum liquid temperature would be 33 °F, while minimum saturation temperature would be 32 °F).

To ensure that no such crossover could occur, DOE is requiring that subcooling (the difference between saturation temperature and liquid temperature) be at least 2 °F. While ASHRAE 72–2022 with Errata specifies subcooling >0 °R, the specified accuracy for the temperature measurement is ±1.4 °F. Therefore, to ensure subcooling occurs, DOE has determined to use the test condition tolerance for liquid refrigerant subcooling of >2 °R for average over test period, which with the given accuracy requirement would ensure at least 0.6 °F subcooling.

DOE recognizes that fluctuations could occur during testing, *e.g.,* the refrigerant liquid temperature could fluctuate. As mentioned above, DOE is requiring that the average refrigerant temperature vary no more than 3 °F from the specified 30 °F target. To limit fluctuations, DOE is additionally requiring that the maximum range of individual liquid temperature measurements be ±5 °F. This is consistent with the operating tolerance ranges for refrigerant liquid saturation temperature and subcooling allowed for testing of WICF unit coolers [34] in AHRI 1250–2020 (*i.e.,* the latest version of the test standard specified in the March 2021 Hussmann waiver). Therefore, for commercial refrigerators, freezers, and refrigerator-freezers connected to a direct expansion remote condensing unit with R–744, DOE is requiring in this final rule that, instead of the liquid refrigerant test conditions specified in appendix A to ASHRAE 72–2022 with Errata, the liquid refrigerant temperature shall be 30.0 °F with a tolerance for the average over test period of ±3.0 °F and a tolerance for the individual measurements of ±5.0 °F.

DOE has determined that these liquid refrigerant test conditions for CRE connected to a direct expansion remote condensing unit with R–744 are representative, repeatable, and reproducible.

In summary, for commercial refrigerators, freezers, and refrigerator-freezers connected to a direct expansion remote condensing unit with R–744, DOE is requiring in this final rule that, instead of the liquid refrigerant

[34] Unit coolers are the walk-in component most comparable to remote refrigerated cabinets, in that they operate with high-pressure subcooled liquid entering the component and low-pressure superheated vapor leaving it.

measurements for direct-expansion remote units specified in appendix A to ASHRAE 72–2022 with Errata, the liquid refrigerant measurements for direct-expansion remote units shall be: liquid refrigerant temperature shall be 30.0 °F with a tolerance for the average over test period of ±3.0 °F and a tolerance for the individual measurements of ±5.0 °F; liquid refrigerant pressure shall be the saturated liquid pressure corresponding to a condensing temperature in the range of 32.0 °F to 44.0 °F for the average over test period; and liquid refrigerant subcooling shall be greater than 2.0 °R for the average over test period.

If manufacturers adopt additional refrigerant types that cannot be tested according to the test procedure as established in this final rule, manufacturers may petition for a waiver to ensure that equipment using such refrigerants can be tested and certified to DOE.

H. Certification of Compartment Volume

DOE's current test procedure incorporates by reference AHAM HRF–1–2008 to measure compartment volume. DOE acknowledges that manufacturers often use CAD in designing their equipment. However, the current test procedure and certification provisions for CRE do not provide for using CAD drawings to determine compartment volume. Using CAD drawings as the basis for determining compartment volumes may be particularly helpful when the geometric designs of the CRE make physical measurements in accordance with AHAM HRF–1–2008 difficult. Currently, DOE's certification requirements in 10 CFR part 429 include provisions for certifying volume for basic models of consumer refrigeration products, commercial gas-fired and oil-fired instantaneous water heaters, and hot water supply boilers using CAD drawings. 10 CFR 429.72(c), (d), and (e).

DOE tentatively determined in the June 2022 NOPR that calculating volume according to CAD drawings would reduce manufacturer test burden and may allow for more accurate measurements of volume for complicated cabinet designs. 87 FR 39164, 39210. DOE proposed in the June 2022 NOPR to adopt provisions in 10 CFR part 429 to allow for certifying volume for basic models of CRE using CAD drawings. To ensure that volumes determined based on CAD drawings are consistent with testing actual production models, DOE also proposed certain enforcement provisions as discussed in section III.J of this final rule.

DOE did not receive any comments in response to the proposal for using CAD drawings for volume measurements, and is adopting those provisions as proposed in the June 2022 NOPR.

I. Test Procedure Waivers

A person may seek a waiver from the test procedure requirements for a particular basic model of a type of covered equipment when the basic model for which the petition for waiver is submitted contains one or more design characteristics that (1) prevent testing according to the prescribed test procedure or (2) cause the prescribed test procedures to evaluate the basic model in a manner so unrepresentative of its true energy consumption characteristics as to provide materially inaccurate comparative data. 10 CFR 431.401(a)(1).

In addition to the test procedure waivers discussed, DOE granted test procedure waivers to address certain CRE designed for specialized applications. Specifically, on September 12, 2018, DOE published a test procedure waiver for ITW for testing specified basic models of grocery and general merchandise system equipment (*i.e.,* refrigerated storage allowing for order storage and customer pickup). 83 FR 46148 (''September 2018 Waiver''). The specified basic models have characteristics that include floating suction temperatures for individual compartments, different typical door-opening cycles, and a high-temperature ''ambient'' compartment. 83 FR 46148, 46149. DOE similarly granted Hussmann an interim waiver for testing CRE intended for short-term storage and designed for loading and retrieving product a limited number of times per day. 86 FR 40548 (July 28, 2021; ''July 2021 Interim Waiver'').

DOE proposed in the June 2022 NOPR to adopt test procedure provisions to address the equipment characteristics at issue in the September 2018 Waiver and the July 2021 Interim Waiver. 87 FR 39164, 39211. For both waiver cases, the subject basic models are intended for short-term storage of refrigerated merchandise and limited door opening cycles per day (*e.g.,* holding customer orders and maintaining refrigerated temperatures until customer pickup). DOE acknowledges that this equipment includes individual-secured compartments that are accessible only to the customer for order retrieval (*e.g.,* by providing the customer with a unique unlocking function to access the compartment). DOE also conducted a review of the market of this type of equipment and found similar characteristics and features in currently available models (*e.g.,* contactless pickup of customer orders using digital locks). Therefore, DOE proposed in the NOPR to name this equipment ''customer order storage cabinets'' to differentiate it from other CRE. DOE is proposing to define ''customer order storage cabinets'' as CRE that store customer orders and include individual, secured compartments with doors that are accessible to customers for order retrieval. 87 FR 39164, 39211.

Consistent with the waiver and interim waiver, DOE proposed in the June 2022 NOPR that customer order storage cabinets be tested according to the conventional CRE test procedure, except that the door openings be conducted by opening each door to the fully open position for 8 seconds, once every 2 hours, for 6 door-opening cycles. *Id.* DOE tentatively determined in the June 2022 NOPR that this proposed approach, consistent with the September 2018 Waiver and the July 2021 Interim Waiver, was representative of typical use of this equipment. *Id.*

In the June 2022 NOPR, DOE requested comment on the proposed term ''customer order storage cabinet'' and its definition to describe the equipment currently addressed in the September 2018 Waiver and the July 2021 Interim Waiver. *Id.* DOE requested comment on the proposal to test such equipment with reduced door openings, consistent with the waiver and interim waiver approach. *Id.*

AHRI supported the proposed definition of ''customer order storage cabinet,'' and recommended that DOE consult with the ASHRAE 72 committee on this approach. (AHRI, No. 38, p. 14)

Hillphoenix agreed with the term ''customer order storage cabinet'' and definitions as proposed in the NOPR. (Hillphoenix, No. 35, p. 8) Hillphoenix recommended that DOE provide research for the opening characteristics used to determine the door-opening procedure. *Id.* Hillphoenix recommended that DOE approach industry and request updated testing standards that better reflect actual product intent, which would drive consistency within the industry and be less burdensome on manufacturers. *Id.*

In the August 2022 public meeting, True stated that regardless of whether the equipment is limited-opening or limited-application, it still has to comply with the food safety temperature requirements of NSF 7. (Public Meeting Transcript, No. 41, p. 24) True commented that providing the option for a different procedure on this application would be giving somebody

a pass for something that should not be considered. *Id.* True commented that the proposed term ''customer order storage cabinet'' and definition should not exist, as equipment intended to be used for order retrieval applications is designed to operate around the clock and not only at certain times, nor is it unplugged at night. (True, No. 28, p. 5) True commented that such units would therefore logically fall under the same category as a storage refrigerator or a storage freezer and should meet the same energy and temperature performance requirements (*i.e.,* −15 °F, 0 °F, and 38 °F) since these units are used to store perishable food items and therefore need to follow NSF/ANSI 7–2021. *Id.*

In the August 2022 public meeting, the CA IOUs commented that they wanted DOE to be aware that there are also heated and non-cooled storage cabinets, and there are products on the market that can do all three for the same compartments. (Public Meeting Transcript, No. 41, p. 24) As a result, the CA IOUs recommended that DOE add the word ''refrigerated'' to clarify things. *Id.*

DOE has reviewed operating characteristics for this equipment through the waivers received. DOE has based the reduced number of door openings on the customer usage data presented in those petitions for waiver and has determined that the number of openings is representative of an average use cycle for this equipment based on the available data. DOE notes that the available data indicate that the door openings for this equipment are significantly less frequent than for other types of CRE.

In response to True's comments, the purpose of DOE's test procedure measures the energy consumption of equipment during a representative average use cycle as compared to the purpose of NSF 7, which is ensuring food safety. DOE has identified unique equipment characteristics for this equipment and is establishing the definition of customer order storage cabinet as proposed in the June 2022 NOPR. DOE recognizes that the reduced number of door openings would result in lower energy use for this equipment as compared to the test procedure with door openings as specified in ASHRAE 72–2022 with Errata.

Because DOE has determined that this equipment can be defined by unique characteristics (*i.e.,* storing customer orders and including individual, secured compartments with doors that are accessible to customers for order retrieval) and it has significantly different operating characteristics as compared to other CRE (*i.e.,* 6 door-opening cycles in 24 hours as compared to 48 door-opening cycles for other CRE), DOE is adopting the definition and test method for this equipment as proposed in the June 2022 NOPR.

Regarding heated or non-cooled storage cabinets, such storage cabinets without cooling functionality would not meet the definition of CRE. The definition of customer order storage cabinet specifies that this equipment is a commercial refrigerator, freezer, or refrigerator-freezer; therefore, DOE has determined that specifying customer order storage cabinets are refrigerated is not necessary.

In addition to door-opening cycles, the September 2018 Waiver specifies testing provisions for other characteristics of the specified basic models, including floating suction temperatures for individual compartments and the presence of a high-temperature ''ambient'' compartment. 83 FR 46148, 46149–46152.

To address the floating suction temperature aspect of the basic models subject to the September 2018 Waiver, DOE requires the use of an alternate test approach for testing and rating the equipment in a manner similar to the remote CRE test procedure. 83 FR 46148, 46151. Specifically, DOE requires that this equipment be tested using an inverse refrigeration load test (*i.e.,* a reverse heat leak method). *Id.* This test allows for determining the thermal load of the cabinet at the specified storage temperatures without requiring refrigerant to be supplied to the unit (as refrigerant is supplied from an integral condensing unit). The September 2018 Waiver specifies calculating energy consumption associated with the thermal load based on assumed EERs, consistent with those specified in AHRI 1200–2010. 83 FR 46148, 46151–46152. The calculations also account for component energy consumption and heat loads. *Id.* DOE proposed in the June 2022 NOPR to adopt this alternate test procedure for any customer order storage cabinets that supply refrigerant to multiple individual-secured compartments and that allow the suction pressure from the evaporator in each individual-secured compartment to float based on the temperature required to store the customer order in that individual-secured compartment. 87 FR 39164, 39211.

For the high-temperature ''ambient'' compartments in the basic models specified in the September 2018 Waiver, DOE requires that testing be based on a 75 °F storage temperature for these compartments and that the ambient compartment be treated as a medium-temperature compartment at 75 °F. 83 FR 46148, 46150. The September 2018 Waiver also requires that all volume and energy consumption calculations be included within the medium-temperature category and summed with other medium-temperature compartment calculations. *Id.* The September 2018 Waiver further requires that compartments that are convertible between ambient and refrigerator temperature ranges be tested at the refrigerator temperature (38 °F) and that compartments that are convertible between refrigerator and freezer (0 °F) temperature ranges be tested at both temperatures. *Id.* DOE proposed in the June 2022 NOPR to adopt the existing waiver instructions for customer order storage cabinets that have at least one individual-secured compartment that is not capable of maintaining an IAT below the ambient dry-bulb temperature (*i.e.,* the individual-secured compartment(s) may include refrigeration systems to ensure proper storage temperatures but are only intended to operate at an IAT of 75 °F ±2 °F and not at a LAPT or the specified refrigerator or freezer temperatures). 87 FR 39164, 39211. Additionally, with the proposed introduction of high-temperature refrigerators, as discussed in sections III.A.1 and III.B.1.b of this final rule, DOE proposed that such compartments would be treated as high-temperature refrigerators rather than refrigerators upon the compliance date of any new energy conservation standards for high-temperature refrigerators. *Id.*

In the June 2022 NOPR, DOE requested comment on the additional proposed test procedure amendments that would allow for reverse heat leak testing of customer order storage cabinets with floating suction pressures for multiple different temperature compartments. *Id.*

AHRI requested more information from DOE regarding the additional proposed test procedure amendments that would allow for reverse heat leak testing of customer order storage cabinets with floating suction pressures for multiple temperature compartments. (AHRI, No. 38, p. 14)

Hillphoenix stated tentative disagreement with the additional proposed test procedure amendments and recommended clarification of the proposed process. (Hillphoenix, No. 35, p. 8) Hillphoenix commented that DOE should not adopt the amendments until industry reviews, tests, and approvals are given by industry standards committees. *Id.*

As discussed in the petition leading to the September 2018 Waiver, the condensing unit control functionality is similar to that found on a parallel rack in a supermarket, with refrigeration capacity managed with a floating or moving saturated suction temperature. See 82 FR 33081, 33092. DOE received no comments in response to the notice announcing the petition for waiver and interim waiver approach, and granted the September 2018 Waiver. DOE has determined that this equipment has a different usage profile as compared to other CRE, and is establishing the alternate test procedure as proposed in the June 2022 NOPR, and consistent with the approach granted in the September 2018 Waiver.

J. Enforcement Provisions

Subpart C of 10 CFR part 429 establishes enforcement provisions applicable to covered products and covered equipment, including CRE. Product-specific enforcement provisions are established in 10 CFR 429.134. Various provisions in 10 CFR 429.134 specify which ratings or measurements DOE will use to determine compliance with applicable energy or water conservation standards. Generally, DOE provides that the certified metric is used for enforcement purposes (*e.g.,* calculation of the applicable energy conservation standard) if the average value measured during assessment and enforcement testing is within a specified percent of the rated value. Otherwise, the average measured value would be used.

Section 429.134 currently does not contain product-specific enforcement provisions for CRE. However, DOE does currently provide product-specific enforcement provisions for refrigerated bottled or canned beverage vending machines, specifying that the certified refrigerated volume will be considered valid only if the measurement(s) (either the measured refrigerated volume for a single-unit sample or the average of the measured refrigerated volumes for a multiple-unit sample) is within 5 percent of the certified refrigerated volume. 10 CFR 429.134(j)(1). The test procedure for measuring volume of beverage vending machines is consistent with the procedure required for CRE, and vending machines typically have volumes similar to those for CRE. Because of the same test methods and similar equipment sizes, in the June 2022 NOPR, DOE proposed consistent product-specific enforcement provisions for CRE. 87 FR 39164, 39211. Specifically, DOE proposed in the June 2022 NOPR to add a new product-specific enforcement provision section stating that the certified volume for CRE will be considered valid only if the measurement(s) (either the measured volume for a single-unit sample or the average of the measured volumes for a multiple-unit sample) is within 5 percent of the certified volume; otherwise, the measured volume would be used as the basis for determining the applicable energy conservation standard. *Id.*

DOE has also established product-specific enforcement provisions for transparent areas of beverage vending machines. 10 CFR 429.134(j)(2). However, display area is only used to determine equipment class for beverage vending machines and TDA is not a metric used to determine applicable energy conservation standards. For consistency with the volume approach, DOE proposed in the June 2022 NOPR that the certified TDA for CRE will be considered valid only if the measurement(s) (either the measured TDA for a single-unit sample or the average of the measured TDAs for a multiple-unit sample) is within 5 percent of the certified TDA. 87 FR 39164, 39212. If the certified TDA is found not to be valid, the measured TDA would be used to determine the applicable energy conservation standard.

In the June 2022 NOPR, DOE requested comment on the proposed product-specific enforcement provisions for CRE. 87 FR 39164, 39212.

AHRI commented expressing concern that the proposed product-specific enforcement provisions for CRE are not open-ended, but it offered tentative support for the proposed provisions and requested that DOE provide more information through a public meeting to clarify intent. (AHRI, No. 38, p. 14)

Hillphoenix recommended that DOE clarify how enforcement would be applied if the sampling plan were to be adopted and how implementing such provisions would benefit end users and/or manufacturers. (Hillphoenix, No. 35, p. 8)

NAMA commented that it understood the desire to develop common language on certified volume measurements; however, a beverage vending machine and a bottle cooler are not necessarily the same product since in a BVM, bottles or cans have specific placement and the volume could be constructed based on the uniform measurement of the refrigerated space available for the beverage containers, while a bottle cooler's refrigerated space depends on how a customer decides on placement. (NAMA, No. 33, p. 3) NAMA urged DOE to study this issue more closely and to use examples of how DOE intended to measure the volume in this case and why it believed certified volume should be stated in the same way as BVM because manufacturers might file Test Procedure Waivers for individual cases. *Id.*

The relevant capacity metrics for CRE will continue to be tested in accordance with the DOE test procedure for CRE, not BVMs. DOE referred to BVMs only as an example of another equipment type with product-specific enforcement provisions and a similar capacity metric (*i.e.,* volume).

Product-specific enforcement provisions are included to clarify how DOE would determine compliance in the case of any enforcement actions. For equipment such as CRE, the applicable energy conservation standard is calculated based on the capacity metric. Product-specific enforcement provisions provide manufacturers certainty that DOE will determine compliance based on the same capacity metrics as the manufacturer, so long as the capacity metrics are rated correctly (*i.e.,* these provisions provide certainty regarding the maximum daily energy consumption for a given CRE basic model, if volume or TDA are rated correctly). DOE has these provisions for many similar products and equipment. If the tested volume or TDA from DOE enforcement testing is near the certified value, DOE will use the certified value as the basis for calculating the appliable standard for compliance determinations. For the reasons discussed, DOE is adopting the product-specific enforcement provisions as proposed in the June 2022 NOPR.

The product-specific enforcement provisions are intended to provide clarity on the energy conservation standard applicable to a specific basic model of CRE. Determinations of compliance based on tested energy consumption will continue to be based on the enforcement provisions in 10 CFR 429.110.

K. Lowest Application Product Temperature

Section 2.2 of appendix B specifies that if a unit is not able to be operated at the specified IAT, the unit is tested at the LAPT, defined in 10 CFR 431.62 as the lowest IAT at which a given basic model is capable of consistently operating (*i.e.,* maintaining so as to comply with the steady-state stabilization requirements specified in ASHRAE 72–2005 for the purposes of testing under the DOE test procedure). Section 2.2 of appendix B specifies that for units equipped with a thermostat, LAPT is the lowest thermostat setting; for remote condensing equipment without a thermostat or other means of

controlling temperature at the case, the LAPT is the temperature achieved with the dew point temperature (as defined in AHRI Standard 1200–2010) set to 5 degrees colder than that required to maintain the manufacturer's lowest specified application temperature.

DOE's Compliance Certification Database [35] lists all CRE models certified to DOE, including the LAPT used for rating each model, if applicable. Of the 28,478 single-compartment individual models included in the Compliance Certification Database at the time of the June 2022 NOPR analysis, 460 individual models are rated at LAPTs. Of these individual models, 77 are rated at LAPTs below the required test IAT. For example, multiple refrigerator models are rated at an IAT of 34 °F (instead of 38 °F ±2 °F), and multiple freezer models are rated at an IAT of −7 °F (instead of 0 °F ±2 °F).

DOE proposed in the June 2022 NOPR to maintain the current LAPT provisions and add an additional provision for testing CRE that are only capable of maintaining temperatures below the specified IAT range (or for buffet tables or preparation tables, the average pan temperature of all measurements taken during the test). 87 FR 39164, 39212. For these units, DOE proposed in the June 2022 NOPR to test at the highest thermostat setting, which would allow testing the CRE under the setting closest to the required IAT (or for buffet tables or preparation tables, the average pan temperature of all measurements taken during the test). *Id.* Also in the NOPR, DOE proposed to amend the definition of LAPT in 10 CFR 431.62 to the following:

''Lowest application product temperature'' means the integrated average temperature (or for buffet tables or preparation tables, the average pan temperature of all measurements taken during the test) at which a given basic model is capable of consistently operating that is closest to the integrated average temperature (or for buffet tables or preparation tables, the average pan temperature of all measurements taken during the test) specified for testing under the DOE test procedure. 87 FR 39164, 39212.

For testing, DOE proposed in the June 2022 NOPR to specify that if a unit is not able to operate at the integrated average temperature specified for testing (or average pan temperature, as applicable), test the unit at the LAPT, as defined in 10 CFR 431.62. *Id.* DOE proposed that for units equipped with a thermostat, LAPT is the lowest thermostat setting (for units that are only able to operate at temperatures above the specified integrated average temperature or average pan temperature) or the highest thermostat setting (for units that are only able to operate at temperatures below the specified integrated average temperature or average pan temperature). *Id.* DOE proposed that for remote condensing equipment without a thermostat or other means of controlling temperature at the case, the LAPT is the temperature achieved with the dew point temperature, or mid-point evaporator temperature for high-glide refrigerants (as defined in AHRI Standard 1200–202X), set to 5 degrees colder than that required to maintain the manufacturer's specified application temperature closest to the specified integrated average temperature or average pan temperature. *Id.*

DOE tentatively determined in the June 2022 NOPR that this proposal would not affect current CRE ratings or testing costs, because the models currently available on the market that would be tested under the newly proposed provision are already testing and rating in accordance with the proposed approach. *Id.*

In response to the June 2022 NOPR, The CA IOUs commented that they support the proposal to shift to testing CRE product classes at consistent temperatures versus testing at the LAPT within each category, such as: low-temperature freezer (to be tested at 0 °F ±2 °F); medium-temperature refrigerator (to be tested at 38 °F ±2 °F); and high-temperature refrigerator (operates above 38 °F ±2 °F, to be tested at 55 °F). (CA IOUs, No. 36, p. 10) The CA IOUs added that testing at consistent product temperatures would improve comparability of energy consumption between products within each category. *Id.*

The updated provisions for ice cream freezers, low temp freezers, medium temp refrigerators, and high-temp refrigerators will limit the need to apply LAPT testing in the future. Equipment will be categorized and rated based on operating temperatures, consistent with the CA IOUs recommendations. To the extent that equipment in these categories cannot maintain the specified IAT, the equipment would either be classified in a different category or would be tested under the LAPT provisions.

Even with the updated operating temperature categories, basic models may still only be capable of maintaining temperatures below the specified IAT range for testing. DOE is adopting the LAPT rating provisions as proposed in the June 2022 NOPR to allow for testing and rating such basic models.

L. Removal of Obsolete Provisions

The DOE test procedure in appendix B is required for testing CRE manufactured on or after March 28, 2017, and appendix A applies to CRE manufactured prior to that date. As such, appendix A is now obsolete for new units being manufactured. Therefore, DOE proposed in the NOPR to remove appendix A. 87 FR 39164, 39212. DOE did not propose to redesignate appendix B as appendix A to avoid confusion regarding the appropriate version of the test procedure required for use. *Id.*

Additionally, the title to appendix B is currently ''Amended Uniform Test Method for the Measurement of Energy Consumption of Commercial Refrigerators, Freezers, and Refrigerator-Freezers.'' To avoid confusion with the other test procedure amendments proposed in this final rule, DOE proposed in the NOPR to amend the title to appendix B to remove the word ''amended.'' 87 FR 39164, 39212.

In the June 2022 NOPR, DOE also proposed to remove outdated standards incorporated by reference in 10 CFR 431.63 that would no longer be referenced under the proposed test procedure. *Id.* Specifically, DOE proposed to remove reference to ANSI/AHAM HRF–1–2004, AHAM HRF–1–2008, and ASHRAE 72–2005. *Id.* DOE would maintain the listing of standards referenced in 10 CFR 431.66 (''Energy conservation standards and their effective dates'') and would consider removing those referenced standards when proposing any amendments to that section of the CFR as part of any future amended energy conservation standards. *Id.*

DOE received no comments in response to the amendments proposed in the June 2022 NOPR and is adopting the changes as proposed.

M. Sampling Plan

DOE's current certification requirements mandate reporting of the chilled or frozen compartment volume in cubic feet, the adjusted volume in cubic feet, or the TDA (as appropriate for the equipment class). 10 CFR 429.42(b)(2)(iii). However, the sampling plan requirements in 10 CFR 429.42(a) do not specify how to determine the represented value of volume or TDA for each basic model based on the test results from the sample of individual models tested. Similar to the requirements for other covered products and commercial equipment, DOE

[35] U.S. Department of Energy Compliance Certification Database, available at *www.regulations.doe.gov/certification-data.*

proposed in the June 2022 NOPR that any represented value of volume or TDA for the basic model be determined as the mean of the measured volumes or TDAs for the units in the test sample, based on the same tests used to determine the reported energy consumption. 87 FR 39164, 39213. Although not currently specified in 10 CFR 429.42, DOE expects manufacturers are currently certifying CRE performance based on the tested volume and TDA. *Id.* Therefore, the amendment proposed in the June 2022 NOPR would clarify the certification requirements but not impose any additional burden on manufacturers. *Id.*

In the June 2022 NOPR, DOE sought comment on the proposed sampling plan for CRE volume and TDA. *Id.*

AHRI commented that the proposed sampling plan for CRE volume and TDA required modification and that DOE should certify the volume and TDA, stating that these are important values and critical to determining the allowable energy consumption of a product. AHRI recommended that DOE work with AHRI to modify standard AHRI 1200–202X and develop appropriate tolerances and also raise this issue with the appropriate standards committee for review and approval. (AHRI, No. 38, p. 14)

NAMA commented that it agreed with AHRI and advised DOE that the proposed sampling plan for CRE volume and TDA needed modification. (NAMA, No. 33, p. 4) NAMA commented that the current plan included no tolerances, and if DOE intended to measure and enforce standards for CRE volume and TDA, DOE must provide tolerances. *Id.* NAMA stated that DOE should also bring this issue to the appropriate standards committee for review and approval. *Id.*

Hussmann commented that the proposed sampling plan for CRE volume and TDA needed modification because it included no tolerances. (Hussmann, No. 32, p. 6) Hussmann commented that if DOE intended to measure and enforce standards for CRE volume and TDA, DOE must provide tolerances, and that DOE should take this issue to the appropriate standards committee for review and approval. *Id.*

Zero Zone stated agreement that DOE should certify the volume and TDA, as these are important values and critical to determining the allowable energy consumption of a product. (Zero Zone, No. 37, p. 10) Zero Zone commented that DOE's proposal of a 5-percent tolerance is too large, and that if the TDA measurements are different, equipment that passes when tested by a manufacturer could fail when tested by DOE. *Id.* Zero Zone recommended that DOE work with AHRI to modify standard 1200 to develop appropriate tolerances. *Id.*

Hillphoenix commented that if DOE intended to measure and enforce standards for CRE volume and TDA, then the process should be evaluated by the appropriate standards committee for approval. (Hillphoenix, No. 35, p. 8)

DOE's certification requirements in 10 CFR 429.42(b)(2) currently require manufacturers to certify volume or TDA for basic models. The sampling plan requirements established in this final rule, and consistent with those proposed in the June 2022 NOPR, clarify that the certified volume or TDA must be based on the mean of the measured values for the tested units of the basic model, based on the same tests used to determine the reported energy consumption.

In response to the comments regarding tolerance associated with the sampling plan to determine compliance and enforce standards, DOE interprets the comments as referring to DOE applying a tolerance around certified volumes or TDAs to determine the applicable maximum daily energy consumption standard level for a basic model. Such tolerances are applied in product-specific enforcement provisions as specified in 10 CFR 429.134. DOE is adopting product-specific enforcement provisions for CRE, as discussed in section III.J of this document.

N. Test Procedure Costs and Harmonization

1. Test Procedure Costs and Impact

In the June 2022 NOPR, DOE proposed to amend the existing test procedure for CRE to:

(1) Establish new definitions for high-temperature refrigerator, medium-temperature refrigerator, low-temperature freezer, and mobile refrigerated cabinet, and amend the definition for ice-cream freezer;

(2) Incorporate by reference the most current versions of industry standards AHRI 1200, ASHRAE 72, and AHRI 1320–2011;

(3) Establish definitions and test procedures for buffet tables and preparation tables;

(4) Establish definitions and test procedures for blast chillers and blast freezers;

(5) Amend the definition for chef base or griddle stand;

(6) Specify alternate conditions for alternative refrigerants;

(7) Allow for certification of compartment volumes based on CAD drawings;

(8) Incorporate provisions for defrosts and customer order storage cabinets currently specified in waivers and interim waivers;

(9) Adopt product-specific enforcement provisions;

(10) Clarify use of the LAPT provisions;

(11) Remove the obsolete test procedure in appendix A; and

(12) Specify a sampling plan for volume and TDA.

87 FR 39164, 39213–39214.

DOE tentatively determined in the June 2022 NOPR that the proposed amendments to the test procedure for CRE currently subject to testing would not impact testing costs, and manufacturers would be able to rely on data generated under the current test procedure should any of these additional proposed amendments be finalized. *Id.*

DOE proposed in the June 2022 NOPR to establish test procedures for additional categories of CRE not currently subject to the DOE test procedure: buffet tables or preparation tables, and blast chillers and blast freezers. *Id.* If a manufacturer chooses to make representations of the energy consumption of this equipment, beginning 360 days after a final rule, were DOE to finalize the proposal, manufacturers would be required to test according to the proposed test procedure. (42 U.S.C. 6314(d)) DOE discusses the costs associated with testing this equipment, if a manufacturer chooses to make representations of the energy consumption, in the following paragraphs.

In the November 2010 NOPR, DOE estimated CRE testing costs to be approximately $5,000 per unit. 75 FR 71596, 71607. Based on testing at third-party test facilities, DOE tentatively determined in the June 2022 NOPR that $5,000 is still a representative CRE test cost based on the existing DOE test procedure. 87 FR 39164, 39214. DOE has also tentatively determined that $5,000 is a representative per-test cost for the new test procedures proposed for the additional CRE categories (*i.e.,* buffet tables or preparation tables, blast chillers, and blast freezers).

For chef bases or griddle stands, DOE is amending the ambient test conditions in this final rule based on comments received in response to the June 2022 NOPR. Because DOE did not receive any information in response to the June 2022 NOPR indicating testing costs would change based on a different ambient test condition, DOE determined that the amended ambient test

conditions would not impact the $5,000 representative per-test cost for the amended CRE test procedure.

Chef bases or griddle stands are currently eligible for ENERGY STAR certification under Product Specification for Commercial Refrigerators and Freezers Version 5.0 which references 10 CFR part 431, subpart C, Appendix B as the required test method.[36] DOE observed that to the extent that chef bases or griddle stand manufacturers make representations regarding the energy consumption of their models, they do so in accordance with ENERGY STAR and the existing DOE test procedure. EPCA prescribes that, if DOE amends a test procedure, all representations of energy efficiency and energy use of CRE, including those made on marketing materials and product labels, must be made in accordance with that amended test procedure, beginning 360 days after publication of such a test procedure final rule in the **Federal Register**. (42 U.S.C. 6314(d)(1)) Therefore, the manufacturers currently making representations of the energy consumption of chef bases or griddle stands will be required to retest according to the test procedure beginning 360 days after this final rule, and may incur some retesting costs associated with their chef bases or griddle stand models if they choose to continue making such representations.

For any manufacturers not currently making representations of the energy use of chef bases or griddle stands, testing according to the amended test procedure will not be required for use (other than if making voluntary representations of energy consumption) until determining compliance with any energy conservation standards for chef bases or griddle stands, should DOE adopt such standards.

For buffet tables and preparation tables, the overall test duration would be similar to the test duration for CRE currently subject to the test procedure. The test would be a 24-hour test, and in the June 2022 NOPR DOE proposed stabilization requirements consistent with CRE currently subject to the test procedure. 87 FR 39164, 39214. The proposed test setup would not require the use of test simulators or test filler materials loaded in any refrigerated compartments, but would require loading pans with distilled water and identifying the appropriate control setting to maintain the specified average temperatures. DOE expects the overall test burden associated with loading and determining appropriate control settings to be similar for testing buffet tables and preparation tables, as proposed, and other CRE currently subject to the test procedure. While DOE has not quantified the differences in test burden, DOE determined that the test burden and duration for buffet and preparation tables is similar to CRE currently subject to the test procedure, and therefore the $5,000 per-test cost is appropriate.

For blast chillers and blast freezers, the overall duration of a test as proposed would be shorter than the 24-hour test period and stabilization period required for CRE currently subject to the test procedure. As proposed in the June 2022 NOPR, blast chiller and blast freezer testing would require the preparation of food simulator material, heating that material to the specified temperature, loading the heated test pans, and then conducting the test procedure as specified (DOE estimates approximately an 8-hour test duration per test). While DOE has not quantified the differences in test burden, DOE expects the increased test burden and decreased test burden to be comparable. Therefore, DOE tentatively determined in the June 2022 NOPR that $5,000 is a representative per-unit test cost for blast chillers and blast freezers, based on the test procedure proposed. 87 FR 39164, 39214.

Under the proposed test procedures, were a manufacturer to choose to make representations of the energy consumption of buffet tables or preparation tables, blast chillers, or blast freezers beginning 360 days after a final rule, and were DOE to finalize the proposal, manufacturers would be required to base such representations on the DOE test procedure. (42 U.S.C. 6314(d))

Based on a review of blast chillers and blast freezers available on the market, DOE determined in the June 2022 NOPR that manufacturers make no claims regarding the energy consumption of their models. 87 FR 39164, 39214.

After establishing any test procedure for blast chillers and blast freezers, DOE expects that the manufacturers currently electing to make no claims regarding energy consumption would continue to do so. Therefore, DOE tentatively determined in the June 2022 NOPR that the proposed test procedure for blast chillers and blast freezers would not impact testing costs should the proposed test procedure be finalized. 87 FR 39164, 39214.

Buffet tables and preparation tables are currently subject to test procedures under the California Code of Regulations. DOE observed that to the extent that buffet table and preparation table manufacturers make representations regarding the energy consumption of their models, they do so in accordance with the California Code of Regulations. EPCA prescribes that, if DOE amends a test procedure, all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with that amended test procedure, beginning 360 days after publication of such a test procedure final rule in the **Federal Register**. (42 U.S.C. 6314(d)(1)) Therefore, the manufacturers currently making representations of the energy consumption of buffet tables and preparation tables will be required to retest according to the test procedure beginning 360 days after this final rule, and may incur some retesting costs associated with their buffet table and preparation table models.

For any manufacturers not currently making representations of the energy use of buffet tables or preparation tables, blast chillers, or blast freezers, testing according to the test procedure will not be required (other than if making voluntary representations of energy consumption) until the compliance date of any energy conservation standards for that equipment, should DOE adopt such standards.

2. Harmonization With Industry Standards

DOE's established practice is to adopt relevant industry standards as DOE test procedures unless such methodology would be unduly burdensome to conduct or would not produce test results that reflect the energy efficiency, energy use, water use (as specified in EPCA) or estimated operating costs of that product during a representative average use cycle. 10 CFR 431.4; section 8(c) of appendix A 10 CFR part 430 subpart C. In cases where the industry standard does not meet EPCA statutory criteria for test procedures DOE will make modifications through the rulemaking process to these standards as the DOE test procedure.

The test procedures for CRE at 10 CFR 431.63 incorporate by reference AHRI 1200–2010 for definitions, test rating conditions, and calculations; ASHRAE 72–2005 for test conditions, equipment, measurements, and test conduct; and AHAM HRF–1–2008 for the volume measurement method.

In the June 2022 NOPR, DOE requested comment on the benefits and burdens of the proposed updates and additions to industry standards

[36] *See www.energystar.gov/sites/default/files/ENERGY%20STAR%20Version%205.0%20%28Rev.%20November%20-%202022%29%20Commercial%20Refrigerators%20and%20Freezers%20Specification.pdf.*

referenced in the test procedure for CRE. 87 FR 39164, 39215. DOE discusses comments received in response to the June 2022 NOPR regarding adopting provisions of industry standards in the relevant discussion sections of this final rule. DOE further describes industry standards incorporated by reference in section IV.N of this document.

AHRI 1200–2010 has been updated to AHRI 1200–2023 to provide additional direction regarding application of the standard and to provide volume measurement instructions (eliminating the need to reference AHAM HRF–1–2008). ASHRAE 72–2005 has similarly been updated in ASHRAE 72–2022 with Errata to reorganize the standard, provide updated setup instructions, revise the test sequence, and provide additional instructions for some test measurements. DOE tentatively determined in the June 2022 NOPR that these updates (at the time, in earlier or draft versions of the standards) provide additional detail for testing but would otherwise not impact energy consumption measurements compared to the current approach. In the June 2022 NOPR, DOE also proposed to incorporate by reference an existing industry standard for testing buffet tables and preparation tables: ASTM F2143–16. This standard provides instructions regarding setup and test conduct. DOE is also aware of the CRE industry standard NSF/ANSI 7–2021,[37] which establishes minimum food protection and sanitation requirements for the materials, design, manufacture, construction, and performance of CRE and CRE components.

O. Effective and Compliance Dates

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

Upon the compliance date of test procedure provisions in this final rule any waivers that had been previously issued and are in effect that pertain to issues addressed by such provisions are terminated. 10 CFR 431.401(h)(3). Recipients of any such waivers are required to test the products subject to the waiver according to the amended test procedure as of the compliance date of the amended test procedure. The amendments proposed in this document pertain to issues addressed by waivers and interim waivers granted to AHT (Case Nos. CR–006, 2017–007, 2020–023, 2020–025, 2022–001, and 2022–002), ITW (Case No. CR–007), and Hussmann (Case No. 2020–003). *See* sections III.F.1 and III.I of this final rule for a discussion of the proposals to address the issues in the existing waivers and interim waivers.

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Orders 12866, 13563 and 14094

Executive Order (''E.O.'') 12866, ''Regulatory Planning and Review,'' as supplemented and reaffirmed by E.O. 13563, ''Improving Regulation and Regulatory Review, 76 FR 3821 (Jan. 21, 2011) and amended by E.O. 14094, ''Modernizing Regulatory Review,'' 88 FR 21879 (April 11, 2023), requires agencies, to the extent permitted by law, to (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public. DOE emphasizes as well that E.O. 13563 requires agencies to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. In its guidance, the Office of Information and Regulatory Affairs (''OIRA'') in the Office of Management and Budget (''OMB'') has emphasized that such techniques may include identifying changing future compliance costs that might result from technological innovation or anticipated behavioral changes. For the reasons stated in the preamble, this final regulatory action is consistent with these principles.

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

B. Review Under the Regulatory Flexibility Act

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

[37] In response to the June 2022 NOPR, interested parties commented in reference to NSF 7–2019. NSF 7–2021 was published after the June 2022 NOPR comment period ended. DOE did not observe any changes from the 2019 to 2021 version that would impact the comments received or DOE's proposal to reference industry standards other than NSF 7–2019 or NSF 7–2021.

number of small entities. The factual basis for this certification is as follows.

DOE uses the Small Business Administration (''SBA'') small business size standards to determine whether manufacturers qualify as ''small businesses,'' which are listed by the North American Industry Classification System (''NAICS''). The SBA considers a business entity to be small business if, together with its affiliates, it employs less than a threshold number of workers specified in 13 CFR part 121. CRE manufacturers, who produce the equipment covered by this final rule, are classified under NAICS code 333415, ''Air-conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing.'' The SBA sets a threshold of 1,250 employees or fewer for an entity to be considered a small business for this category. This employee threshold includes all employees in a business's parent company and any other subsidiaries.

DOE has recently conducted a focused inquiry into small business manufacturers of the CRE covered by this rulemaking. As with the initial regulatory flexibility analysis, DOE accessed its Compliance Certification Database (''CCD''),[38] California Energy Commission's Modernized Appliance Efficiency Database System (''MAEDbS''),[39] and other public sources, including manufacturer websites, to create a list of companies that produce, manufacture, import, or private label the CRE covered by this rulemaking. DOE refreshed its equipment database in support of the FRFA. DOE then consulted other publicly available data, such as manufacturer specifications and product literature, import/export logs (*e.g.,* bills of lading from Panjiva[40]), and basic model numbers, to identify original equipment manufacturers (''OEMs'') of the equipment covered by this rulemaking. DOE further relied on public sources and subscription-based market research tools (*e.g.,* Dun & Bradstreet reports[41]) to determine company location, headcount, and annual revenue. DOE screened out companies that do not offer equipment covered by this rulemaking, do not meet the SBA's definition of a ''small business,'' or are foreign-owned and operated.

DOE initially identified 83 OEMs selling CRE into the U.S. market. Of the 83 OEMs identified, DOE estimates that 25 qualify as small OEMs and are not foreign-owned and operated.

In this final rule, DOE amends and establishes test procedures for CRE as follows:

(1) Establish new definitions for high-temperature refrigerator, medium-temperature refrigerator, low-temperature freezer, and mobile refrigerated cabinet, and amend the definition for ice-cream freezer;

(2) Incorporate by reference the most current versions of industry standards AHRI 1200, ASHRAE 72, and AHRI 1320;

(3) Establish definitions and a new appendix C including test procedures for buffet tables and preparation tables;

(4) Establish definitions and a new appendix D including test procedures for blast chillers and blast freezers;

(5) Amend the definition and certain test conditions for chef bases or griddle stands;

(6) Specify refrigerant conditions for CRE that use R–744;

(7) Allow for certification of compartment volumes based on computer-aided design models;

(8) Incorporate provisions for defrosts and customer order storage cabinets currently specified in waivers and interim waivers;

(9) Adopt product-specific enforcement provisions;

(10) Clarify use of the lowest application product temperature provisions;

(11) Remove the obsolete test procedure in appendix A; and

(12) Specify a sampling plan for volume and total display area.

DOE maintains that the amendments detailed in the final rule would not impact testing costs, which would remain at approximately $5,000 per-unit. Furthermore, DOE does not expect manufacturers would need to re-test or re-certify equipment as manufacturers would be able to rely on data generated under the current test procedure for the amendments detailed in this final rule.

For the test procedures established by this final rule for additional categories of CRE not currently subject to the DOE test procedure (*i.e.,* buffet tables or preparation tables, and blast chillers and blast freezers), testing would not be required (other than making voluntary representations of energy consumption) until the compliance date of any energy conservation standards for equipment in these categories. If a manufacturer chooses to make representations of the energy consumption of this equipment, beginning 360 days after a final rule, manufacturers would be required to test according to the adopted test procedure. (42 U.S.C. 6314(d)) DOE has determined that $5,000 is a representative per-test cost for the new test procedures for the additional CRE categories.

For the amended test procedure established by this final rule for chef bases or griddle stands, testing similarly would not be required until the compliance date of any energy conservation standards for equipment in these categories. However, any representations of energy use for chef bases or griddle stands must be made in accordance with the amended test procedure starting 360 days after this notice publishes in the **Federal Register**. Manufacturers currently choosing to make representations of the energy consumption of this equipment according to the existing test procedure may continue to do so until 360 days after publication of this final rule. To the extent that a manufacturer chooses to test according to the amended test procedure, DOE has determined that $5,000 is a representative per-test cost, consistent with the other CRE categories.

Based on a review of commercially available blast chillers and blast freezers, DOE has determined that manufacturers make no claims regarding the energy consumption of their models. To the extent that buffet table and preparation table manufacturers make claims regarding the energy consumption of their models, DOE observed that they do so in accordance with the California Code of Regulations. The manufacturers currently making representations of the energy consumption of buffet tables and preparation tables would be required to test according to the adopted test procedure beginning 360 days after the final rule.

DOE reviewed California Energy Commission's MAEDbS and identified two small domestic OEMs currently making representations of the energy consumption of buffet table or preparation table models. According to MAEDbS, one small OEM makes claims regarding the energy consumption of 26 buffet table or preparation table models and the other small OEM makes claims regarding the energy consumption of 15 buffet table or preparation table models. Based on Dun & Bradstreet reports,[42]

[38] U.S. Department of Energy's Compliance Certification Database is available at *www.regulations.doe.gov/certification-data* (Last accessed February 24, 2023).

[39] California Energy Commission's Modernized Appliance Efficiency Database System is available at *cacertappliances.energy.ca.gov/Pages/Search/AdvancedSearch.aspx* (Last accessed February 24, 2023)

[40] Panjiva Supply Chain Intelligence is available at: *panjiva.com/import-export/United-States* (Last accessed March 28, 2023).

[41] The Dun & Bradstreet Hoovers subscription login is available online at *app.dnbhoovers.com/* (Last accessed March 28, 2023).

[42] *Id.*

both small OEMs have an estimated annual revenue of over $100 million. As previously discussed, DOE estimates a per-unit test cost of $5,000. Therefore, DOE estimates that the potential costs associated with re-testing would be minimal, accounting for approximately 0.1 percent of annual revenue for both small businesses.

AHRI commented that they disagree with DOE's conclusion that ''the amendments detailed in the NOPR would not have a significant impact on a substantial number of small entities.'' (AHRI, No. 38, p. 14) AHRI expressed concern about the impact of the proposed amendments on small entities, including both manufacturers and end users, because the proposed amendments could drive a continued use of older, less efficient, and leaky equipment. *Id.* AHRI commented further that Natural Resources Canada (''NRCAN'') would likely harmonize with this requirement, resulting in additional cost associated with third-party testing for NRCAN and also for ENERGY STAR, which would create an undue burden, especially on small businesses. *Id.*

NAMA stated its agreement with AHRI and advised DOE that this conclusion was inaccurate, and that NAMA had profound concerns about the impact of the proposed amendments on small entities, including both manufacturers and end users. (NAMA, No. 33, p. 4) NAMA commented that its concerns centered around the possibility of the proposed amendments driving a continued use of older, less efficient, and refrigerant-leaky equipment, as well as a continuation of the trend of greater sale of refurbished products that do not meet current DOE standards. *Id.* NAMA also advised DOE that NRCAN would likely harmonize with this requirement, creating additional costs associated with the testing for NRCAN, especially for new classifications—and costs associated with third-party testing (required for both NRCAN and ENERGY STAR) would create an undue burden, especially on small businesses. *Id.*

Continental commented that as previously stated in its comments, some proposed changes to test procedures, including use of ASHRAE 72–2022, would increase test burden on manufacturers and testing agencies, and prove particularly burdensome to small manufacturers like itself. (Continental, No. 29, p. 9)

Hoshizaki commented that they disagree with DOE, and stated that adding new test standards to previously unregulated products will require testing at least two of each model to fully realize the impact of new test standards. (Hoshizaki, No. 30, p. 5) Hoshizaki commented that DOE requires listing of the product with the CCD, and accurate testing will be needed to qualify such listings. *Id.* They noted that since NRCAN is likely to harmonize with DOE requirements, third-party certification is required for NRCAN listing. *Id.* They commented that costs associated with this third-party testing is an undue burden on small business manufacturers. *Id.*

Regarding the small business impacts, as previously discussed, DOE does not expect small manufacturers would need to re-test or re-certify CRE models as a direct result of the amendments detailed in this final rule. For the two small manufacturers that may incur some re-testing costs associated with making voluntary representations of energy consumption, DOE's analysis indicates that re-testing costs would have de minimis cost impacts on the small manufacturers, which would account for approximately 0.1 percent of annual revenue for each of the small businesses. Regarding the estimated test procedure costs, see section III.N.1 of this final rule for additional discussion of the per-unit testing costs.

DOE does not anticipate that the adopted test procedure amendments would result in increased testing costs for the vast majority of manufacturers, including small manufacturers. DOE estimates that two small businesses may incur some re-testing costs associated with their buffet table and preparation table models. However, DOE's research indicates these costs would account for approximately 0.1 percent of annual revenue for both small OEMs identified. Therefore, DOE concludes that the cost effects accruing from the final rule would not have a ''significant economic impact on a substantial number of small entities,'' and that the preparation of a FRFA is not warranted. DOE will submit a certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the Small Business Administration for review under 5 U.S.C. 605(b).

C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of CRE must certify to DOE that their products comply with any applicable energy conservation standards. To certify compliance, manufacturers must first obtain test data for their products according to the DOE test procedures, including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including CRE. (*See generally* 10 CFR part 429.) The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (''PRA''). This requirement has been approved by OMB under OMB control number 1910–1400. Public reporting burden for the certification is estimated to average 35 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

DOE is not amending the certification or reporting requirements for CRE in this final rule. Further, certification data will be required for buffet tables and preparation tables, blast chillers, and blast freezers; however, DOE is not proposing certification or reporting requirements for these categories of CRE in this final rule. Instead, DOE may consider proposals to amend the certification requirements and reporting for these categories under a separate rulemaking regarding appliance and equipment certification. DOE will address changes to OMB Control Number 1910–1400 at that time, as necessary.

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

D. Review Under the National Environmental Policy Act of 1969

In this final rule, DOE establishes test procedure amendments that it expects will be used to develop and implement future energy conservation standards for CRE. DOE has determined that this rule falls into a class of actions that are categorically excluded from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) and DOE's implementing regulations at 10 CFR part 1021. Specifically, DOE has determined that adopting test procedures for measuring energy efficiency of consumer products and industrial equipment is consistent with activities identified in 10 CFR part 1021, appendix A to subpart D, A5 and A6. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

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

F. Review Under Executive Order 12988

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

G. Review Under the Unfunded Mandates Reform Act of 1995

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

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

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

I. Review Under Executive Order 12630

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

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

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). Pursuant to OMB Memorandum M–19–15, Improving Implementation of the Information Quality Act (April 24, 2019), DOE published updated guidelines which are available at *www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf.* DOE has reviewed this final rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

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

reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

This regulatory action is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

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

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

The modifications to the test procedure for CRE adopted in this final rule incorporate testing methods contained in certain sections of the following commercial standards: AHRI 1200–2023, AHRI 1320–2011, ASHRAE 72–2022 with Errata, and ASTM F2143–16. DOE has evaluated these standards and is unable to conclude whether it fully complies with the requirements of section 32(b) of the FEAA (*i.e.,* whether it was developed in a manner that fully provides for public participation, comment, and review.) DOE has consulted with both the Attorney General and the Chairman of the FTC about the impact on competition of using the methods contained in these standards and has received no comments objecting to their use.

M. Congressional Notification

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

N. Description of Materials Incorporated by Reference

In this final rule, DOE incorporates by reference the following test standards: AHRI 1200–2023 is an industry-accepted test procedure that provides rating instructions, calculations, and methods for CRE. The test procedure discussed in this final rule references AHRI 1200–2023 for specific rating instructions, calculations, and rating methods for CRE. AHRI 1200–2023 is available at *www.ahrinet.org/standards/search-standards.*

AHRI 1320–2011 is an industry accepted test procedure that provides rating instructs, calculations, and methods for CRE used with secondary coolants. The test procedure discussed in this final rule references AHRI 1320–2011 regarding specific provisions regarding secondary coolants, but otherwise references AHRI 1200–2023 as discussed. AHRI 1320–2011 is available at *www.ahrinet.org/standards.*

ANSI/ASHRAE Standard 72–2022 is an industry-accepted test procedure that provides setup, instrumentation, measurement, and test conduct instructions for testing CRE. The test procedure discussed in this final rule references ASHRAE 72–2022 as the basis for test setup and test conduct requirements.

Errata sheet for ANSI/ASHRAE Standard 72–2022, *Method of Testing Open and Closed Commercial Refrigerators and Freezers,* November 11, 2022. This errata sheet corrects the note preceding Normative Appendix A of ASHRAE 72–2022.

ASHRAE 72–2022 is available at *www.techstreet.com/standards/ashrae-72-2022?product_id=1710927* and the November 11, 2022 Errata is available at *www.ashrae.org/technical-resources/standards-and-guidelines/standards-errata.*

ASTM F2143–16 is an industry-accepted test procedure that provides setup, instrumentation, conditions, measurement, and test conduct instructions for testing buffet tables and preparation tables. The test procedure discussed in this final rule references ASTM F2143–16 as the basis for test setup and test conduct for buffet tables and preparation tables. Copies of ASTM F2143–16 can be purchased at *www.astm.org/f2143–16.html.*

ASTM E1084–86 (Reapproved 2009), which appears in the regulatory text, has already been incorporated by reference for that text; no change is being made to this standard.

V. Approval of the Office of the Secretary

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

List of Subjects

10 CFR Part 429

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

10 CFR Part 431

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

Signing Authority

This document of the Department of Energy was signed on September 8, 2023, by Francisco Alejandro Moreno, Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE **Federal Register** Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on September 12, 2023.

Treena V. Garrett,

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

For the reasons stated in the preamble, DOE amends parts 429 and 431 of Chapter II of Title 10, Code of Federal Regulations as set forth below:

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

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

Authority: 42 U.S.C. 6291–6317; 28 U.S.C. 2461 note.

■ 2. Section 429.42 is amended by adding paragraphs (a)(3) and (4) to read as follows:

§ 429.42 Commercial refrigerators, freezers, and refrigerator-freezers.

(a) * * *

(3) *Represented value calculations.* The volume and total display area (TDA) of a basic model, as applicable, is the mean of the measured volumes and the mean of the measured TDAs, as applicable, for the tested units of the basic model, based on the same tests used to determine energy consumption.

(4) *Convertible equipment.* Each basic model of commercial refrigerator, freezer, or refrigerator-freezer that is capable of operating at integrated average temperatures that spans the operating temperature range of multiple equipment classes, either by adjusting a thermostat for a basic model or by the marketed, designed, or intended operation for a basic model with a remote condensing unit but without a thermostat, must determine the represented values, which includes the certified ratings, either by testing, in conjunction with the applicable sampling provisions, or by applying an AEDM to comply with the requirements necessary to certify to each equipment class that the basic model is capable of operating within.

(i) *Customer order storage cabinets.* For customer order storage cabinets that have individual-secured compartments that are convertible between the ≥32 °F and <32 °F operating temperatures, the customer order storage cabinets must determine the represented values, which includes the certified ratings, either by testing, in conjunction with the applicable sampling provisions, or by applying an AEDM, with all convertible compartments operating either as medium temperature refrigerators or all convertible compartments as low-temperature freezers, or at the lowest application product temperature for each equipment class as specified in § 431.64 of this chapter, to comply with the requirements necessary to certify to each equipment class that the basic model is capable of operating within.

(ii) [Reserved]

* * * * *

■ 3. Amend § 429.72 by adding paragraph (f) to read as follows:

§ 429.72 Alternative methods for determining non-energy ratings.

* * * * *

(f) *Commercial refrigerators, freezers, and refrigerator-freezers.* The volume of a basic model of a commercial refrigerator, refrigerator-freezer, or freezer may be determined by performing a calculation of the volume based upon computer-aided design (CAD) models of the basic model in lieu of physical measurements of a production unit of the basic model. If volume is determined by performing a calculation of volume based on CAD drawings, any value of volume of the basic model reported to DOE in a certification of compliance in accordance with § 429.42(b)(2)(iii) must be calculated using the CAD-derived volume(s) and the applicable provisions in the test procedures in 10 CFR part 431.64 for measuring volume.

■ 4. Amend § 429.134 by adding reserved paragraphs (dd) and (ee) and paragraph (ff) to read as follows:

§ 429.134 Product-specific enforcement provisions.

* * * * *

(dd)–(ee) [Reserved]

(ff) *Commercial refrigerators, freezers, and refrigerator-freezers*—(1) *Verification of volume.* The volume will be measured pursuant to the test requirements of 10 CFR part 431 for each unit tested. The results of the measurement(s) will be averaged and compared to the value of the certified volume of the basic model. The certified volume will be considered valid only if the average measured volume is within five percent of the certified volume.

(i) If the certified volume is found to be valid, the certified volume will be used as the basis for determining the maximum daily energy consumption allowed for the basic model.

(ii) If the certified volume is found to be invalid, the average measured volume of the units in the sample will be used as the basis for determining the maximum daily energy consumption allowed for the basic model.

(2) *Verification of total display area.* The total display area will be measured pursuant to the test requirements of 10 CFR part 431 for each unit tested. The results of the measurement(s) will be averaged and compared to the value of the certified total display area of the basic model. The certified total display area will be considered valid only if the average measured total display area is within five percent of the certified total display area.

(i) If the certified total display area is found to be valid, the certified total display area will be used as the basis for determining the maximum daily energy consumption allowed for the basic model.

(ii) If the certified total display area is found to be invalid, the average measured total display area of the units in the sample will be used as the basis for determining the maximum daily energy consumption allowed for the basic model.

(3) *Determination of pull-down temperature application.* A classification of a basic model as pull-down temperature application will be considered valid only if a model meets the definition of ''pull-down temperature application'' specified in § 431.62 of this chapter as follows.

(i) 12-ounce beverage can temperatures will be measured for 12-ounce beverage cans loaded at the locations within the commercial refrigerator that are as close as possible to the locations that would be measured by test simulators according to the test procedure for commercial refrigerators specified in § 431.64 of this chapter.

(ii) The commercial refrigerator will be operated at ambient conditions consistent with those specified for commercial refrigerators in § 431.64 of this chapter and at the control setting necessary to achieve a stable integrated average temperature of 38 °F, prior to loading.

(iii) 12-ounce beverage cans to be fully loaded into the commercial refrigerator (with and without temperature measurements) will be maintained at 90 °F ±2 °F based on the average measured 12-ounce beverage can temperatures prior to loading into the commercial refrigerator.

(iv) The duration of pull-down (which must be 12 hours or less) will be determined starting from closing the commercial refrigerator door after completing the 12-ounce beverage can loading until the integrated average temperature reaches 38 °F ±2 °F.

(v) An average stable temperature of 38 °F will be determined by operating the commercial refrigerator for an additional 12 hours after initially reaching 38 °F ±2 °F with no changes to control settings, and determining an integrated average temperature of 38 °F ±2 °F at the end of the 12 hour stability period.

PART 431—ENERGY EFFICIENCY PROGRAM FOR CERTAIN COMMERCIAL AND INDUSTRIAL EQUIPMENT

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

Authority: 42 U.S.C. 6291–6317; 28 U.S.C. 2461 note.

■ 6. Section 431.62 is revised to read as follows:

§ 431.62 Definitions concerning commercial refrigerators, freezers and refrigerator-freezers.

Air-curtain angle means:

(1) For equipment without doors and without a discharge air grille or discharge air honeycomb, the angle

between a vertical line extended down from the highest point on the manufacturer's recommended load limit line and the load limit line itself, when the equipment is viewed in cross-section; and

(2) For all other equipment without doors, the angle formed between a vertical line and the straight line drawn by connecting the point at the inside edge of the discharge air opening with the point at the inside edge of the return air opening, when the equipment is viewed in cross-section.

Basic model means all commercial refrigeration equipment manufactured by one manufacturer within a single equipment class, having the same primary energy source, and that have essentially identical electrical, physical, and functional characteristics that affect energy consumption.

Blast chiller means commercial refrigeration equipment, other than a blast freezer, that is capable of the rapid temperature pull-down of hot food products from 135 °F to 40 °F within a period of four hours, when measured according to the test procedure at appendix D to subpart C of part 431.

Blast freezer means commercial refrigeration equipment that is capable of the rapid temperature pull-down of hot food products from 135 °F to 40 °F within a period of four hours and capable of achieving a final product temperature of less than 32 °F, when measured according to the test procedure at appendix D to subpart C of this part.

Buffet table or preparation table means a commercial refrigerator with an open-top refrigerated area, that may or may not include a lid, for displaying or storing merchandise and other perishable materials in pans or other removable containers for customer self-service or food production and assembly. The unit may or may not be equipped with a refrigerated storage compartment underneath the pans or other removable containers that is not thermally separated from the open-top refrigerated area.

Chef base or griddle stand means commercial refrigeration equipment that has a maximum height of 32 in., including any legs or casters, and that is designed and marketed for the express purpose of having a griddle or other cooking appliance placed on top of it that is capable of reaching temperatures hot enough to cook food.

Closed solid means equipment with doors, and in which more than 75 percent of the outer surface area of all doors on a unit are not transparent.

Closed transparent means equipment with doors, and in which 25 percent or more of the outer surface area of all doors on the unit are transparent.

Commercial freezer means a unit of commercial refrigeration equipment in which all refrigerated compartments in the unit are capable of operating below 32 °F (±2 °F).

Commercial hybrid means a unit of commercial refrigeration equipment:

(1) That consists of two or more thermally separated refrigerated compartments that are in two or more different equipment families, and

(2) That is sold as a single unit.

Commercial refrigerator means a unit of commercial refrigeration equipment in which all refrigerated compartments in the unit are capable of operating at or above 32 °F (±2 °F).

Commercial refrigerator-freezer means a unit of commercial refrigeration equipment consisting of two or more refrigerated compartments where at least one refrigerated compartment is capable of operating at or above 32 °F (±2 °F) and at least one refrigerated compartment is capable of operating below 32 °F (±2 °F).

Commercial refrigerator, freezer, and refrigerator-freezer means refrigeration equipment that—

(1) Is not a consumer product (as defined in § 430.2 of this chapter);

(2) Is not designed and marketed exclusively for medical, scientific, or research purposes;

(3) Operates at a chilled, frozen, combination chilled and frozen, or variable temperature;

(4) Displays or stores merchandise and other perishable materials horizontally, semi-vertically, or vertically;

(5) Has transparent or solid doors, sliding or hinged doors, a combination of hinged, sliding, transparent, or solid doors, or no doors;

(6) Is designed for pull-down temperature applications or holding temperature applications; and

(7) Is connected to a self-contained condensing unit or to a remote condensing unit.

Customer order storage cabinet means a commercial refrigerator, freezer, or refrigerator-freezer that stores customer orders and includes individual, secured compartments with doors that are accessible to customers for order retrieval.

Door means a movable panel that separates the interior volume of a unit of commercial refrigeration equipment from the ambient environment and is designed to facilitate access to the refrigerated space for the purpose of loading and unloading product. This includes hinged doors, sliding doors, and drawers. This does not include night curtains.

Door angle means:

(1) For equipment with flat doors, the angle between a vertical line and the line formed by the plane of the door, when the equipment is viewed in cross-section; and

(2) For equipment with curved doors, the angle formed between a vertical line and the straight line drawn by connecting the top and bottom points where the display area glass joins the cabinet, when the equipment is viewed in cross-section.

Fully open (for drawers) means opened not less than 80% of their full travel.

High-temperature refrigerator means a commercial refrigerator that is not capable of an operating temperature at or below 40.0 °F.

Holding temperature application means a use of commercial refrigeration equipment other than a pull-down temperature application, except a blast chiller or freezer.

Horizontal Closed means equipment with hinged or sliding doors and a door angle greater than or equal to 45°.

Horizontal Open means equipment without doors and an air-curtain angle greater than or equal to 80° from the vertical.

Ice-cream freezer means:

(1) Prior to the compliance date(s) of any amended energy conservation standard(s) issued after January 1, 2023 for ice-cream freezers (see § 431.66), a commercial freezer that is capable of an operating temperature at or below −5.0 °F and that the manufacturer designs, markets, or intends specifically for the storing, displaying, or dispensing of ice cream or other frozen desserts; or

(2) Upon the compliance date(s) of any amended energy conservation standard(s) issued after January 1, 2023 for ice-cream freezers (see § 431.66), a commercial freezer that is capable of an operating temperature at or below −13.0 °F and that the manufacturer designs, markets, or intends specifically for the storing, displaying, or dispensing of ice cream or other frozen desserts.

Integrated average temperature means the average temperature of all test package measurements taken during the test.

Lighting occupancy sensor means a device which uses passive infrared, ultrasonic, or other motion-sensing technology to automatically turn off or dim lights within the equipment when no motion is detected in the sensor's coverage area for a certain preset period of time.

Lowest application product temperature means the integrated average temperature (or for buffet tables or preparation tables, the average pan

temperature of all measurements taken during the test) at which a given basic model is capable of consistently operating that is closest to the integrated average temperature (or for buffet tables or preparation tables, the average pan temperature of all measurements taken during the test) specified for testing under the DOE test procedure (see § 431.64).

Low-temperature freezer means a commercial freezer that is not an ice-cream freezer.

Medium-temperature refrigerator means a commercial refrigerator that is capable of an operating temperature at or below 40.0 °F.

Mobile refrigerated cabinet means commercial refrigeration equipment that is designed and marketed to operate only without a continuous power supply.

Night curtain means a device which is temporarily deployed to decrease air exchange and heat transfer between the refrigerated case and the surrounding environment.

Operating temperature means the range of integrated average temperatures at which a self-contained commercial refrigeration unit or remote-condensing commercial refrigeration unit with a thermostat is capable of operating or, in the case of a remote-condensing commercial refrigeration unit without a thermostat, the range of integrated average temperatures at which the unit is marketed, designed, or intended to operate.

Pull-down temperature application means a commercial refrigerator with doors that, when fully loaded with 12-ounce beverage cans at 90 degrees F, can cool those beverages to an average stable temperature of 38 degrees F in 12 hours or less.

Rating temperature means the integrated average temperature a unit must maintain during testing (*i.e.,* either as listed in the table at § 431.66(d)(1) or the lowest application product temperature).

Remote condensing unit means a factory-made assembly of refrigerating components designed to compress and liquefy a specific refrigerant that is remotely located from the refrigerated equipment and consists of one or more refrigerant compressors, refrigerant condensers, condenser fans and motors, and factory supplied accessories.

Scheduled lighting control means a device which automatically shuts off or dims the lighting in a display case at scheduled times throughout the day.

Self-contained condensing unit means a factory-made assembly of refrigerating components designed to compress and liquefy a specific refrigerant that is an integral part of the refrigerated equipment and consists of one or more refrigerant compressors, refrigerant condensers, condenser fans and motors, and factory-supplied accessories.

Semivertical Open means equipment without doors and an air-curtain angle greater than or equal to 10° and less than 80° from the vertical.

Service over counter means equipment that has sliding or hinged doors in the back intended for use by sales personnel, with glass or other transparent material in the front for displaying merchandise, and that has a height not greater than 66 in. and is intended to serve as a counter for transactions between sales personnel and customers.

Test package means a packaged material that is used as a standard product temperature-measuring device.

Transparent means greater than or equal to 45 percent light transmittance, as determined in accordance with ASTM E1084–86 (Reapproved 2009) (incorporated by reference, see § 431.63) at normal incidence and in the intended direction of viewing.

Vertical Closed means equipment with hinged or sliding doors and a door angle less than 45°.

Vertical Open means equipment without doors and an air-curtain angle greater than or equal to 0° and less than 10° from the vertical.

Wedge case means a commercial refrigerator, freezer, or refrigerator-freezer that forms the transition between two regularly shaped display cases.

■ 7. Amend § 431.63 by revising paragraphs (a), (c), (d), and (e) to read as follows:

§ 431.63 Materials incorporated by reference.

(a) Certain material is incorporated by reference into this subpart with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, the DOE must publish a document in the **Federal Register** and the material must be available to the public. All approved incorporation by reference (IBR) material is available for inspection at DOE and at the National Archives and Records Administration (NARA). Contact DOE at: the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 1000 Independence Avenue SW, EE–5B, Washington, DC 20024, (202)-586–9127, *Buildings@ee.doe.gov, www.energy.gov/eere/buildings/building-technologies-office.* For information on the availability of this material at NARA, visit *www.archives.gov/federal-register/cfr/ibr-locations.html or* email*: fr.inspection@nara.gov.* The material may be obtained from the sources in the following paragraphs of this section:

* * * * *

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

(1) ARI Standard 1200–2006, *Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets,* 2006; IBR approved for § 431.66.

(2) AHRI Standard 1200 (I–P)–2010 (''AHRI Standard 1200 (I–P)–2010''), *2010 Standard for Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets,* 2010; IBR approved for § 431.66.

(3) AHRI Standard 1200–2023 (I–P) (''AHRI 1200–2023''), *2023 Standard for Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets,* copyright 2023; IBR approved for appendices B, C, and D to this subpart.

(4) AHRI Standard 1320–2011 (I–P), (''AHRI 1320–2011'') *2011 Standard for Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets for Use With Secondary Refrigerants,* copyright 2011; IBR approved for appendix B to this subpart.

(d) *ASHRAE.* The American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 1971 Tullie Circle NE, Atlanta, GA 30329; (404) 636–8400; *ashrae@ashrae.org; www.ashrae.org/.*

(1) ANSI/ASHRAE Standard 72–2022 (ASHRAE 72–2022), *Method of Testing Open and Closed Commercial Refrigerators and Freezers,* approved June 30, 2022; IBR approved for appendices B, C, and D to this subpart.

(2) Errata sheet for ANSI/ASHRAE Standard 72–2022 (ASHRAE 72–2022 Errata), *Method of Testing Open and Closed Commercial Refrigerators and Freezers,* November 11, 2022; IBR approved for appendices B, C, and D to this subpart.

(e) *ASTM.* ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428; (877) 909–2786; *www.astm.org/.*

(1) ASTM E1084–86 (Reapproved 2009), *Standard Test Method for Solar Transmittance (Terrestrial) of Sheet Materials Using Sunlight,* approved April 1, 2009; IBR approved for § 431.62.

(2) ASTM F2143–16, *Standard Test Method for Performance of Refrigerated*

Buffet and Preparation Tables, approved May 1, 2016; IBR approved for appendix C to this subpart.

■ 8. Section 431.64 is revised to read as follows:

§ 431.64 Uniform test method for the measurement of energy consumption of commercial refrigerators, freezers, and refrigerator-freezers.

(a) *Scope.* This section provides the test procedures for measuring, pursuant to EPCA, the energy consumption or energy efficiency for a given equipment category of commercial refrigerators, freezers, and refrigerator-freezers.

(b) *Testing and calculations.* (1) Determine the daily energy consumption and volume or total display area of each covered commercial refrigerator, freezer, or refrigerator-freezer by conducting the appropriate test procedure set forth below in appendix B, to this subpart. The daily energy consumption of commercial refrigeration equipment shall be calculated using raw measured values and the final test results shall be reported in increments of 0.01 kWh/day.

(2) Determine the daily energy consumption and pan storage volume, pan display area, and refrigerated volume of each buffet table or preparation table by conducting the appropriate test procedure set forth below in appendix C to this subpart. The daily energy consumption shall be calculated using raw measured values and the final test results shall be recorded in increments of 0.01 kWh/day.

(3) Determine the energy consumption per weight of product and product capacity of each blast chiller and blast freezer by conducting the appropriate test procedure set forth below in appendix D to this subpart. The energy consumption per weight of product shall be calculated using raw measured values and the final test results shall be recorded in increments of 0.01 kWh/lb.

Appendix A [Removed and Reserved]

■ 9. Appendix A to subpart C of part 431 is removed and reserved.

■ 10. Appendix B to subpart C of part 431 is revised to read as follows:

Appendix B to Subpart C of Part 431—Uniform Test Method for the Measurement of Energy Consumption of Commercial Refrigerators, Freezers, and Refrigerator-Freezers

Note: On or after September 20, 2024, any representations, including for certification of compliance, made with respect to the energy use or efficiency of commercial refrigeration equipment, except for buffet tables or preparation tables, blast chillers, blast freezers, or mobile refrigerated cabinets, must be made in accordance with the results of testing pursuant to this appendix. Prior to September 20, 2024, any representations with respect to energy use or efficiency of commercial refrigeration equipment, except for buffet tables or preparation tables, blast chillers, blast freezers, or mobile refrigerated cabinets, must be made either in accordance with the results of testing pursuant to this appendix or with the results of testing pursuant to this appendix as it appeared in appendix B to subpart C of part 431 in the 10 CFR parts 200–499 edition revised as of January 1, 2023. Buffet tables or preparation tables are subject to the test method requirements in appendix C to subpart C of part 431. Blast chillers and blast freezers are subject to the test method requirements in appendix D to subpart C of part 431.

The test procedure for equipment cooled only by secondary coolants in section 1.1.3 of this appendix is not required for use until the compliance date(s) of any amended energy conservation standard(s) (see § 431.66) for such commercial refrigeration equipment.

High-temperature refrigerators must be tested as medium-temperature refrigerators according to section 2.1.3 of this appendix based on the lowest application product temperature until the compliance date(s) of any amended energy conservation standard(s) (see § 431.66) established for high-temperature refrigerators. On and after the compliance date(s) of such energy conservation standard(s) (see § 431.66), high-temperature refrigerators must be tested as high-temperature refrigerators according to section 2.1.4 of this appendix.

0. Incorporation by Reference

DOE incorporated by reference in § 431.63 the entire standard for AHRI 1200–2023; AHRI 1320–2011; ASHRAE 72–2022 and ASHRAE 72–2022 Errata (the latter two collectively referenced as ASHRAE 72–2022 with Errata). However, only enumerated provisions of AHRI 1200–2023 and AHRI 1320–2011 are applicable to this appendix as follows:

0.1. AHRI 1200–2023

(a) Section 3, ''Definitions,'' as referenced in section 1.1 of this appendix.

(b) Section 3.2.8, ''Dew Point,'' as referenced in section 2.2. of this appendix.

(c) Section 3.2.20, ''Total Display Area (TDA),'' as referenced in section 3.2 of this appendix.

(d) Section 4, ''Test Requirements,'' as referenced in section 1.1 of this appendix.

(e) Section 4.1.1.1, ''High Temperature Applications,'' as referenced in section 2.1.4 of this appendix.

(f) Section 4.1.1.2, ''Ice Cream Applications,'' as referenced in section 2.1.1 of this appendix.

(g) Section 4.1.1.3, ''Low Temperature Applications,'' as referenced in section 2.1.2 of this appendix.

(h) Section 4.1.1.4, ''Medium Temperature Applications,'' as referenced in section 2.1.3 of this appendix.

(i) Section 5.1, ''Rating Requirements for Remote Commercial Refrigerated Display Merchandisers and Storage Cabinets'' as referenced in sections 1.1.2, 1.1.3, and 1.5.3.3 of this appendix.

(j) Section 5.2, ''Rating Requirements for Self-Contained Commercial Refrigerated Display Merchandisers and Storage Cabinets,'' as referenced in section 1.1.1 of this appendix.

(k) Section 9, ''Symbols and Subscripts,'' as referenced in section 1.1 and 2.2 of this appendix.

(l) Appendix C, ''Commercial Refrigerated Display Merchandiser and Storage Cabinet Refrigerated Volume Calculation—Normative'' as referenced in section 3.1 of this appendix.

(m) Appendix D, ''Commercial Refrigerated Display Merchandiser and Storage Cabinet Total Display Area (TDA) Calculation—Normative,'' as referenced in section 3.2 of this appendix.

0.2. AHRI 1320–2011

(a) Sections 5.2.7 and 5.2.8 as referenced in section 1.1.3 of this appendix.

(b) [Reserved].

1. Test Procedure

1.1. Determination of Daily Energy Consumption. Determine the daily energy consumption of each covered commercial refrigerator, freezer, or refrigerator-freezer by conducting the test procedure set forth in AHRI 1200–2023, section 3, ''Definitions,'' section 4, ''Test Requirements,'' and section 9, ''Symbols and Subscripts.''

1.1.1. For each commercial refrigerator, freezer, or refrigerator-freezer with a self-contained condensing unit, also use AHRI 1200–2023, section 5.2, ''Rating Requirements for Self-Contained Commercial Refrigerated Display Merchandisers and Storage Cabinets.''

1.1.2. For each commercial refrigerator, freezer, or refrigerator-freezer with a remote condensing unit, also use AHRI 1200–2023, section 5.1, ''Rating Requirements for Remote Commercial Refrigerated Display Merchandisers and Storage Cabinets.''

1.1.3. For each commercial refrigerator, freezer, or refrigerator-freezer used with a secondary coolant, test according to section 1.1.2 of this appendix, except in place of the equations for CDEC and CEC in sections 5.1.2 and 5.1.2.1 of AHRI 1200–2023, respectively, apply the following equations:

$$CDEC = CEC + [FEC + LEC + AEC + DEC + PEC]^{*} + CPEC$$

$$CEC = [(Q_{rt} + Q_{CP}) \cdot (t - t_{dt})]/(EER \cdot 1000)$$

Where CPEC and Q_{CP} are as specified in sections 5.2.7 and 5.2.8 of AHRI 1320–2011 and EER is determined based on a temperature that is 6.0 °F lower than the secondary coolant cabinet inlet temperature.

1.2. Methodology for Determining Applicability of Transparent Door Equipment Families. To determine if a door for a given model of commercial refrigeration equipment is transparent:

(a) Calculate the outer door surface area including frames and mullions;

(b) calculate the transparent surface area within the outer door surface area excluding frames and mullions;

(c) calculate the ratio of (2) to (1) for each of the outer doors; and

(d) the ratio for the transparent surface area of all outer doors must be greater than 0.25 to qualify as a transparent equipment family.

1.3. Drawers. Drawers shall be treated as identical to doors when conducting the DOE test procedure. Commercial refrigeration equipment with drawers intended for use with pans shall be configured with stainless steel food service pans, installed in a configuration per the manufacturer's instructions utilizing the maximum pan sizes specified. If the manufacturer does not specify the pan sizes, the maximum pan depth and pan volume allowed shall be used. For commercial refrigeration equipment with drawers intended for use with pans, the net usable volume includes only the interior volume of the pan(s) in the drawer. The net usable volume shall be measured by the amount of water needed to fill all the pan(s) to within 0.5 inches of the top rim, or determined by calculating the total volume of all pan(s) using the pan manufacturers' published pan volume. For commercial refrigeration equipment with drawers not intended for pans, the net usable volume shall be equal to the total volume of the drawer to the top edge of the drawer. Test simulators shall be placed in commercial refrigeration equipment with drawers as follows: For each drawer, there shall be two test simulators placed at each of the following locations: at the left end, at the right end, and at consistent 24 inch to 48 inch intervals across the width of the drawer (for drawers wider than 48 inches). For drawers with overall internal width of 48 inches or less, only the left and right ends shall have test simulators. If test simulators are to be placed at a pan edge or divider, the test simulator shall be placed at the nearest adjacent location. For each drawer, one test simulator shall be placed on the bottom of the pan or drawer at each of the front and rear test simulator locations of the drawer. Test simulators shall be placed in contact with the drawer or pan end or ends unless load limiting stops are provided as part of the case. Test simulators shall be secured such that the test simulators do not move during the test. The net usable volume where test simulators are not required shall be filled with filler material so that between 60 percent and 80 percent of the net usable volume is occupied by test simulators and uniformly occupied by filler material.

1.4. Long-time Automatic Defrost. For commercial refrigeration equipment not capable of operating with defrost intervals of 24 hours or less, testing may be conducted using a two-part test method.

1.4.1. First Part of Test. The first part of the test shall be a 24-hour test starting in steady-state conditions and including eight hours of door opening (according to ASHRAE 72–2022 with Errata). The energy consumed in this test, ET1, shall be recorded.

1.4.2. Second Part of Test. The second part of the test shall be a defrost cycle, including any operation associated with a defrost. The start and end of the test period be determined as the last time before and first time after a defrost occurrence when the measured average simulator temperature (*i.e.,* the instantaneous average of all test simulator temperature measurements) is within 0.5 °F of the IAT as measured during the first part of the test. The energy consumed in this test, ET2, and duration, t_{DI}, shall be recorded.

1.4.3. Daily Energy Consumption. Based on the measured energy consumption in these two tests, the daily energy consumption (DEC) in kWh shall be calculated as:

$$DEC = ET1 \times \frac{(1{,}440 - t_{NDI})}{1{,}440} + \frac{ET2}{t_{DC}}$$

$$t_{NDI} = \frac{t_{DI}}{t_{DC}}$$

Where:

DEC = daily energy consumption, in kWh;
ET 1 = energy consumed during the first part of the test, in kWh;
ET 2 = energy consumed during the second part of the test, in kWh;
t_{NDI} = normalized length of defrosting time per day, in minutes;
t_{DI} = length of time of defrosting test period, in minutes;
t_{DC} = minimum time between defrost occurrences, in days; and
1440 = conversion factor, minutes per day.

1.5. Customer Order Storage Cabinets. Customer order storage cabinets shall conduct door openings according to ASHRAE 72–2022 with Errata, except that each door shall be opened to the fully open position for 8 seconds, once every 2 hours, for 6 door-opening cycles.

1.5.1. Ambient Compartments. For customer order storage cabinets that have at least one individual-secured compartment that is not capable of maintaining an integrated average temperature below the ambient dry-bulb temperature, the individual-secured compartment(s) at ambient dry-bulb temperature shall be categorized as a high-temperature refrigerator compartment for the purpose of testing and rating. All volume, total display area, and energy consumption calculations shall be included within the high-temperature refrigerator category and summed with other high-temperature refrigerator category compartment(s) calculations.

1.5.2. Convertible Compartments. For customer order storage cabinets that have individual-secured compartments that are convertible between the ambient dry-bulb temperature and the ≥32 °F operating temperature, the convertible compartment shall be tested as a medium-temperature refrigerator compartment or at the lowest application product temperature as specified in section 2.2 of this appendix.

1.5.3. Inverse Refrigeration Load Test. For customer order storage cabinets that supply refrigerant to multiple individual-secured compartments and that allow the suction pressure from the evaporator in each individual-secured compartment to float based on the temperature required to store the customer order in that individual-secured compartment, test according to section 1.1.2 of this appendix, except that energy (heat) loss shall be allowed at a rate and ΔT equivalent to the energy gains of a standard refrigerated cabinet as specified in sections 1.5.3.1–1.5.3.3 of this appendix.

1.5.3.1. Anti-sweat door heaters. Anti-sweat door heaters shall be de-energized for the inverse refrigeration load test specified in section 1.5.3. of this appendix.

1.5.3.2. Integrated Average Temperature. For medium-temperature refrigerator compartments, the integrated average temperature shall be 112.4 °F ±2.0 °F. For low-temperature freezer compartments, the integrated average temperature shall be 150.4 °F ±2.0 °F. For ambient compartments, the integrated average temperature shall be 75.4 °F ±2.0 °F.

1.5.3.3. Daily Energy Consumption. Determine the calculated daily energy consumption (''CDEC'') and the EER based on AHRI 1200–2023, section 5.1, ''Rating Requirements for Remote Commercial Refrigerated Display Merchandisers and Storage Cabinets,'' except that the compressor energy consumption (''CEC'') shall be calculated by applying the following equations:

$$CEC = \frac{[(Q \times t) + ML + (FEC + AEC + DEC) \times 3.412]}{EER \times 1000}$$

$$Q = \frac{W_{in} \times 3.412}{t}$$

$ML = N_d \times (A_e + A_m)$

$A_e = [(H_a - H_c) - (H_t - H_a)] \times m_a$

$A_m = C_{p,liner} \times W_{liner} \times \Delta T_{liner}$

Where:

CEC = compressor energy consumption, kWh per day;

Q = inverse refrigeration load (does not include waste heat from auxiliary components and moisture infiltration), in BTU per h;

t = test duration, in h;

ML = moisture load impacts, BTU per day;

FEC = evaporator fan motor(s) energy consumption, Wh per day;

AEC = anti-condensate heater(s) energy consumption, Wh per day;

DEC = defrost heater(s) energy consumption, Wh per day;

3.412 = conversion factor, BTU per Wh;

EER = energy efficiency ratio, BTU per Wh;

1000 = conversion factor, W per kW;

W_{in} = energy input measured over the test period for all energized components (heaters, controls, and fans) located in the refrigerated compartments, in Wh;

N_d = number of door openings during test, unitless;

A_e = enthalpy adjustment, BTU per day;

A_m = moisture/frost accumulation, BTU per day;

H_a = ambient air enthalpy, BTU per pound;

H_c = compartment air enthalpy based on air conditions during cold operation (*e.g.,* 0 °F dry bulb/ − 20 °F dew point for freezer compartment, 38 °F dry bulb/ 20 °F dew point for refrigerator compartment, 75 °F dry bulb/20 °F dew point for ambient compartment), BTU per pound;

H_t = compartment air enthalpy during heat leak test based on dew point being equal to ambient air dew point, BTU per pound;

m_a = mass of compartment air exchanged (30% of total compartment volume) based density of air during cold operation, pounds;

$C_{p,liner}$ = specific heat of liner material, BTU per °F per pound;

W_{liner} = weight of all liner parts, pounds; and

ΔT_{liner} = maximum temperature rise of all liner parts (*e.g.,* 4.5 °F, 2.5 °F, and 1 °F for freezer, refrigerator, and ambient compartments, respectively), °F.

2. Test Conditions

2.1. Integrated Average Temperatures. Conduct the testing required in section 1 of this appendix, and determine the daily energy consumption at the applicable integrated average temperature as follows:

2.1.1. Ice-Cream Freezers. Test ice-cream freezers and ice-cream freezer compartments to the integrated average temperature specified in section 4.1.1.2, ''Ice Cream Applications,'' of AHRI 1200–2023.

2.1.2. Low-Temperature Freezers. Test low-temperature freezers and low-temperature freezer compartments to the integrated average temperature specified in section 4.1.1.3, ''Low Temperature Applications,'' of AHRI 1200–2023.

2.1.3. Medium-Temperature Refrigerators. Test medium-temperature refrigerators and medium-temperature refrigerator compartments to the integrated average temperature specified in section 4.1.1.4, ''Medium Temperature Applications,'' of AHRI 1200–2023.

2.1.4. High-Temperature Refrigerators. Test high-temperature refrigerators and high-temperature refrigerator compartments to the integrated average temperature specified in section 4.1.1.1, ''High Temperature Applications,'' of AHRI 1200–2023.

2.2. Lowest Application Product Temperature. If a unit of commercial refrigeration equipment is not able to be operated at the integrated average temperature specified in section 2.1 of this appendix, test the unit at the lowest application product temperature (LAPT), as defined in § 431.62. For units equipped with a thermostat, LAPT is the measured temperature at the lowest thermostat setting of the unit (for units that are only able to operate at temperatures above the specified test temperature) or the highest thermostat setting of the unit (for units that are only able to operate at temperatures below the specified test temperature). For remote condensing equipment without a thermostat or other means of controlling temperature at the case, the lowest application product temperature is measured at the temperature achieved with the dew point temperature (as defined in section 3.2.8, ''Dew Point,'' of AHRI 1200–2023) or mid-point evaporator temperature (as defined in section 9, ''Symbols and Subscripts,'' of AHRI 1200–2023) set to 5 degrees colder than that required to maintain the manufacturer's specified application temperature that is closest to the specified integrated average temperature.

2.3. Testing at NSF Test Conditions. For commercial refrigeration equipment that is also tested in accordance with NSF test procedures (Type I and Type II), integrated average temperatures and ambient conditions used for NSF testing may be used in place of the DOE-prescribed integrated average temperatures and ambient conditions provided they result in a more stringent test. That is, the measured daily energy consumption of the same unit, when tested at the rating temperatures and/or ambient conditions specified in the DOE test procedure, must be lower than or equal to the measured daily energy consumption of the unit when tested with the rating temperatures or ambient conditions used for NSF testing. The integrated average temperature measured during the test may be lower than the range specified by the DOE applicable temperature specification provided in section 2.1 of this appendix, but may not exceed the upper value of the specified range. Ambient temperatures and/or humidity values may be higher than those specified in the DOE test procedure.

2.4. Liquid Refrigerant Pressure Required Accuracy. The liquid refrigerant pressure required accuracy is ±35 kPa (±5.1 psi).

2.5 Commercial Refrigerator, Freezer, and Refrigerator-Freezer connected to a Direct Expansion Remote Condensing Unit with R–744. For commercial refrigerators, freezers, and refrigerator-freezers connected to a direct expansion remote condensing unit with R–744, instead of the liquid refrigerant measurements for direct-expansion remote units specified in appendix A to ASHRAE 72–2022 with Errata, the liquid refrigerant measurements for direct-expansion remote units shall be: liquid refrigerant temperature shall be 30.0 °F with a tolerance for the average over test period of ±3.0 °F and a tolerance for the individual measurements of ±5.0 °F; liquid refrigerant pressure shall be the saturated liquid pressure corresponding to a condensing temperature in the range of 32.0 °F to 44.0 °F for the average over test period; and liquid refrigerant subcooling shall be greater than 2.0 °R for the average over test period.

2.6 Chef Base or Griddle Stand Test Conditions. For chef bases or griddle stands, instead of the dry-bulb temperature, wet-bulb temperature, and radiant heat temperature specified in appendix A to ASHRAE 72–2022 with Errata: dry-bulb temperature shall be 86.0 °F with a tolerance for the average over test period of ±1.8 °F and a tolerance for the individual measurements of ±3.6 °F; wet-bulb temperature shall be 73.7 °F with a tolerance for the average over test period of ±1.8 °F and a tolerance for the individual measurements of ±3.6 °F; and radiant heat temperature shall be greater than or equal to 81.0 °F.

3. Volume and Total Display Area

3.1. Determination of Volume. Determine the volume of a commercial refrigerator, freezer, and refrigerator-freezer using the method set forth in AHRI 1200–2023, appendix C, ''Commercial Refrigerated Display Merchandiser and Storage Cabinet Refrigerated Volume Calculation—Normative.''

3.2. Determination of Total Display Area. Determine the total display area of a commercial refrigerator, freezer, and refrigerator-freezer using the method set forth in AHRI 1200–2023, section 3.2.20, ''Total Display Area (TDA),'' and appendix D, ''Commercial Refrigerated Display Merchandiser and Storage Cabinet Total Display Area (TDA) Calculation—Normative.''

■ 11. Appendix C to subpart C of part 431 is added to read as follows:

Appendix C to Subpart C of Part 431—Uniform Test Method for the Measurement of Energy Consumption of Buffet Tables or Preparation Tables

Note: On or after September 20, 2024, any representations, including for certification of compliance, made with respect to the energy use or efficiency of buffet tables or preparation tables must be made in accordance with the results of testing pursuant to this appendix.

0. Incorporation by Reference

DOE incorporated by reference in § 431.63 the entire standard for AHRI 1200–2023, ASHRAE 72–2022, ASHRAE 72–2022 Errata (the latter two collectively referenced as ASHRAE 72–2022 with Errata), and ASTM F2143–16. However, only enumerated provisions of those documents are applicable to this appendix as follows:

0.1. AHRI 1200–2023

(a) Section 3.2.17, ''Refrigerated Volume (Vr),'' as referenced in section 2.2 of this appendix.

(b) Normative Appendix C, ''Commercial Refrigerated Display Merchandiser and Storage Cabinet Refrigerated Volume Calculation,'' as referenced in section 2.2 of this appendix.

0.2 ASHRAE 72–2022 with Errata

(a) Section 5.1, ''Installation and Settings,'' as referenced in section 1.3 of this appendix.

(b) Section 5.2, ''Wall or Vertical Partition Placement,'' as referenced in section 1.3 of this appendix.

(c) Section 5.3, ''Components and Accessories,'' as referenced in section 1.3 of this appendix.

(d) Section 6.1, ''Ambient Temperature and Humidity,'' as referenced in section 1.2 of this appendix.

(e) Section 7.1, ''Sequence of Operations,'' as referenced in section 1.5 of this appendix.

(f) Section 7.2, ''Preparation Period'' (excluding sections 7.2.1 and 7.2.2), as referenced in section 1.5 of this appendix.

(g) Section 7.3, ''Test Periods A and B'' (excluding sections 7.3.1, 7.3.2, 7.3.3, and 7.3.4), as referenced in sections 1.5 and 1.5.1 of this appendix.

(h) Section 7.4, ''Test Alignment Period,'' as referenced in section 1.5 of this appendix.

(i) Section 7.5, ''Determining Stability,'' as referenced in sections 1.5 and 1.5.2 of this appendix.

(j) Normative Appendix A, ''Measurement Locations, Tolerances, Accuracies, and Other Characteristics,'' (only the measured quantities specified in section 1.2 of this appendix) as referenced in sections 1.2 and 1.5.3 of this appendix.

0.3 ASTM F2143–16

(a) Section 3, ''Terminology,'' as referenced in section 1.1 of this appendix.

(b) Section 6.1, ''Analytical Balance Scale,'' as referenced in section 1.1 of this appendix.

(c) Section 6.2, ''Pans,'' as referenced in section 1.1 of this appendix.

(d) Section 7, ''Reagents and Materials,'' as referenced in section 1.1 of this appendix.

(e) Section 9, ''Preparation of Apparatus'' (section 9.6 only), as referenced in sections 1.1 and 1.4.2 of this appendix.

(f) Section 10.1, ''General'' (section 10.1.1 only), as referenced in sections 1.1 and 1.5.3 of this appendix.

(g) Section 10.2, ''Pan Thermocouple Placement,'' as referenced in section 1.1 of this appendix.

(h) Section 10.5, ''Test'' (sections 10.5.5 and 10.5.6 only), as referenced in sections 1.1 and 1.5.1 of this appendix.

(i) Section 11.4, ''Energy Consumption'' (section 11.4.1 only), as referenced in section 1.1 of this appendix.

(j) Section 11.5, ''Production Capacity,'' as referenced in sections 1.1 and 2.1 of this appendix.

1. Test Procedure

1.1. Determination of Daily Energy Consumption. Determine the daily energy consumption of each buffet table or preparation table with a self-contained condensing unit by conducting the test procedure set forth in ASTM F2143–16 section 3, ''Terminology,'' section 6.1, ''Analytical Balance Scale,'' section 6.2, ''Pans,'' section 7, ''Reagents and Materials,'' section 9.6, ''Preparation of Apparatus'', section 10.1, ''General'' (section 10.1.1 only), section 10.2, ''Pan Thermocouple Placement,'' section 10.5, ''Test'' (sections 10.5.5 and 10.5.6 only), section 11.4, ''Energy Consumption'' (section 11.4.1 only), and section 11.5, ''Production Capacity,'' with additional instructions as described in the following sections.

1.2. Test Conditions. Ambient conditions and instrumentation for testing shall be as specified in the ''Chamber conditions'' and ''Electricity supply and consumption of unit under test and components metered separately'' portions of appendix A to ASHRAE 72–2022 with Errata and measured according to section 6.1 of ASHRAE 72–2022 with Errata and the specifications in appendix A of ASHRAE 72–2022 with Errata. The ''highest point'' of the buffet table or preparation table shall be determined as the highest point of the open-top refrigerated area of the buffet table or preparation table, without including the height of any lids or covers. The geometric center of the buffet table or preparation table is: for buffet tables or preparation tables without refrigerated compartments, the geometric center of the top surface of the open-top refrigerated area; and for buffet tables or preparation tables with refrigerated compartments, the geometric center of the door opening area for the refrigerated compartment.

1.3. Test Setup. Install the buffet table or preparation table according to sections 5.1, 5.2, and 5.3 of ASHRAE 72–2022 with Errata.

1.4. Test Load.

1.4.1. Pan Loading. Fill pans with distilled water to within 0.5 in. of the top edge of the pan. For pans that are not configured in a horizontal orientation, only the lowest side of the pan is filled to within 0.5 in. of the top edge of the pan with distilled water.

1.4.2. Refrigerated Compartments. Measure the temperature of any refrigerated compartment(s) as specified in section 9.6 of ASTM F2143–16. The thermocouples for measuring compartment air temperature shall be in thermal contact with the center of a 1.6-oz (45-g) cylindrical brass slug with a diameter and height of 0.75 in. The brass slugs shall be placed at least 0.5 in from any heat-conducting surface.

1.5. Stabilization and Test Period. Prepare the unit for testing and conduct two test periods to determine stability according to sections 7.1 through 7.5 of ASHRAE 72–2022 with Errata, excluding sections 7.2.1, 7.2.2, 7.3.1, 7.3.2, 7.3.3, and 7.3.4. The preparation period under section 7.2 of ASHRAE 72–2022 with Errata includes loading the test unit pans with distilled water and adjusting the controls to maintain the desired performance.

1.5.1. Test Periods A and B. Conduct two test periods, A and B, as specified in section 7.3 of ASHRAE 72–2022 with Errata (excluding sections 7.3.1, 7.3.2, 7.3.3, and 7.3.4). The 24-hour test periods shall begin with an 8-hour active period as specified in section 10.5.5 of ASTM F2143–16. Following the active period, the remaining 16 hours of the test period shall be a standby period with the pans remaining in place, any pan covers in the closed position, and with no additional door openings.

1.5.2. Stability. Average pan temperatures shall be used to determine stability, as specified in section 7.5 of ASHRAE 72–2022 with Errata, rather than average test simulator temperatures.

1.5.3. Data Recording. For each test period, record data as specified in section 10.1.1 of ASTM F2143–16, except record wet-bulb temperature rather than relative humidity. Rather than voltage, current, and power as specified in section 10.1.1 of ASTM F2143–16, record the electrical supply potential and frequency and energy consumption as specified in appendix A of ASHRAE 72–2022 with Errata.

1.6. Target Temperatures.

1.6.1. Average Pan Temperature. The average of all pan temperature measurements during the test period shall be 38 °F ±2 °F. If the unit under test is not able to be operated at this average temperature range, test the unit at the lowest application product temperature (LAPT), as defined in § 431.62. For units equipped with a thermostat, LAPT is measured at the lowest thermostat setting of the unit (for units that are only able to operate at temperatures above the specified test temperature) or the highest thermostat setting of the unit (for units that are only able to operate at temperatures below the specified test temperature).

1.6.2. Average Compartment Temperature. The average of all compartment temperature measurements during the test period shall be 38 °F ±2 °F. If the unit under test is not capable of maintaining both average pan temperature and average compartment temperature within the specified range, the average compartment temperature shall be the average temperature necessary to maintain average pan temperature within the specified range. If the unit is tested at the LAPT for the average pan temperature, as described in section 1.6.1 of this appendix, the average compartment temperature is the average of all compartment temperature measurements at that control setting.

2. Capacity Metrics

2.1. Pan Volume. Determine pan volume according to section 11.5 of ASTM F2143–16.

2.2. Refrigerated Volume. Determine the volume of any refrigerated compartments according to section 3.2.17 and appendix C of AHRI 1200–2023. The refrigerated volume excludes the volume occupied by pans loaded in the open-top display area for testing.

2.3. Pan Display Area. Determine the pan display area based on the total surface area of water in the test pans when filled to within 0.5 in. of the top edge of the pan, or for test pans that are not configured in a horizontal orientation, when the lowest side of the pan is filled to within 0.5 in. of the top edge of the pan with water.

■ 12. Appendix D to subpart C of part 431 is added to read as follows:

Appendix D to Subpart C of Part 431—Uniform Test Method for the Measurement of Energy Consumption of Blast Chillers or Blast Freezers

Note: On or after September 20, 2024, any representations, including for certification of compliance, made with respect to the energy use or efficiency of blast chillers or blast freezers must be made in accordance with the results of testing pursuant to this appendix.

0. Incorporation by Reference

DOE incorporated by reference in § 431.63 the entire standard for AHRI 1200–2023, ASHRAE 72–2022, and ASHRAE 72–2022 Errata (the latter two collectively referenced as ASHRAE 72–2022 with Errata). However, only enumerated provisions of those documents are applicable to this appendix as follows:

0.1 AHRI 1200–2023

(a) Appendix C, ''Commercial Refrigerated Display Merchandiser and Storage Cabinet Refrigerated Volume Calculation—Normative,'' as referenced in section 1.1.1. of this appendix.

(b) Reserved.

0.2 ASHRAE 72–2022 with Errata

(a) Section 4, ''Instruments,'' as referenced in section 1.2 of this appendix.

(b) Section 5, ''Preparation of Unit Under Test'' (except section 5.4, ''Loading of Test Simulators and Filler Material''), as referenced in section 1.2 of this appendix.

(c) Section 6.1, ''Ambient Temperature and Humidity,'' as referenced in sections 1.2 and 1.4 of this appendix.

(d) Figure 6, ''Location of Ambient Temperature Indicators,'' as referenced in sections 1.2 and 1.4 of this appendix.

(e) Normative Appendix A, ''Measurement Locations, Tolerances, Accuracies, and Other Characteristics,'' (only the measured quantities specified in section 1.2.1 of this appendix) as referenced in sections 1.2 and 1.4 of this appendix.

1. Test Procedures

1.1. Scope. This section provides the test procedures for measuring the energy consumption in kilowatt-hours per pound (kWh/lb) for self-contained commercial blast chillers and blast freezers that have a refrigerated volume of up to 500 ft^3.

1.1.1. Determination of Refrigerated Volume. Determine the refrigerated volume of a self-contained commercial blast chiller or blast freezer using the method set forth in AHRI 1200–2023, appendix C, ''Commercial Refrigerated Display Merchandiser and Storage Cabinet Refrigerated Volume Calculation—Normative.''

1.2. Determination of Energy Consumption. Determine the energy consumption of each covered blast chiller or blast freezer by conducting the test procedure set forth in ASHRAE 72–2022 with Errata section 4, ''Instruments,'' section 5, ''Preparation of Unit Under Test'' (except section 5.4, ''Loading of Test Simulators and Filler Material''), section 6.1, ''Ambient Temperature and Humidity,'' Figure 6, ''Location of Ambient Temperature Indicators,'' and normative appendix A, ''Measurement Locations, Tolerances, Accuracies, and Other Characteristics'' (only the measured quantities specified in section 1.2.1 of this appendix), as well as the requirements of this appendix.

1.2.1. Measured Quantities in Normative Appendix A of ASHRAE 72–2022 with Errata. The following measured quantities shall be in accordance with the specifications of normative appendix A of ASHRAE 72–2022 with Errata: dry bulb temperature (except for deviations specified in sections 1.3 and 1.4 of this appendix), electrical supply frequency, electrical supply potential, energy consumed (except for deviations specified in section 1.3 of this appendix), extent of non-perforated surface beyond edges of unit under test, front clearance, rear or side clearance, and time measurements.

1.2.2. Additional Specifications for ASHRAE 72–2022 with Errata. The term ''refrigerator'' used in ASHRAE 72–2022 with Errata shall instead refer to ''blast chiller'' or ''blast freezer,'' as applicable. In section 5.3 of ASHRAE 72–2022 with Errata, the phrase ''all necessary components and accessories shall be installed prior to loading the storage and display areas with test simulators and filler material'' shall be replaced with ''all necessary components and accessories shall be installed prior to precooling the unit under test.'' Section 5.3.5 shall also require that, prior to precooling the unit under test, the condensate pan shall be dry.

1.3. Data Recording Measurement Intervals. Measurements shall be continuously recorded during the test in intervals no greater than 10 seconds.

1.4. Test Conditions. The required test conditions shall have dry bulb temperature values according to Table D.1 when measured at point A in figure 6 of ASHRAE 72–2022 with Errata and according to section 6.1 of ASHRAE 72–2022 with Errata.

TABLE D.1—TEST CONDITION VALUES AND TOLERANCES

Test condition	Value	Tolerance
Dry Bulb	86.0 °F	Average over test period: ±1.8 °F. Individual measurements: ±3.6 °F.

1.5. Product Pan. The product pan shall be a 12 in. by 20 in. by 2.5 in., 22 gauge or heavier, and 300 series stainless steel pan. If the blast chiller or blast freezer is not capable of holding the 12 in. by 20 in. by 2.5 in. product pan dimensions, the manufacturer's recommended pan size shall be used, conforming as closely as possible to the 12 in. by 20 in. by 2.5 in. pan dimensions.

1.6. Product Temperature Measurement. The product temperature shall be measured in the geometric center of the measured product pans using an unweighted thermocouple placed 5/8 of an in. above the bottom of the measured product pan. The thermocouple leads shall be secured to the bottom of the measured product pan while also allowing for the transfer of the measured product pan from the heating source into the blast chiller's or blast freezer's cabinet.

1.7. Product Preparation. The product shall be made for each product pan and shall be loaded to 2 in. of product thickness (*i.e.,* depth) within the product pan unless an additional product pan with a product thickness of less than 2 in. is needed to meet the product capacity determined in section 2.1 of this appendix. A 20-percent-by-volume propylene glycol (1,2-Propanediol) mixture in water shall be prepared. In each product pan, pour the propylene glycol mixture over #20 mesh southern yellow pine sawdust to create a 22 percent to 78 percent by mass slurry. An example of an acceptable sawdust specification is the American Wood Fibers brand, #20 Mesh Pine Sawdust. Mix until the sawdust becomes completely saturated and leave uncovered in the product pan. Verify that the product pan thermocouple is fully submerged in the product mixture and reposition the product pan thermocouple to the requirements of section 1.6. of this appendix if the product pan thermocouple is incorrectly positioned after mixing. Each product pan shall be weighed before and after the food product simulator is added and prior to heating the product. The weight of the product shall not include the weight of the pans, thermocouples, or wires. A cumulative total of the product weight shall be calculated and the product pans shall continue to be loaded with the product mixture until the cumulative total reaches, but not exceeds, the product capacity determined in section 2.1 of this appendix with a tolerance of ±5 percent or ±2 pounds,

whichever is less. The cumulative total weight of product, the weight of product in each individual pan, and the number of pans shall be recorded.

1.8. Product Pan Heating. Measured product pans shall be maintained at an average temperature of 160.0 °F ±1.8 °F and individual pan temperatures shall be maintained at 160 °F ±10 °F for a minimum of 8 hours prior to being loaded into the blast chiller or blast freezer. Non-measured product pans shall also be heated for a minimum of 8 hours prior to being loaded into the blast chiller or blast freezer and the non-measured product pans shall be placed in alternating positions with the measured product pans in the heating device. Data acquisition for the temperature of the measured product pans and time measurements shall begin to be recorded prior to the minimum of 8 hours heating period.

1.9. Product Pan Distribution. The product pans shall be spaced evenly throughout each vertical column of rack positions in the blast chiller or blast freezer without the product pans touching any other product pans and without the product pans touching the top and the bottom of the blast chiller or blast freezer cabinet. For blast chillers or blast freezers that have an additional product pan with a product thickness of less than 2 in., the additional product pan shall be placed as close to the middle rack position as possible while maintaining an even distribution of all product pans. If not all rack positions are occupied by product pans, the product pan locations shall be recorded.

1.10. Measured Product Pans. If multiple product pans are required per level of the blast chiller or blast freezer (*i.e.,* product pans can be loaded side-by-side at the same level), only the product temperature of one product pan per level shall be measured and the product pans measured should alternate vertical columns of the blast chiller or blast freezer cabinet so that each vertical column does not have two measured product pans on sequential levels. If a blast chiller or blast freezer requires an additional product pan with a thickness less than 2 in., the additional product pan shall not be measured for product temperature.

1.11. Stabilization. The blast chiller or blast freezer shall stabilize at the test conditions specified in section 1.4 of this appendix for at least 24 hours without operating.

1.12. Pre-cool Cycle. Data acquisition for the test condition temperatures specified in section 1.4 of this appendix and time measurements shall begin to be recorded prior to the pre-cool cycle. The pre-cool cycle shall be initiated on a blast chiller or blast freezer once the stabilization specified in section 1.11 of this appendix is complete. The fastest pre-cool cycle shall be selected. The pre-cool cycle shall be complete when the blast chiller or blast freezer notifies the user that the pre-cool is complete. If the blast chiller or blast freezer does not notify the user that the pre-cool cycle is complete, the pre-cool cycle shall be deemed complete when the blast chiller or blast freezer reaches 40 °F or 2 °F based on the blast chiller's or blast freezer's sensing probe for blast chillers and blast freezers, respectively. For blast chillers or blast freezers without any defined pre-cool cycles, the fastest blast chilling or blast freezing cycle shall be run with an empty cabinet until the blast chiller or blast freezer reaches 40 °F or 2 °F based on the blast chiller's or blast freezer's sensing probe. During the pre-cool cycle, the blast chiller's or blast freezer's sensing probe shall remain in its default or holstered position. The pre-cool test data to be recorded are the test condition temperatures specified in section 1.4 of this appendix, pre-cool cycle selected, pre-cool duration, and final pre-cool cabinet temperature based on the blast chiller's or blast freezer's sensing probe.

1.13. Loading. The blast chiller or blast freezer door shall be fully open to an angle of not less than 75 °F for loading at 4.0 ±1.0 minutes after the blast chiller or blast freezer completes the pre-cool cycle as specified in section 1.12 of this appendix. The door shall remain open to load all of the product pans for the entirety of the loading procedure. The door shall remain open for 20 seconds per roll-in rack and 15 seconds per product pan for roll-in and standard blast chillers or blast freezers, respectively. The total door open period shall have a tolerance of ±5 seconds. The blast chiller's or blast freezer's sensing probe shall be inserted into the geometric center of a product pan approximately 1 in. deep in the product mixture at the median pan level in the blast chiller or blast freezer. If the product pan at the median level is the additional product pan with less than 2 in. of product thickness, the closest product pan or product pan level that is farthest away from the evaporator fan shall be used to insert the blast chiller's or blast freezer's sensing probe. If the median pan level has capacity for multiple product pans, the probed product pan shall be the furthest away from the evaporator. The sensing probe shall not touch the bottom of the product pan or be exposed to the air. The location of the product pan with the sensing probe shall be recorded. The sensing probe shall be placed so that there is no interference with the product pan thermocouple. The product pan thermocouple wiring shall not affect the energy performance of the blast chiller or blast freezer. The door shall remain closed for the remainder of the test.

1.14. Blast Chilling or Blast Freezing Cycle. Determine the blast chilling or blast freezing cycle that will conduct the most rapid product temperature pulldown that is designed for the densest food product, as stated in the blast chiller's or blast freezer's manufacturer literature. A blast chilling cycle shall have a target temperature of 38.0 °F and a blast freezing cycle shall have a target temperature of 0.0 °F. The test condition temperatures specified in section 1.4 of this appendix and the time measurements shall continue to be recorded from the pre-cool cycle. Measured product pan temperatures shall continue to be recorded from the minimum of 8-hour period of heating prior to the loading of the product pans into the blast chiller or blast freezer. Electrical supply frequency, electrical supply potential, and energy consumed shall start to be recorded as soon as the blast chiller or blast freezer door is opened to load the product pans. Once the blast chiller or blast freezer door is closed, the blast chilling cycle or blast freezing cycle shall be selected and initiated as soon as is practicable. The blast chilling cycle or blast freezing cycle selected shall be recorded. The blast chilling or blast freezing test period shall continue from the door opening until all individual measured pan temperatures are at or below 40.0 °F or 2.0 °F for blast chiller and blast freezer tests, respectively, regardless of whether the selected cycle program has terminated. If all individual measured pan temperatures do not reach 40.0 °F or 2.0 °F for blast chiller and blast freezer tests, respectively, two hours after the selected cycle program has terminated, the test shall be repeated with the target temperature lowered by 1.0 °F until all individual measured pan temperatures are at or below 40.0 °F or 2.0 °F for blast chiller and blast freezer tests, respectively, at the conclusion of the test. The duration of the blast chiller or blast freezer test shall be recorded.

1.15. Calculations. The measured energy consumption determined in section 1.14 of this appendix shall be reported in kilowatt-hours and shall be divided by the cumulative total weight of product determined in section 1.7 of this appendix in pounds.

2. Capacity Metric

2.1. Product Capacity. Determine the product capacity by reviewing all manufacturer literature that is included with the blast chiller or blast freezer. The largest product capacity by weight that is stated in the manufacturer literature shall be the product capacity. If the blast chiller or blast freezer is able to operate as both a blast chiller and a blast freezer when set to different operating modes by the user and the manufacturer literature specifies different product capacities for blast chilling and blast freezing, the largest capacity by weight stated for the respective operating mode shall be the product capacity. If no product capacity is stated in the manufacturer literature, the product capacity shall be the product capacity that fills the maximum number of 12 in. by 20 in. by 2.5 in. pans that can be loaded into the blast chiller or blast freezer according to section 1.7 of this appendix. If the blast chiller or blast freezer with no product capacity stated in the manufacturer literature is not capable of meeting the definition of a blast chiller or blast freezer according to § 431.62 upon testing according to section 1 of this appendix, one 12 in. by 20 in. by 2.5 in. pan shall be removed from the blast chiller or blast freezer until the definition of a blast chiller or blast freezer is met according to § 431.62 when testing according to section 1 of this appendix.

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