DEPARTMENT OF ENERGY

10 CFR Parts 429 and 430

[EERE–2022–BT–TP–0028]

RIN 1904–AF49

Energy Conservation Program: Test Procedure for Central Air Conditioners and Heat Pumps

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

ACTION: Final rule.

SUMMARY: This final rule amends the Federal test procedure for central air conditioners and heat pumps (''CAC/HPs'') to incorporate by reference the latest versions of the applicable industry standards. Specifically, DOE is incorporating by reference the latest version of the relevant industry consensus test standard, AHRI 210/240–2024 (I–P) for the current test procedure for CAC/HPs (''appendix M1'') for measuring the current cooling and heating metrics—seasonal energy efficiency ratio 2 (''SEER2'') and heating seasonal performance factor 2 (''HSPF2''). DOE is incorporating by reference the new industry consensus test standard, AHRI 1600–2024 (I–P), for a new test procedure (''appendix M2'') for CAC/HPs that adopts two new metrics—seasonal cooling and off-mode rating efficiency (''SCORE'') and seasonal heating and off-mode rating efficiency (''SHORE''). Testing to the SCORE and SHORE metrics would not be required until such time as compliance is required with any amended energy conservation standard based on the new metrics. Additionally, DOE is amending certain provisions of DOE's regulations related to representations and enforcement for CAC/HPs.

DATES: The effective date of this rule is February 6, 2025. The amendments will be mandatory for product testing starting July 7, 2025. Manufacturers will be required to use the amended test procedure until the compliance date of any final rule establishing amended energy conservation standards based on the newly established test procedure. At such time, manufacturers will be required to begin using the newly established test procedure.

The incorporation by reference of certain publications listed in this rule is approved by the Director of the Federal Register on February 6, 2025.

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-2022-BT-TP-0028.* 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 maintains previously approved incorporations by reference and incorporates by reference the following industry standards into 10 CFR parts 429 and 430:

AHRI Standard 210/240–2024 (I–P), Performance Rating of Unitary Air-conditioning and Air-source Heat Pump Equipment, copyright 2024 (''AHRI 210/240–2024'').

AHRI Standard 1600–2024 (I–P), Performance Rating of Unitary Air-conditioning and Air-source Heat Pump Equipment, copyright 2024 (''AHRI 1600–2024'').

Copies of AHRI 210/240–2024 and AHRI 1600–2024 can be obtained from the Air-Conditioning, Heating, and Refrigeration Institute (AHRI), 2311 Wilson Blvd., Suite 400, Arlington, VA 22201, (703) 524–8800, or online at: *www.ahrinet.org.*

ANSI/ASHRAE Standard 16–2016, Method of Testing for Rating Room Air Conditioners, Packaged Terminal Air Conditioners, and Packaged Terminal Heat Pumps for Cooling and Heating Capacity, ANSI approved November 1, 2016 (''ANSI/ASHRAE 16'').

ANSI/ASHRAE Standard 37–2009, Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment, ANSI-approved June 25, 2009 (''ASHRAE 37–2009'').

ANSI/ASHRAE Standard 116–2010, Methods of Testing for Rating Seasonal Efficiency of Unitary Air Conditioners and Heat Pumps, ANSI approved February 24, 2010 (''ANSI/ASHRAE 116–2010'').

Copies of ANSI/ASHRAE 16, ASHRAE 37–2009, and ANSI/ASHRAE 116–2010 can be purchased from the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (''ASHRAE'') website at *www.ashrae.org/resources—publications.*

See section IV.N of this document for further discussion of these standards.

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I. Authority and Background

Central air conditioners (''CACs'') and central air conditioning heat pumps (''HPs'') (collectively, ''CAC/HPs'') are included in the list of ''covered products'' 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. 6292 (a)(3)) DOE's test procedure for CAC/HPs is currently prescribed at 10 CFR part 430, subpart B, appendix M1 (''appendix M1''). The following sections discuss DOE's authority to establish and amend the test procedure for CAC/HPs and relevant background information regarding DOE's consideration of the test procedure for this product.

A. Authority

The Energy Policy and Conservation Act, Pub. L. 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, as codified) Title III, Part B of EPCA [2] established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency. These products include CAC/HPs, the subject of this document. (42 U.S.C. 6292(a)(3))

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. 6291), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The Federal testing requirements consist of test procedures that manufacturers of covered products must use as the basis for: (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted under EPCA (42 U.S.C. 6295(s)), and (2) making other representations about the efficiency of those products (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the products comply with any relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

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

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

EPCA also requires that, at least once every seven years, DOE evaluate test procedures for each type of covered product, including CAC/HPs, 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 or period of use. (42 U.S.C. 6293(b)(1)(A))

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

DOE's regulations at 10 CFR 430.27 provide that any interested person may seek a waiver from the test procedure requirements if certain conditions are met. A waiver requires manufacturers to use an alternate test procedure in situations in which the DOE test procedure cannot be used to test the product or equipment, or use of the DOE test procedure would generate unrepresentative results. 10 CFR 430.27(a)(1). DOE's regulations at 10 CFR 430.27(l) require that as soon as practicable after the granting of any waiver, DOE will publish in the **Federal Register** a notice of proposed rulemaking (''NOPR'') to amend its regulations so as to eliminate any need for the continuation of such waiver. As soon thereafter as practicable, DOE will publish in the **Federal Register** a final rule. 10 CFR 430.27(l).

In addition, EPCA requires that DOE amend its test procedures for all covered products to integrate measures of standby mode and off-mode energy consumption into the overall energy efficiency, energy consumption, or other

[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 reflects 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 B was redesignated Part A.

energy descriptor, unless the current test procedure already incorporates the standby mode and off-mode energy consumption, or if such integration is technically infeasible. (42 U.S.C. 6295(gg)(2)(A)(i)–(ii)) If an integrated test procedure is technically infeasible, DOE must prescribe separate standby mode and off-mode energy use test procedures for the covered product, if a separate test is technically feasible. (42 U.S.C. 6295(gg)(2)(A)(ii)) Any such amendment must consider the most current versions of the International Electrotechnical Commission (IEC) Standard 62301 [3] and IEC Standard 62087 [4] as applicable. (42 U.S.C. 6295(gg)(2)(A)) DOE is publishing this final rule in satisfaction of the seven-year review requirement specified in EPCA. (42 U.S.C. 6293(b)(1)(A))

B. Background

On April 5, 2024, DOE published in the **Federal Register** a notice of proposed rulemaking (''NOPR'') (''April 2024 NOPR'') proposing to update the Federal test procedure for CAC/HPs by: (1) incorporating by reference at appendix M1 the most recent draft version of the AHRI Standard 210/240 industry test procedure, AHRI 210/240–202X Draft, for measuring SEER2 and HSPF2; and (2) establishing a new test procedure at 10 CFR part 430, subpart B, appendix M2 (''appendix M2'') that references the draft new industry test procedure, AHRI 1600–202X Draft, for measuring new efficiency metrics, seasonal cooling and off mode rating efficiency (''SCORE''), and seasonal heating and off mode rating efficiency (''SHORE''). 89 FR 24206. Copies of the AHRI drafts were added to the docket for this rulemaking for review by interested parties.[5] [6] As stated in the April 2024 NOPR, if AHRI 210/240–202X Draft and AHRI 1600–202X Draft were to be finalized and formally adopted, DOE's intention would be to reference the final published version of AHRI 210/240 and AHRI 1600 in DOE's subsequent test procedure final rule. 89 FR 24206, 24209. DOE held a public meeting webinar on April 25, 2024 to discuss the proposed amendments to the CAC/HP test procedure presented in the April 2024 NOPR.

DOE received comments in response to the April 2024 NOPR from the interested parties listed in table I.1.

TABLE I–1—LIST OF COMMENTERS WITH WRITTEN SUBMISSIONS IN RESPONSE TO THE APRIL 2024 NOPR

Commenter(s)	Reference in this final rule	Comment No. in the docket	Commenter type
Air-Conditioning, Heating, and Refrigeration Institute	AHRI	25	Trade Association.
Pacific Gas and Electric Company, San Diego Gas and Electric, and Southern California Edison; collectively, the California Investor-Owned Utilities.	CA IOUs	32	Utilities.
Carrier Global Corporation	Carrier	29	Manufacturer.
Copeland LP	Copeland	31	Manufacturer.
Daikin Comfort Technologies North America Inc	Daikin	36 and 40	Manufacturer.
GE Appliances	GE Appliances	37	Manufacturer.
Heating, Air-conditioning & Refrigeration Distributors International	HARDI	26	Trade Association.
Johnson Controls	JCI	35	Manufacturer.
Appliance Standards Awareness Project, National Consumer Law Center, and New York State Energy Research and Development Authority.	Joint Advocates	30	Efficiency Organization, Consumer Advocacy Organization, and State Agency.
Keith Rice	Keith Rice	33	HVAC R&D Engineer.
Lennox International Inc	Lennox	24	Manufacturer.
LG Electronics U.S.A., Inc	LG	38	Manufacturer.
Mitsubishi Electric US	Mitsubishi	28	Manufacturer.
National Comfort Products	NCP	27	Manufacturer.
Northwest Energy Efficiency Alliance	NEEA	39	Efficiency Organization.
Rheem Manufacturing Company	Rheem	34	Manufacturer.

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.[7] To the extent that interested parties have provided written comments that are substantively consistent with any oral comments provided during the April 25, 2024 public meeting, DOE cites the written comments throughout this final rule. DOE did not identify any oral comments provided during the April 25, 2024, public meeting that are not substantively addressed by written comments.

In May 2024, AHRI finalized AHRI 210/240–202X Draft and AHRI 1600–202X Draft without substantial change, and published AHRI Standard 210/240–2024, ''Performance Rating of Unitary Air-conditioning and Air-source Heat Pump Equipment'' (''AHRI 210/240–2024''), and AHRI Standard 1600–2024, ''Performance Rating of Unitary Air-conditioning and Air-source Heat Pump Equipment'' (''AHRI 1600–2024''), respectively.

II. Synopsis of the Final Rule

In this final rule, DOE is updating its regulations for CAC/HPs by: (1) amending appendix M1 to incorporate by reference the latest industry standard, AHRI 210/240–2024, while maintaining the current efficiency metrics EER2, SEER2 and HSPF2; and (2) establishing a new appendix M2 that references the new industry test

[3] IEC 62301, *Household electrical appliances—Measurement of standby power* (Edition 2.0, 2011–01).

[4] IEC 62087, *Audio, video and related equipment—Methods of measurement for power consumption* (Edition 1.0, Parts 1–6: 2015, Part 7: 2018).

[5] The AHRI 210/240–202X Draft test procedure is available in the docket for this rulemaking at: *www.regulations.gov/document/EERE-2022-BT-TP-0028-0017*.

[6] The AHRI 1600–202X Draft test procedure is available in the docket for this rulemaking at: *www.regulations.gov/document/EERE-2022-BT-TP-0028-0018*.

[7] The parenthetical reference provides a reference for information located in the docket of DOE's rulemaking to develop test procedures for CAC/HPs. (Docket No. EERE–2022–BT–TP–0028, which is maintained at: *www.regulations.gov*). The references are arranged as follows: (commenter name, comment docket ID number at page of that document).

procedure, AHRI 1600–2024, for measuring new efficiency metrics, EER, SCORE and SHORE. Appendix M2 would be the applicable test method for CAC/HPs for any standards denominated in terms of SCORE and SHORE. Use of appendix M2 would not be required until such time as compliance is required with any amended energy conservation standard based on the new metrics, should DOE adopt such standards. After the date on which compliance with appendix M2 would be required, appendix M1 would no longer be required as part of the Federal test procedure. DOE is also amending certain provisions within DOE's regulations for representation and enforcement consistent with the proposed test procedure amendments.

Table II.1 summarizes the adopted changes to the amended appendix M1 and the new appendix M2 test procedures, as well as the reason for the adopted change.

TABLE II–1—SUMMARY OF CHANGES IN AMENDED APPENDIX M1 AND NEW APPENDIX M2 TEST PROCEDURES RELATIVE TO CURRENT TEST PROCEDURE

DOE test procedure prior to amendment	Appendix M1 test procedure	Appendix M2 test procedure	Attribution
Incorporates by reference AHRI 210/240–2008.	Incorporates by reference AHRI 210/240–2024.	Incorporates by reference AHRI 1600–2024.	Updates to the applicable industry test procedures.
Includes provisions for determining SEER2, HSPF2, EER2, and $P_{W,OFF}$.	Maintains provisions for determining SEER2, HPSF2, EER2, and $P_{W,OFF}$.	Includes provisions for determining SCORE and SHORE and maintains provisions for determining EER (same as EER2).	Updates to the applicable industry test procedures.
Includes certain CAC/HP provisions regarding determination of represented values in 10 CFR 429.16.	Includes provisions to remove the alternative efficiency determination method (''AEDM'') exception for split-systems in 10 CFR 429.16.	Includes provisions to remove the AEDM exception for split-systems, to extend the AEDM tolerance requirement to SCORE and SHORE, and to no longer require representations of the $P_{W,OFF}$ metric in 10 CFR 429.16.	Improve representativeness of test procedure.
Does not include certain CAC/HP-specific enforcement provisions in 10 CFR 429.134(k).	Includes CAC/HP-specific enforcement provisions regarding verification of cut-out and cut-in temperatures and a controls verification procedure.	Includes CAC/HP-specific enforcement provisions regarding verification of cut-out and cut-in temperatures and a controls verification procedure.	Clarify how DOE will conduct enforcement testing.

DOE has determined that the amendments to the CAC/HP test procedures in appendix M1 and newly established appendix M2 would not be unduly burdensome to conduct. Furthermore, DOE has determined that the amendments to appendix M1 would not alter the measured efficiency of CAC/HPs or require retesting or recertification solely as a result of DOE's adoption of the amendments to the test procedure. Additionally, DOE has determined that the amendments to appendix M1 would not increase the cost of testing. Representations of energy use or energy efficiency would be required to be based on testing in accordance with the amended test procedure in appendix M1 beginning 180 days after the date of publication of the test procedure final rule in the **Federal Register**.

DOE has determined, however, that new appendix M2 would alter the measured efficiency of CAC/HPs, in part because the amended test procedure would adopt different energy efficiency metrics than in the current test procedure. Additionally, DOE has determined that testing according to the new appendix M2 would not increase the cost of testing as compared to appendix M1. Cost estimates are discussed in section III.J of this document. As discussed, use of appendix M2 would not be required until the compliance date of amended energy conservation standards denominated in terms of SCORE and SHORE, should DOE adopt such standards.

The amendments to representation requirements in 10 CFR 429.16 would not be required until 180 days after publication in the **Federal Register** of this final rule.

Discussion of DOE's proposed actions are addressed in further detail in section III of this final rule.

III. Discussion

A. Scope of Applicability

This rulemaking applies to CAC/HPs. DOE defines the term *central air conditioner or central air conditioner heat pump* to mean a product, other than a packaged terminal air conditioner or packaged terminal heat pump, single-phase single-package vertical air conditioner with cooling capacity less than 65,000 British thermal units (''Btu'') per hour (''Btu/h''), single-phase single-package vertical heat pump with cooling capacity less than 65,000 Btu/h, computer room air conditioner, or unitary dedicated outdoor air system, as these equipment categories are defined at 10 CFR 431.92, which is powered by single-phase electric current, air-cooled, rated below 65,000 Btu/h, not contained within the same cabinet as a furnace, the rated capacity of which is above 225,000 Btu/h, and is a heat pump or a cooling unit only. A central air conditioner or central air conditioning heat pump may consist of: a single-package unit; an outdoor unit and one or more indoor units; an indoor unit only; or an outdoor unit with no match. In the case of an indoor unit only or an outdoor unit with no match, the unit *must* be tested and rated as a system (combination of both an indoor and an outdoor unit). For all central air conditioner and central air conditioning heat pump-related definitions, see appendix M or M1 of subpart B of this part. 10 CFR 430.2.

Consistent with the April 2024 NOPR, DOE is not proposing any changes to the CAC/HP definition. However, DOE notes that the last sentence in the CAC/HP definition includes references to see additional definitions in appendices M and M1. As noted in section II, in this final rule, DOE is incorporating by reference the latest industry standards, AHRI 210/240–2024 and AHRI 1600–2024, including the relevant definitions

in these standards. Therefore, references to appendices M and M1 are no longer relevant in the CAC/HP definition. To prevent confusion, DOE is removing the last sentence in the definition that contains these references. 10 CFR 430.2.

The current scope of the CACs/HP test procedure includes:

(a) Split-system air conditioners, including single-split, multi-head mini-split, multi-split (including variable refrigerant flow (''VRF'')), and multi-circuit systems;

(b) Split-system heat pumps, including single-split, multi-head mini-split, multi-split (including VRF), and multi-circuit systems;

(c) Single-package air conditioners;

(d) Single-package heat pumps;

(e) Small-duct, high-velocity systems (including VRF);

(f) Space-constrained products—air conditioners; and

(g) Space-constrained products—heat pumps.

See section 1.1 of appendix M1.

DOE is not amending the scope of CACs/HPs covered by the test procedure in appendix M1 or appendix M2.

B. Updates to Industry Standards

DOE is incorporating by reference AHRI 210/240–2024 and the relevant standards it references as the basis for the updated appendix M1 test procedure. Similarly, DOE is incorporating by reference AHRI 1600–2024 and the relevant standards it references as the basis for the new appendix M2 test procedure. Incorporating each industry standard in full as the basis for each respective appendix would enable DOE to better harmonize with the industry standard and eliminate manufacturer burden in certifying with separate test procedures. The following sections discuss the referenced standards for appendices M1 and M2.

1. AHRI 210/240–2024

In the April 2024 NOPR, DOE noted that AHRI and other relevant stakeholders, including DOE, worked to develop a revised AHRI 210/240 standard, AHRI 210/240–202X Draft, that included updates to address issues pertaining to the CAC/HP test procedure with broad stakeholder consensus. 89 FR 24206, 24211–24212. DOE proposed to amend its test procedure for CAC/HPs at appendix M1 by incorporating by reference AHRI 210/240–202X Draft. *Id.* Because AHRI 210/240–202X Draft was in draft form at the time of the publication of the April 2024 NOPR, DOE noted that it intended to update its incorporation by reference to the final published version of AHRI 210/240–202X Draft in the final rule, unless the draft version is not finalized before the final rule or there are substantive changes between the draft and published versions, in which case DOE may adopt the substance of the AHRI 210/240–202X Draft or provide additional opportunity for comment on the substantive changes to the updated industry consensus standard. *Id.* In May 2024, AHRI published the finalized AHRI 210/240 standard, AHRI 210/240–2024, which did not include any significant deviations from AHRI 210/240–202X Draft.

AHRI, the CA IOUs, Carrier, Daikin, GE Appliances, JCI, Lennox, and NEEA were generally supportive of DOE's proposal on updating appendix M1 by adopting the finalized AHRI 210/240 standard. (AHRI, No. 25 at p. 3; Carrier, No. 29 at p. 4; CA IOUs, No. 32 at p. 1; Daikin, No. 36 at p. 1; GE Appliances, No. 37 at pp. 4–5; JCI, No. 35 at p. 1; Lennox, No. 24 at p. 3; NEEA, No. 39 at p. 2) AHRI commented that it supports the adoption of AHRI 210/240–2024 as a revised appendix M1, but with minimal additions and some exclusions, and will be publishing an addendum to AHRI 210/240–2024 that will include the aforementioned minimal additions that DOE established in the April 2024 NOPR, including revision to the definition of outdoor unit with no match. (AHRI, No. 25 at p. 3)

The Joint Advocates and CA IOUs encouraged DOE to adopt AHRI 210/240–2024 in the new CAC/HP test procedure final rule as soon as possible. (Joint Advocates, No. 30 at p. 1; CA IOUs, No. 32 at p. 1) Carrier stated that it supports the incorporation by reference of AHRI 210/240–2024 into a revised appendix M1, but with some recommendations. (Carrier, No. 29 at p. 4) Rheem commented that even though it supported the adoption of the consensus AHRI 210/240–2024 in the updated Appendix M1, it was concerned that the new versions of ANSI/ASHRAE Standard 37–2009[8] and ANSI/ASHRAE Standard 16–2016[9] with major changes, which are to be published in the near future, are not currently referenced in AHRI 210/240–2024. (Rheem, No. 34 at p. 3) Specifically, Rheem pointed out that once the new versions of the aforementioned ASHRAE standards are published, AHRI 210/240–2024 should be revised to incorporate references to the revised standards, and subsequently, DOE should update appendix M1 to incorporate the revised AHRI 210/240–2024 by reference. (*Id.* at pp. 3–4) Rheem further commented that since AHRI 210/240–2024 cites sections of 10 CFR 429.16, and of appendix M1 to subpart B of 10 CFR part 430, it should be revised to ensure that these references to CFR are still appropriate, since DOE has proposed major revisions to these sections from the CFR. (*Id.*) Rheem pointed to the newly introduced enforcement provisions in 10 CFR 429.134(k), which require calculation of average capacity (10 CFR 429.134(k)(4)(iii)(A)(*1*) and (*2*)) or time-averaged integrated (10 CFR 429.134(k)(4)(iii)(A)(*3*)) capacity and power consumption, and Rheem suggested updates to appendix I of AHRI 210/240–2024 to state that average capacity, average power consumption, time-averaged integrated capacity, and time-integrated power consumption should be calculated according to the appropriate sections of AHRI 210/240–2024 and ANSI/ASHRAE 16, as applicable. (*Id.*) Rheem pointed out that table 8 of AHRI 210/240–2024, which lists the test conditions for CAC/HPs under test, does not include the details on how to measure the compressor speed for cooling full-speed tests (A2 and B2), and cooling minimum-speed tests (B1, F1, G1, and I1) for variable-speed compressor units, as currently specified in section 3.2.4(a) of appendix M1. (*Id.* at p. 4) Rheem commented that the aforementioned details should be added as notes under table 8 of AHRI 210/240–2024, after appropriate translations of the test nomenclature.[10] *Id.*

In response to Rheem's comment, DOE notes that in the April 2024 NOPR, DOE proposed to incorporate by reference AHRI 210/240–202X draft and the AHRI 1600–202X draft, at revised appendix M1 and new appendix M2, respectively, while this final rule is updating these references to the final drafts, AHRI 210/240–2024 and AHRI 1600–2024. DOE has reviewed the finalized standards, AHRI 210/240–2024 and AHRI 1600–2024, and has concluded that all current references to 10 CFR 429.16 in the standards would

[8] ANSI/ASHRAE 37–2009 provides a method of test for many categories of air-conditioning and heating products and equipment, including CAC/HPs.

[9] ANS/ASHRAE 16–2016 provides a method of test for rating room air conditioners, packaged terminal air conditioners, and packaged terminal heat pumps.

[10] Currently, all full-speed cooling and heating mode tests in appendix M1 are identified with ''2'' in the subscript of the relevant test, whereas AHRI 210/240–202X and AHRI 1600–202X identify them with the ''Full'' subscript. Similarly, all minimum-speed cooling and heating mode tests in appendix M1 are identified with ''1'' in the subscript of the relevant test, whereas AHRI 210/240–202X and AHRI 1600–202X identify them with the ''Low'' subscript.

not require revision. Additionally, DOE clarifies that any further updates to appendix I of the AHRI 210/240 and AHRI 1600 standards to add the definitions of average capacity, average power consumption, time-averaged integrated capacity, and time-integrated power consumption will have to be initiated by AHRI, as part of an addendum. DOE has determined that additional definitions are not necessary at this time and notes that an updated appendix I to AHRI 210/240 and AHRI 1600 is not yet available for review; therefore, DOE is not adopting additional definitions as recommended by Rheem at this time. Regarding Rheem's comment on table 8 of AHRI 210/240–2024 lacking language from section 3.2.4 (a) of the current appendix M1 for maintaining the same full compressor speed for all full-speed cooling tests, and the same minimum compressor speed for all minimum-speed cooling tests, DOE is adding provisions in section 2 of the revised appendix M1 and section 2 of the new appendix M2, consistent with the existing requirement in appendix M1, as follows:

For cooling mode tests of variable capacity systems, the compressor shall operate at the same cooling full speed, measured by RPM of power input frequency (Hz), for both A_{Full} and B_{Full} tests. Additionally, the compressor shall operate at the same cooling minimum speed, measured by RPM or power input frequency (Hz), for the B_{Low}, F_{Low}, G_{Low}, and I_{Low} tests.

As noted, in May 2024, AHRI published AHRI 210/240–2024, which does not include any significant deviations from AHRI 210/240–202X Draft. As such, the adoption of AHRI 210/240–2024 in this final rule is consistent with the proposal to reference AHRI 210/240–202X Draft in the April 2024 NOPR.

Therefore, DOE is amending its test procedure for CAC/HPs by incorporating by reference AHRI 210/240–2024 for use in the new appendix M1. Specifically, in the new test procedure for CAC/HPs at appendix M1, DOE is adopting sections 3 (excluding 3.2.16, 3.2.20, 3.2.46, 3.2.51, 3.2.63, 3.2.78 and 3.2.79), 5 (excluding 5.1.6.2), 6.1–6.3, and 6.6, and Appendices D, E, G, and K of AHRI 210/240–2024.[11]

Additionally, as proposed in the April 2024 NOPR, DOE is making additions and deletions to the incorporations by reference for the CAC/HP Federal test procedure (*see* 10 CFR 430.3) to align with the references made within AHRI 210/240–2024. 89 FR 24206, 24212.

Currently, appendix M1 incorporates by reference: AMCA 210–2007,[12] AHRI 210/240–2008, AHRI 1230–2010,[13] ASHRAE 23.1–2010,[14] ANSI/ASHRAE 37–2009, and ASHRAE 116–2010. 10 CFR 430.3.

In the amended test procedure at appendix M1, DOE is adding an incorporation by reference to ANSI/ASHRAE 16–2016 and removing incorporations by reference to AMCA 210–2007, AHRI 210/240–2008, AHRI 1230–2010, and ASHRAE 23.1–2010. Therefore, DOE is incorporating by reference AHRI 210/240–2024, ANSI/ASHRAE 16–2016, ANSI/ASHRAE 37–2009, and ANSI/ASHRAE 116–2010, at appendix M1.

2. AHRI 1600–2024

In parallel to the AHRI 210/240–202X Draft, AHRI and other relevant stakeholders, including DOE, worked to develop a forward-looking AHRI test procedure that would act as the successor to the AHRI 210/240–202X Draft and be effective in the long term (*i.e.,* AHRI 1600–202X Draft).

In the April 2024 NOPR, DOE proposed to establish a new test procedure for CAC/HPs at appendix M2 by incorporating by reference AHRI 1600–202X Draft (in its entirety). 89 FR 24206, 24212. DOE noted that it intended to update its incorporation by reference to the final published version of AHRI 1600–202X Draft in the final rule, unless the draft version is not finalized before the final rule or there are substantive changes between the draft and published versions, in which case DOE may adopt the substance of the AHRI 1600–202X Draft or provide additional opportunity for comment on the substantive changes to the updated industry consensus standard. *Id.* In May 2024, AHRI published the finalized AHRI 1600 standard, AHRI 1600–2024, which did not include any significant deviations from AHRI 1600–202X Draft.

Several stakeholders, namely Lennox, AHRI, Mitsubishi, Copeland, the CA IOUs, Rheem, Daikin, NEEA, and Carrier, appreciated DOE's efforts of collaborating with the stakeholders to develop the AHRI 1600 standard, and supported its adoption at appendix M2. (Lennox, No. 24 at p. 4; AHRI, No. 25 at p. 3;[15] Mitsubishi, No. 28 at p. 1; Copeland, No. 31 at p. 1; CA IOUs, No. 32 at p. 2; Rheem, No. 34 at p. 4; Daikin, No. 36 at p. 1; NEEA, No. 39 at p. 2; Carrier, No. 29 at p. 4) Rheem commented that in a similar vein to its comment made on AHRI 210/240–2024 (*see* section III.B.1 of this document), DOE should be aware that the revised editions of ANSI/ASHRAE Standard 37 and ANSI/ASHRAE Standard 16 are currently not referenced in AHRI Standard 1600–2024. (Rheem, No. 34 at p. 4) Rheem further pointed to DOE's inclusion of the energy efficiency metric energy efficiency ratio 2 (''EER2) in 10 CFR 430.23(m)(2); several sections of 10 CFR 429.16 and 10 CFR 429.134(k)(4); and sections 2, 4.1, and 4.2 of appendix M2 to subpart B of 10 CFR part 430, which in turn incorporate AHRI 1600–2024 by reference, which only includes energy efficiency ratio (''EER'') as the efficiency metric, and not EER2. (*Id.* at p. 5) Rheem stated that this mismatch should be resolved by either DOE revising its relevant references from EER2 to EER, or that AHRI 1600–2024 should be revised to replace all instances of EER with EER2. (*Id.*) Further, Rheem pointed out that section 4.1 of the new appendix M2 references 10 CFR 431.97, in relation to certification to the energy conservation standards SCORE and SHORE, and suggested this citation should be changed to 10 CFR 430.32(c), which will be amended to prescribe energy conservation standards for CAC/HPs. (*Id.*) Additionally, as noted in section III.B.1 for AHRI 210/240–2024, Rheem commented that table 8 of AHRI 1600–2024 should contain sentences similar to section 3.2.4(a) of appendix M1, to

[11] DOE notes that the substance of these provisions remains the same as those proposed in the April 2024 NOPR, but AHRI did some reorganization in moving from AHRI 210/240–202X Draft to AHRI 210/240–2024. Consequently, the adopted section numbers cited here differ from those presented in DOE's proposed rule. *See* 89 FR 24206, 24212.

[12] ANSI/AMCA 210–2007, ANSI/ASHRAE 51–2007, (''AMCA 210–2007'') Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating, ANSI approved Aug. 17, 2007. A copy of AMCA 210–2007 can be purchased from the Air Movement and Control Association International Inc. (''AMCA'') website at *www.amca.org/store/index.php*.

[13] ANSI/AHRI 1230–2010 with Addendum 2, (''AHRI 1230–2010''): 2010 Standard for Performance Rating of Variable Refrigerant Flow (''VRF'') Multi-Split Air-Conditioning and Heat Pump Equipment, ANSI approved Aug. 2, 2010. A copy of AHRI 1230–2010 can be obtained from AHRI, 2111 Wilson Boulevard, Suite 500, Arlington, VA 22201, USA, 703–524–8800, or by going to *www.ahrinet.org*.

[14] ANSI/ASHRAE 23.1–2010, (''ASHRAE 23.1–2010''): Methods of Testing for Rating the Performance of Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Temperatures of the Refrigerant, ANSI approved Jan. 28, 2010. A copy of ASHRAE 23.1–2010 can be obtained from the ASHRAE website at *www.ashrae.org/resources--publications.*

[15] While AHRI's comment noted support for the adoption of the AHRI 1600 standard at appendix M1, DOE surmises that this is a typographical error, and AHRI intended to express support for adoption at appendix M2 instead. As proposed in the April 2024 NOPR, appendix M1 references the draft AHRI 210/240 standard.

specify that for variable-speed compressor systems, the cooling full compressor speed for both A2 and B2 tests should be same, and the cooling minimum compressor speed for the B1, F1, G1, and I1 tests should remain the same. (*Id.* at p. 4)

In response to Rheem's comment regarding AHRI 210/240–2024 retaining the EER2 metric while AHRI 1600–2024 using the EER metric, DOE agrees with Rheem that this mismatch has potential to confuse users of the test procedure. DOE notes that the EER2 metric in AHRI 210/240–2024 is identical to the EER metric in AHRI 1600–2024. Both metrics are evaluated at the same test conditions and convey the same full-load efficiency information. Therefore, for appendix M1, which references AHRI 210/240–2024, DOE is retaining the EER2 metric. For appendix M2, which references AHRI 1600–2024, DOE is including EER as the full-load metric, with EER evaluated the same way as EER2 per appendix M1. DOE is making appropriates changes in the regulatory text at 10 CFR parts 429 and 430, and appendix M2, to reflect this clarification. In response to Rheem's comment for the citation of the SCORE and SHORE energy conservation standards in the April 2024 NOPR, DOE agrees that the correct citation is to 10 CFR 430.32(c), and not 10 CFR 431.97. Finally, as mentioned in section III.B.1 of this document, DOE is adding language to section 2 of appendix M2 to explicitly state that for variable-capacity compressor systems, the cooling full compressor speeds for both A_{Full} and B_{Full} tests should be identical, and the cooling minimum compressor speed for the B_{Low}, F_{Low}, G_{Low}, and I_{Low} tests should be identical.

As discussed, AHRI 1600–2024 does not include any significant deviations from AHRI 1600–202X Draft. As such, the adoption of AHRI 1600–2024 in this final rule is consistent with the proposal to reference AHRI 1600–202X Draft in the April 2024 NOPR.

DOE is amending its test procedure for CAC/HPs by incorporating by reference AHRI 1600–2024 for use in the new appendix M2. Specifically, in the new test procedure for CAC/HPs at appendix M2, DOE is adopting sections 3 (excluding 3.2.16, 3.2.20, 3.2.45, 3.2.50, 3.2.63, 3.2.78, and 3.2.79), 5 (excluding 5.1.6.2), 6 (excluding 6.1.8, 6.2, 6.3, 6.4, and 6.5), 11, and 12 and appendices D, E, G, K, and L of the AHRI 1600–202X Draft in the Federal test procedure for CAC/HPs at appendix M2.

Additionally, consistent with the April 2024 NOPR, DOE is also incorporating by reference ANSI/ASHRAE 16–2016, ANSI/ASHRAE 37–2009, and ANSI/ASHRAE 116–2010, which are referenced within AHRI 1600–2024. Therefore, in total, DOE is proposing to incorporate by reference AHRI 1600–2024, ANSI/ASHRAE 16–2016, ANSI/ASHRAE 37–2009, and ANSI/ASHRAE 116–2010, at appendix M2.

3. ANSI/ASHRAE 37–2009

ANSI/ASHRAE 37–2009 provides a method of test for electrically driven unitary air-conditioning and heat pump equipment, which includes CAC/HPs. In the April 2024 NOPR, DOE proposed to incorporate by reference ANSI/ASHRAE 37–2009 at both appendix M1 and appendix M2, since AHRI 210/240–202X Draft and AHRI 1600–202X Draft both reference test instructions in ANSI/ASHRAE 37–2009. 89 FR 24206, 24212. The finalized versions of these draft standards, AHRI 210/240–2024 and the AHRI 1600–2024, also reference ANSI/ASHRAE 37–2009. More specifically, sections 5, 6, 8, and 11 and appendices C, D, E, I, and J of AHRI 210/240–2024 and AHRI 1600–2024 refer to methods of test in ANSI/ASHRAE 37–2009.

DOE currently incorporates by reference ANSI/ASHRAE 37–2009 in 10 CFR part 430, subpart B, and the current incorporation by reference applies to the current Federal test procedure for CAC/HPs specified at appendix M1. Given that AHRI 210/240–2024 Draft references ANSI/ASHRAE 37–2009 for several test instructions, DOE has concluded, consistent with the April 2024 NOPR, that it is appropriate to maintain the existing incorporation by reference of ANSI/ASHRAE 37–2009 in appendix M1. Additionally, given that AHRI 1600–2024 references ANSI/ASHRAE 37–2009 for several test instructions, DOE has concluded, consistent with the April 2024 NOPR, that it is appropriate to incorporate by reference ANSI/ASHRAE 37–2009 for use with appendix M2.

4. ANSI/ASHRAE 16–2016

ANSI/ASHRAE 16–2016, which provides a method of test for rating room air conditioners, packaged terminal air conditioners, and packaged terminal heat pumps, is referenced for testing CAC/HPs by both the AHRI 210/240–202X Draft and the AHRI 1600–202X Draft. Consequently, in the April 2024 NOPR, DOE proposed to incorporate by reference ANSI/ASHRAE 16–2016 at both appendix M1 and appendix M2. 89 FR 24206, 24213. The finalized versions of the AHRI draft standards, AHRI 210/240–2024 and AHRI 1600–2024, also reference ANSI/ASHRAE 16–2016. More specifically, section 5.1.1 of AHRI 210/240–2024 and AHRI 1600–2024 refer to testing of non-ducted CAC/HPs from provisions in ANSI/ASHRAE 16–2016, or by using a combination of provisions in ANSI/ASHRAE 37–2009 and ANSI/ASHRAE 116–2016.

Currently, ANSI/ASHRAE 16–2016 is not incorporated by reference in appendix M1. DOE has concluded that testing conducted per ANSI/ASHRAE 16–2016 for non-ducted CAC/HPs will not impact ratings in comparison to testing conducted per provisions in ANSI/ASHRAE 37–2009 and ANSI/ASHRAE 116–2010. Thus, given that AHRI 210/240–2024 and AHRI 1600–2024 refer to ANSI/ASHRAE 16–2016 as an option for testing of non-ducted CAC/HPs, and it does not impact ratings, DOE has concluded, consistent with the April 2024 NOPR, that it is appropriate to incorporate by reference ANSI/ASHRAE 16–2016 for appendices M1 and M2.

5. ANSI/ASHRAE 116–2010

ANSI/ASHRAE 116–2010, which provides a method of test for unitary air conditioners and heat pumps with a cooling capacity of 65,000 Btu/h and less, is referenced for testing CAC/HPs by both AHRI 210/240–202X Draft and AHRI 1600–202X Draft. Consequently, in the April 2024 NOPR, DOE proposed to incorporate by reference ANSI/ASHRAE 116–2010 at both appendix M1 and appendix M2. 89 FR 24206, 24213. The finalized versions of the AHRI draft standards, AHRI 210/240–2024 and AHRI 1600–2024, also reference ANSI/ASHRAE 116–2010. More specifically, sections 5, 6, 8, and 11 and appendices D and E of AHRI 210/240–2024 and AHRI 1600–2024 refer to methods of test in ANSI/ASHRAE 116–2010.

Given that AHRI 210/240–2024 references ANSI/ASHRAE 116–2010 for several test instructions, DOE has concluded, consistent with the April 2024 NOPR, that it is appropriate to maintain the incorporation by reference of ANSI/ASHRAE 116–2010 in appendix M1. Additionally, given that the AHRI 1600–2024 Draft references ANSI/ASHRAE 116–2010 for several test instructions, DOE has concluded, consistent with the April 2024 NOPR, that it is appropriate to incorporate by reference ANSI/ASHRAE 116–2010 for use with appendix M2.

C. Revised CAC/HP Test Procedure

As discussed, EPCA requires that test procedures for each type of covered product, including CAC/HPs, 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 or period of use. (42 U.S.C. 6293(b)(3))

In this final rule, DOE is maintaining the current efficiency metrics, EER2, SEER2 and HSPF2, at appendix M1 and is referencing AHRI 210/240–2024 for measuring the existing metrics. DOE has determined that the amendments to appendix M1 would not affect the measured efficiency of CAC/HPs or require retesting solely because of DOE's adoption of the amendments to the appendix M1 test procedure. At appendix M1, DOE is incorporating by reference the following sections of the AHRI 210/240–2024: sections 3 (with certain exclusions [16]), 5 (with one exclusion [17]), 6 (with certain exclusions [18]), 11, and 12, as well as appendices D, E, G, K, and L.

Additionally, DOE is establishing a new test procedure at appendix M2 that adopts AHRI 1600–2024, including the new SCORE and SHORE metrics.[19] Use of appendix M2 is not required until the compliance date of any amended standards denominated in terms of the new metrics for appendix M2, should such standards be adopted. At appendix M2, DOE is referencing the following sections of AHRI 1600–2024: sections 3 (with certain exclusions [20]), 5 (with one exclusion [21]), 6 (with certain exclusions [22]), 11, and 12 and appendices D, E, G, K and L.

Further, at both appendix M1 and appendix M2, DOE is incorporating by reference the following: ANSI/ASHRAE 37–2009, except sections 1 (Purpose), 2 (Scope), and 4 (Classifications); ANSI/ASHRAE 16–2016 except sections 1 (Purpose), 2 (Scope), and 4 (Classifications); and ANSI/ASHRAE 116–2010 except sections 1 (Purpose), 2 (Scope), 4 (Classifications), and 7 (Methods of Test).

D. Efficiency Metrics

As discussed, DOE is updating the current Federal test procedure for CAC/HPs at appendix M1 consistent with the most recent draft version of the relevant industry consensus test procedure, AHRI 210/240–2024. DOE is also establishing a new Federal test procedure at 10 CFR part 430, subpart B, appendix M2, consistent with the new industry consensus test procedure, AHRI 1600–2024. Sections III.D.1 and III.D.2 of this document discuss which metrics are applicable for appendices M1 and M2, respectively.

1. Metrics Applicable to Appendix M1

Consistent with the April 2024 NOPR, appendix M1 maintains the current energy efficiency metrics (*i.e.,* EER2, SEER2, and HSPF2), and includes a new optional metric: the peak load coefficient of performance (''COP_{peak}''), applicable to central heat pumps (''CHPs''). The amendments to appendix M1 to align with AHRI 210/240–2024 maintain the existing energy efficiency metrics, and DOE has determined that testing under appendix M1 would be consistent with the existing test procedure and there would be no impact on measured efficiencies.

2. Metrics Applicable to Appendix M2

The newly established appendix M2 introduces new integrated cooling and integrated heating efficiency metrics, namely SCORE and SHORE, respectively. Unlike SEER2 and HSPF2, which are seasonal energy efficiency descriptors, SCORE and SHORE are integrated metrics that include off mode power, $P_{W,OFF}$. Hence, appendix M2 will not require separate representations for off mode power. Appendix M2 will retain the full-load EER metric, with EER evaluated in the same way as appendix M1.[23] Appendix M2 also includes the optional metric COP_{peak}.

E. Near-Term Changes in the CAC/HP Test Procedure

The following sections discuss issues that affect the CAC/HP test procedure in the near term—*i.e.,* they will be required 180 days after publication of the final rule. As previously explained, these near-term revisions are implemented at appendix M1 via incorporation by reference of the relevant industry consensus test procedure, AHRI 210/240–2024. DOE has reviewed AHRI 210/240–2024 and has concluded that it satisfies the EPCA requirement that test procedures should not be unduly burdensome to conduct and should be representative of an average use cycle. (42 U.S.C. 6293(b)(3)) These near-term amendments in appendix M1 do not alter the measured efficiency of CAC/HPs in terms of the current cooling and heating test metrics, SEER2 and HSPF2, or the current off mode metric, $P_{W,OFF}$.

DOE clarifies that while all issues discussed subsequently within this section are near-term, they are also part of the long-term CAC/HP test procedure—*i.e.,* these revisions are also included in AHRI 1600–2024, which DOE is incorporating by reference at appendix M2. As such, when discussing these near-term changes, DOE makes references to both AHRI 210/240–2024 and AHRI 1600–2024.

1. Controls Verification Procedure for Variable-Speed Systems

Appendix M1 uses a steady-state test concept for variable-speed systems where test room conditions are kept within narrow operating tolerances for each test point, and the CAC/HP system is manually controlled to operate at a fixed specified compressor speed and airflow rate for each test point. As part of the previous rulemaking, several stakeholders encouraged DOE to review ways to improve the representativeness of the test procedures for CAC/HPs (especially variable-speed systems), particularly to consider test procedures where the unit operates under its own native controls in responding to conditioning loads (*i.e.,* load-based testing).[24]

[16] DOE is not incorporating by reference the following provisions in section 3 of AHRI 210/240–2024 because the terms are either defined in appendix M1, or are not needed for the DOE test procedure: 3.2.16 (Double-duct System), 3.2.20 (Gross Capacity), 3.2.46 (Oil Recovery Mode), 3.2.51 (Published Rating), 3.2.63 (Standard Filter), 3.2.78 (Unitary Air-conditioner), and 3.2.79 (Unitary Heat Pump).

[17] DOE is not incorporating by reference the following provision in section 5 of AHRI 210/240–2024 because the term is defined in appendix M1: 5.1.6.2 (Outdoor Unit with No Match (OUWNM)).

[18] DOE is not incorporating by reference the following provisions in section 6 of AHRI 210/240–2024 because the provisions are either defined in 10 CFR 429.16, or are not needed for the DOE test procedure: 6.1.8 (Tested Combinations or Tested Units), 6.2 (Application Ratings), 6.3 (Publication of Ratings), 6.4 (Ratings), and 6.5 (Uncertainty and Variability).

[19] As explained in Section III.B.2, DOE will replace EER2 in appendix M1 with EER in appendix M2. However, EER will be calculated in a manner identical to EER2, and both convey the same full load test information.

[20] DOE is not incorporating by reference the following provisions in section 3 of AHRI 1600–2024 because the terms are either defined in appendix M1, or are not needed for the DOE test procedure: 3.2.16 (Double-duct System), 3.2.20 (Gross Capacity), 3.2.45 (Oil Recovery Mode), 3.2.50 (Published Rating), 3.2.63 (Standard Filter), 3.2.78 (Unitary Air-conditioner), and 3.2.79 (Unitary Heat Pump).

[21] DOE is not incorporating by reference the following provision in section 5 of AHRI 1600–2024 because the term is defined in appendix M2: 5.1.6.2 (Outdoor Unit with No Match (OUWNM)).

[22] DOE is not incorporating by reference the following provisions in section 6 of AHRI 1600–2024 D because the provisions are either defined in 10 CFR 429.16, or are not needed for the DOE test procedure: 6.1.8 (Tested Combinations or Tested Units), 6.2 (Application Ratings), 6.3 (Publication of Ratings), 6.4 (Ratings), and 6.5 (Uncertainty and Variability).

[23] AHRI 1600–2024 replaced the EER2 and COP2 metrics from AHRI 210/240–2024 with EER and COP. For consistency, appendix M2 will follow the nomenclature in AHRI 1600–2024 and will hence use EER as the full-load metric, while appendix M1 will use the EER2 metric.

[24] A load-based test method differs from the steady-state test method currently used in DOE test procedures for air-conditioning and heat pump equipment. In a steady-state test method, the indoor room is maintained at a constant temperature

Continued

To review this topic in detail as part of the current rulemaking, in an RFI published on January 24, 2023, (the ''January 2023 RFI''), DOE requested comments, information, and data pertaining to the consideration of load-based testing methodologies under development by various organizations and whether certain aspects of these methodologies might be adopted into the DOE test procedure. 88 FR 4091, 4098–4101.

In the April 2024 NOPR, based on review of the stakeholder comments received in response to the January 2023 RFI—specifically, that it has not yet been conclusively demonstrated that load-based testing methods have sufficient repeatability and reproducibility to be the basis of direct measurement of system performance—DOE tentatively concluded that use for direct measurement of performance for regulatory purposes would not be suitable at this time. 89 FR 24206, 24220. Instead, DOE tentatively concluded that it would be appropriate to continue to allow regulatory tests to use fixed-speed settings for testing variable-speed systems, while developing a controls verification procedure (''CVP'') that could be used for audit, assessment, and enforcement testing to ensure that the fixed-speed settings are representative of native (unfixed) control, in which the control system may vary compressor speed and/or indoor airflow. *Id.*

DOE noted that AHRI and other relevant stakeholders, including DOE, participated in the development of revised AHRI test standards to address several issues raised in the January 2023 RFI, including the representativeness of fixed-speed testing for variable-speed systems. 89 FR 24206, 24220. From these discussions on the revised AHRI test standards, consensus was developed on using a CVP approach. *Id.* In section III.F.1.e of the April 2024 NOPR, DOE provided a summary of the CVP approach in Appendix I of AHRI 210/240–202X Draft and AHRI 1600–202X Draft. 89 FR 24206, 24220–24222.

DOE acknowledged that the CVP approach outlined in appendix I of the relevant AHRI drafts represented industry consensus regarding: (1) the verification of compliance of systems with the variable capacity system definition, and (2) verification of the consistency of fixed-speed settings of compressor and indoor fans with native control operation as part of enforcement. 89 FR 24206, 24222. DOE considered that the CVP approach presented a more representative test procedure for variable-speed systems operating in the field, because it provided a tool to verify that the fixed compressor speed settings and indoor air fan settings used in regulatory tests are representative of native control operation as the unit operates to maintain the thermostat set point, *i.e.,* indoor dry-bulb temperature. *Id.* For these reasons, DOE proposed to incorporate by reference appendix I of AHRI 210/240–202X Draft to support enforcement associated with testing conducted in accordance with appendix M1, and to incorporate by reference appendix I of AHRI 1600–202X Draft to support enforcement associated with testing conducted in accordance with appendix M2. *Id.*

In response to DOE's proposal, several stakeholders, namely Lennox, the CA IOUs, Rheem, Daikin, GE Appliances, and Carrier, generally showed support for DOE's proposal on implementing the CVP approach for certification of variable-speed products. (Lennox, No. 24 at p. 2; CA IOUs, No. 32 at p. 2; Rheem, No. 34 at p. 5; Daikin, No. 36 at p. 3; GE Appliances, No. 37 at p. 4; Carrier, No. 29 at p. 5)

The Joint Advocates commented that even though it is not appropriate to adopt load-based testing for measuring the direct regulatory test performance of CAC/HPs due to insufficient information on repeatability and reproducibility of load-based testing methods, DOE should consider adopting them as an integral part of the test procedure in a future update to the CAC/HP test procedure. (Joint Advocates, No. 30 at pp. 3–4) Further, the Joint Advocates commented that test data that will better inform repeatability and reproducibility of load-based tests will be coming out in the near future. (*Id.*) The Joint Advocates expressed concern that since the CVP is only an enforcement provision, manufacturers are not required to conduct it while rating their product, and hence, adopting some version of load-based testing will ensure that all certified ratings are more representative of unit performance in the field. (*Id.*)

In response to the Joint Advocates' comment, DOE reiterates that it explored the potential of adopting a load-based method for direct measurement of performance in the April 2024 NOPR. However, as discussed in the April 2024 NOPR, the consensus of affected stakeholders was to adopt a CVP approach instead of a wholesale load-based method test procedure. 89 FR 24206, 24222. DOE is not aware of additional information, such as new load-based test data, available for review to assess the feasibility of adopting load-based testing as a mandatory part of the CAC/HP test procedure. Even though the CVP is primarily intended for use by DOE for assessment and enforcement purposes, it is expected that manufacturers will preemptively utilize the CVP to evaluate the fixed-speed settings used for certification tests of their variable-speed products to ensure consistency with native-control operation.

AHRI 210/240–2024 and AHRI 1600–2024, the industry standards DOE is referencing in this final rule, finalized the relevant test method for the CVP at appendix I without any substantial change as compared to their corresponding drafts. Therefore, consistent with the April 2024 NOPR, DOE is incorporating by reference appendix I of AHRI 210/240–2024 to support enforcement associated with testing conducted in accordance with appendix M1, and to incorporate by reference appendix I of AHRI 1600–2024 to support enforcement associated with testing conducted in accordance with appendix M2. The enforcement provisions are discussed in more detail in section III.I.2 of this document.

2. Low-Temperature Heating Performance

In the April 2024 NOPR, DOE proposed to incorporate by reference AHRI 210/240–202X and AHRI 1600–202X Drafts and adopt several test procedure provisions that pertained to low-temperature heating performance. 89 FR 24206, 24222–24225. Specifically, DOE proposed to (1) reference the definition of ''cold climate heat pump'' (''CCHP'') contained in the AHRI drafts, (2) reference the requirement for products certified as a CCHP to conduct the H4 heating test (either the H4, $H4_{Full}$, or $H4_{Boost}$ heating test, as applicable), (3) retain the current size-for-cooling approach, and (4) include COP_{peak} as an optional representation for combined heat pump and electric resistance heat efficiency at 5 °F outdoor temperature for CHPs, as outlined in appendix K of AHRI 210/240–202X and AHRI 1600–202X Drafts,[25] at appendix M1 and appendix M2, respectively.

throughout the test. In this type of test, any variable-speed or variable-position components of air conditioners and heat pumps are set in a fixed position, which is typically specified by the manufacturer. In contrast, a load-based test has the conditioning load applied to the indoor room using a load profile that approximates how the load varies for units installed in the field. In this type of test, an air-conditioning system or heat pump is allowed to automatically determine and vary its control settings in response to the imposed conditioning loads rather than relying on manufacturer-specified settings.

[25] In several instances of the April 2024 NOPR, DOE incorrectly referred to appendix L of the

DOE did not receive any comments regarding the aforementioned proposals in the April 2024 NOPR. AHRI 210/240–2024 and AHRI 1600–2024, the final versions of the draft AHRI standards, finalized the same low-temperature heating performance provisions without change. Therefore, consistent with the April 2024 NOPR proposal, DOE is incorporating by reference AHRI 210/240–2024 and AHRI 1600–2024 and adopting the low-temperature heating performance provisions discussed in the aforementioned paragraphs.

3. Cut-Out and Cut-In Temperature Verification

Appendix J of AHRI 210/240–202X Draft and also of AHRI 1600–202X Draft includes a test applicable to all CHPs to determine cut-out and cut-in temperatures (*i.e.,* T_{off} and T_{on} respectively).[26] In the April 2024 NOPR, DOE proposed that during assessment and enforcement testing of CHPs, DOE may verify the cut-out and cut-in temperatures using the test specified in appendix J of AHRI 210/240–202X Draft, when conducting assessment and enforcement testing associated with appendix M1, and the test specified in appendix J of AHRI 1600–202X Draft, when conducting assessment and enforcement testing associated with appendix M2. The proposal indicated that, if conducting the appendix J cut-out/cut-in verification, the tested values determined for these temperatures would be used as the T_{off} and T_{on} values for the unit. 89 FR 24206, 24226.

AHRI 210/240–2024 and AHRI 1600–2024, the industry standards DOE is referencing in this final rule, finalized the relevant test method for determining cut-out and cut-in temperatures at appendix J without any substantial change as compared to their respective drafts. Therefore, consistent with the April 2024 NOPR, DOE is incorporating by reference appendix J of AHRI 210/240–2024 and AHRI 1600–2024 at appendix M1 and appendix M2, respectively.

As further discussed in section III.I.1 of this document, DOE may verify certified cut-out and cut-in temperatures using the test methods in appendix J of the relevant AHRI drafts for the purposes of assessment and enforcement testing.

4. Low-Static Single-Split Blower-Coil System Definition and Testing Provisions

Section 3.1.4.1.1 of appendix M1 defines the minimum external static pressure (''ESP'') for ducted blower-coil systems in table 4. For conventional blower-coil systems (*i.e.,* all CAC/HPs that are not classified as ceiling-mount, wall-mount, mobile home, low-static, mid-static, small-duct high-velocity (''SDHV''), or space-constrained), the minimum ESP is specified as 0.5 inches of water column (''in. wc.''). The definition for low-static blower-coil systems includes only multi-split and multi-head mini-split systems—it does not include single-split systems.

AHRI 210/240–202X Draft and AHRI 1600–202X Draft include a new definition specific for low-static single-split blower-coil systems, as shown below.

''Low-static single-split blower-coil system'' means a ducted single-split system air conditioner or heat pump for which all of the following apply:

(1) The Outdoor Unit has a Specified cooling capacity less than or equal to 24,000 Btu/h;

(2) If the Outdoor Unit is a heat pump or a variable capacity air conditioner, it is separately Specified with a blower-coil indoor unit tested with a minimum 0.5 in H2O ESP, otherwise it is separately Specified with a coil-only indoor unit; and

(3) The Indoor Unit is marketed for and produces a maximum ESP less than 0.5 in H2O when operated at the Specified cooling full-load airflow not exceeding 400 scfm per Specified ton of cooling.

Both drafts also include provisions requiring low-static single-split blower-coil systems to be tested at their specified airflow (not to exceed 400 standardized cubic feet per minute (''scfm'') per specified ton of cooling capacity) at their maximum airflow setting. If the ESP achieved at the specified airflow is less than 0.1 in. wc., the provisions require adjustment of the airflow measurement apparatus fan to reduce airflow and increase ESP until a minimum of 0.1 in. wc. is achieved.

In the April 2024 NOPR, DOE proposed to incorporate by reference the new definition of low-static single-split blower-coil system and associated testing provisions, which would include single-split systems that cannot accommodate the 0.5 in. wc. required for testing single-split blower-coil systems in accordance with the current DOE test procedure in appendix M1. 89 FR 24206, 24227.

DOE did not receive any comments regarding the aforementioned proposals in the April 2024 NOPR. AHRI 210/240–2024 and AHRI 1600–2024 finalized the definition and testing provisions for low-static single-split blower-coil systems without substantial change as compared with their respective drafts. Therefore, consistent with the April 2024 NOPR proposals, DOE is incorporating by reference AHRI 210/240–2024 and AHRI 1600–2024, and adopting the definition and testing provisions for low-static single-split blower-coil systems.

In advance of adopting these changes, multiple manufacturers, including Samsung HVAC America LLC (''Samsung''),[27] Mitsubishi,[28] and Hisense (Guangdong) Air Conditioning Co. Ltd. (''Hisense''),[29] petitioned DOE for test procedure waivers pertaining to low-static single-split blower-coil systems. All petitions asserted nearly identical circumstances and model limitations—that it was impossible to test certain basic models according to appendix M1 because the models could not operate at the conventional minimum ESP requirement of 0.5 in. wc. found in table 4 of appendix M1. Subsequently, manufacturers could not certify compliance for or sell these products.

On June 5, 2023, DOE published a notification of petition for waiver and grant of an interim waiver that permits Samsung to use an alternative test procedure for the basic models subject to its petition. 88 FR 36558. The alternative test procedure allows Samsung to test its basic models that are designed for low-static, short-duct applications at 0.1 in. wc. ESP and to make proportional adjustments to fan power and capacity such that the results are equivalent to performance measured at 0.5 in. wc. ESP. 88 FR 36558, 36561–36563. DOE initially determined that this alternate test procedure was appropriate and allowed for the accurate measurement of the energy efficiency of the specified basic models, while alleviating the testing problems cited in implementing the DOE test procedure for the models. *Id.*

In the April 2024 NOPR, DOE noted that, should the new definition of low-

respective AHRI 210/240–202X and AHRI 1600–202X Drafts as the appendices regarding COP_{peak}. (*See* 89 FR 24206, 24225). These were typographical errors, since the appendices regarding COP_{peak} are at appendix K of the respective AHRI 210/240–202X and AHRI 1600–202X Drafts.

[26] In several instances of the April 2024 NOPR, DOE incorrectly referred to appendix K of the respective AHRI 210/240–202X and AHRI 1600–202X Drafts as the appendices regarding cut-out and cut-in temperature verification. (*See* 89 FR 24206, 24226 and 89 FR 24206, 24243). These were typographical errors, since the appendices regarding cut-out and cut-in temperature verification are at appendix J of the respective AHRI 210/240–202X and AHRI 1600–202X Drafts.

[27] *See* Samsung's petition at *www.regulations.gov/docket/EERE-2023-BT-WAV-0010.*

[28] *See* Mitsubishi's petition at *www.regulations.gov/docket/EERE-2023-BT-WAV-0015.*

[29] *See* Hisense's petition at *www.regulations.gov/docket/EERE-2023-BT-WAV-0011.*

static single-split blower-coil system and the associated testing provisions be adopted, DOE would terminate Samsung's interim waiver pending final determination. 89 FR 24206, 24227. The interim waiver was granted with the understanding that it was impossible to test the manufacturer's specific basic models according to the prescribed test procedures in appendix M1. Given that DOE is adopting provisions for low-static single-split blower-coil systems, DOE concludes that this alternate test procedure is no longer necessary. Therefore, DOE is terminating the aforementioned waiver for Samsung. DOE notes that the ratings for the subject Samsung basic models may change when moving to the amended appendix M1 test procedure outlined in this final rule.

DOE has not published a notification of petition for waiver or granted interim waivers for either the Mitsubishi or Hisense petitions. However, for the same reasons that DOE is terminating Samsung's aforementioned waiver, DOE concludes that an alternate test procedure is no longer necessary. DOE considers the petitions submitted by Mitsubishi and Hisense to be addressed sufficiently by the low-static single-split blower-coil system definition and testing provisions adopted in this final rule.

5. Mandatory Constant Circulation Systems

Currently, nearly all CAC/HP products are designed with R–410A as the refrigerant. However, under global warming potential (''GWP'') restrictions enacted by an Environmental Protection Agency (''EPA'') final rule published on October 24, 2023 (''October 2023 EPA final rule''), the use of R–410A is scheduled to be phased out for CAC/HP products.[30] 88 FR 73098. The EPA Significant New Alternatives Policy (''SNAP'') Program evaluates and regulates substitutes for ozone-depleting chemicals (such as CAC/HP refrigerants) that are being phased out under the stratospheric ozone protection provisions of the Clean Air Act. (42 U.S.C. 7401 *et seq.*) [31] Of interest to CAC/HPs, the EPA SNAP Program's list of viable substitutes [32] includes a group of refrigerants classified as A2L refrigerants. While these refrigerants have GWP levels meeting the requirements of the October 2023 EPA Final Rule, they face stricter safety requirements than R–410A due to the moderate flammability associated with their ''2L'' ASHRAE safety classification.[33] Many of the safety requirements specifically address mitigation of ignition risk in case of refrigerant leakage. One mitigation option for refrigerant leakage is air circulation, which can be initiated when a leak is detected, or the system can use ''constant circulation,'' running the fan, typically at a reduced speed, at all times. This latter approach has energy use implications, which are addressed in the AHRI 210/240 and AHRI 1600 standards.[34]

AHRI 210/240–202X Draft and AHRI 1600–202X Draft include a new definition for ''mandatory constant circulation system'' (''MCCS''). The updated industry standard drafts also include testing provisions for such systems, specifically requiring that CAC/HPs meeting the mandatory constant circulation system definition not use the default cooling and heating degradation coefficients, but rather evaluate these degradation coefficients using the respective cyclic tests specified by table 7 of AHRI 210/240–202X Draft and AHRI 1600–202X Draft, conducted in accordance with section E12 of appendix E of AHRI 210/240–202X Draft and AHRI 1600–202X Draft. In the April 2024 NOPR, DOE proposed to incorporate by reference the new definition of MCCS and the aforementioned testing provisions outlined in AHRI 210/240–202X Draft and AHRI 1600–202X Draft, at appendix M1 and appendix M2, respectively. 89 FR 24206, 24228.

In response to DOE's proposal, Carrier expressed support for the MCCS testing approach, but it commented that there is ambiguity regarding the specific products to which the MCCS testing approach applies. (Carrier, No. 29 at pp. 2–3) Carrier stated that for a CAC/HP system with a charge quantity between m1 and m2,[35] the room size in which the UL 60335–2–40 4th edition refrigerant safety standard allows the system to be installed (or the effective volume into which refrigerant would be dispersed in case of leakage) is limited. Further, this limitation can be stricter if the system does not employ air circulation, either continuously or initiated by a refrigerant leak detection system (''LDS''). (*Id.*) Carrier requested that DOE provide further specificity on the testing approach for products that might require air circulation as mitigation in some installations but not necessarily all installations. (*Id.*) Carrier recommended that DOE require all systems with a charge level greater than m1 and less than or equal to m2 that do not contain an LDS be tested as an MCCS since how and where these products are installed in the field are outside the manufacturer's control (besides a label specifying the required area). (*Id.*)

In a rebuttal, Daikin opposed Carrier's aforementioned recommendation, for several reasons. (Daikin, No. 40 at p. 1) First, Daikin commented that UL 60335–2–40 4th edition is clear in its requirements for information that must be provided in installation instructions, including instructions regarding how to install the product in accordance with refrigerant safety codes, including how to meet the minimum floor area requirements. (*Id.*) Daikin specifically pointed to Annex DD of UL 60335–2–40 4th edition, which specifies that an original equipment manufacturer (''OEM'') must include details of minimum installation height, minimum floor area, and other appropriate information in installation instructions to ensure safety requirements are met. (*Id.*) Daikin also commented that CAC/HPs using A2L refrigerant, in addition to providing information in installation instructions, must have adequate warning labels (per Clause 7 of UL 60335–2–40 4th edition, Annex 101.DVF of UL 60335–2–40 4th edition, and EPA SNAP Rule 25), such that the installer will be well aware the product being installed needs special attention. (*Id.*)

Second, Daikin commented that the minimum floor area required by ASHRAE 15.2 (with which UL 60335–2–40 requires compliance), for some situations, does not depend on whether

[30] EPA published an interim final rule on December 26, 2023 (''EPA Technology Transition Interim Final Rule'') that allows 1 additional year, until January 1, 2026, solely for the installation of new CAC/HPs using components manufactured or imported prior to January 1, 2025. 88 FR 88825.

[31] Additional information regarding EPA's SNAP Program is available online at *www.epa.gov/ozone/snap/*.

[32] A list of EPA SNAP Program-approved refrigerant substitutes is available at *www.epa.gov/snap/substitutes-residential-and-light-commercial-air-conditioning-and-heat-pumps*.

[33] ASHRAE assigns safety classification to refrigerants based on toxicity and flammability data. The capital letter designates a toxicity class based on allowable exposure, and the numeral denotes flammability. For toxicity, class A denotes refrigerants of lower toxicity, and class B denotes refrigerants of higher toxicity. For flammability, class 1 denotes refrigerants that do not propagate a flame when tested as per the standard; classes 2 and 2L denote refrigerants of lower flammability; and class 3 denotes highly flammable refrigerants (such as hydrocarbons).

[34] DOE is aware that a refrigerant leakage detection system may also draw power, which would also be addressed in the AHRI 210/240 and AHRI 1600 test standards. However it is DOE's understanding that the impact of this power is much less than operation of the fan in constant circulation mode.

[35] UL 60335–2–40 fourth edition defines charge quantities m1 and m2 based on the type of refrigerant.

the system employs circulation (whether continuous or LDS initiated) to meet mitigation requirements. (Daikin, No. 40 at p. 2)

Third, Daikin commented that, if a manufacturer chooses to use continuous circulation airflow as the method of leak mitigation, the manufacturer must conduct additional safety verification of that function, per Annex GG of UL 60335–2–40 4th edition (specifically, Clause GG.2.2.2DV). (Daikin, No. 40 at pp. 2–3) Annex GG of UL 60335–2–40 4th edition states that a product using continuous circulation shall (1) run the indoor fan continuously, except for short periods of maintenance and service; (2) detect or monitor continuously if the airflow rate drops below a specific level (Q_{min}); and (3) if the airflow drops below the specified level, provide an output signal that airflow is reduced and disable compressor operation unless the compressor operation reduces the leak rate or the total amount of refrigerant released to the indoor space. Consequently, Daikin commented that, if the manufacturer chooses to rely on continuous circulation as the mitigation method, the OSHA-certified Nationally Recognized Testing Laboratory (''NRTL'') that certifies the product to meet the safety standard UL 60335–2–40 must check by inspection that the manufacturer runs the fan continuously. (*Id.*)

Fourth, Daikin commented on the DOE test procedure emphasis on installation instructions. (Daikin, No. 40 at p. 3) The DOE test procedure requirement to follow the OEM installation instructions when installing a system for testing is based on the premise that the installation instructions provide a setup representative of field installation. Thus, Daikin asserted it would be logical for DOE to be consistent and also assume that the installing contractor would follow requirements related to refrigerant safety that are laid out in installation instructions. (*Id.*)

In response to the Carrier and Daikin comments, it is DOE's understanding (as noted in Daikin's comment) that use of constant circulation as the method of refrigerant leakage risk mitigation requires that the CAC/HP product must be inherently designed with this feature—a contractor cannot be in compliance with UL 60335–2–40 4th edition requirements if the feature is selected in the field for a system that does not inherently already have it. Specifically, an NRTL must certify upon inspection that a product using constant circulation for safety code compliance indeed runs its indoor fan continuously. Thus, the circumstances ''outside the manufacturer's control'' involving installation by a contractor using constant circulation as the means of mitigation of systems without LDS and without MCCS that Carrier mentioned in its comment are violations of refrigerant safety codes. While such violations may occur in the future, DOE concludes that the seriousness of the potential consequences would make them infrequent, *i.e.,* such circumstances could not be considered representative of the installation of such systems. Therefore, DOE determines that, for testing according to the DOE test procedure, it is not appropriate to require testing using constant circulation for products with charge between m1 and m2 that don't have an LDS and are not inherently an MCCS. However, any product using constant circulation to comply with refrigerant safety codes that would meet the MCCS definition in AHRI 210/240–202X Draft and AHRI 1600–202X Draft could be verified to have this status by powering up the unit, and consequently will be required to test as an MCCS.

AHRI 210/240–2024 and AHRI 1600–2024 finalized the definition and testing provisions for MCCS without substantial change. DOE has determined that the definition and approach included in the finalized versions provide a more representative measure of CAC/HP efficiency for systems utilizing mandatory constant circulation as a means of refrigerant leakage mitigation. Therefore, consistent with the April 2024 NOPR proposals, DOE is incorporating by reference AHRI 210/240–2024 and AHRI 1600–2024 and adopting the definition and testing provisions for MCCS.

Daikin noted in its comment that the certification aspects of the MCCS test procedure changes were not included in the April 2024 NOPR. (Daikin, No. 40 at p. 3) Daikin recommended that DOE include as mandatory certification a declaration from the manufacturer regarding whether the CAC/HP product relies upon mandatory continuous circulation or not. (*Id.*) Further, Daikin suggested that whether a product uses continuous circulation or not could be validated by operation of the product when it is powered up, as well as validated by the safety agency (*i.e.,* NRTL) certification report. (*Id.*)

In response to Daikin's recommendation, DOE notes that it will consider certification requirements for CAC/HPs, including a requirement to certify whether the CAC/HP product relies upon mandatory constant circulation or not, in a separate rulemaking. However, DOE may validate whether a system utilizes constant circulation when powered up for the purposes of assessment or enforcement testing.

6. Dual-Fuel Heat Pumps

Heat pumps generally have reduced capacity and perform less efficiently at low ambient outdoor temperatures than they do at moderate ambient outdoor temperatures. Most heat pumps require some form of auxiliary heat when outdoor temperature is low to satisfy building load in excess of heat pump capacity. DOE is aware of HPs that combine the operation of a conventional electric HP with back-up heat provided by fuel, such as a gas fuel-fired furnace or boiler. These are referred to as ''dual-fuel'' systems or hybrid heat pumps (''HHPs'') and provide an alternative to heat pumps specifically designed to perform in cold climates (*i.e.,* cold climate heat pumps). Dual-fuel systems rely on heat pump operation at milder ambient temperatures, but switch to the back-up heating source at low ambient temperatures.

The AHRI 210/240–202X Draft and AHRI 1600–202X Draft included a new definition for dual-fuel heat pump systems. Additionally, the two AHRI drafts introduced a new seasonal efficiency metric, Dual Fuel Utilization Efficiency (''DFUE''), meant to capture the heating efficiency of such dual-fuel heat pump systems. Calculation of DFUE according to the draft standards is optional, requires no additional testing, and is outlined in appendix L of both standards.

In the April 2024 NOPR, DOE tentatively determined that while the definition and optional test approach included in the draft industry standards may provide a representative test approach for dual-fuel heat pump systems, DOE was at that time continuing to evaluate whether to include such provisions in its CAC/HP test procedures. 89 FR 24206, 24229. Therefore, DOE proposed to not incorporate by reference the new definition of dual-fuel heat pump and the optional seasonal efficiency metric, DFUE, outlined in the AHRI 210/240–202X and AHRI 1600–202X Drafts. *Id.*

AHRI 210/240–2024 and AHRI 1600–2024 finalized the definition and optional seasonal efficiency metric, DFUE, for dual-fuel heat pump without substantial change. Based on DOE's continued evaluation of the dual-fuel provisions in the two AHRI drafts, DOE has concluded that such provisions are not necessary in the CAC/HP test procedures. Therefore, DOE is not incorporating by reference the new definition of dual-fuel heat pump and

the optional seasonal efficiency metric, DFUE, outlined in the AHRI 210/240–2024 and AHRI 1600–2024. However, DOE recognizes that representations of dual-fuel heat pump performance may be useful to consumers. Therefore, while DOE is not proposing provisions for dual-fuel heat pumps, DOE would allow manufacturers to make optional representations of dual-fuel heat pump performance consistent with available AHRI industry test standards.

DOE notes that since dual-fuel heat pump systems are comprised of two covered products currently subject to energy conservations standards (*i.e.,* a heat pump and a furnace), DOE would continue to require reporting of the relevant CAC/HP and consumer furnace heating metrics—EER2, SEER2, HSPF2, EER, SCORE and SHORE for CAC/HP, and AFUE for consumer furnaces; regardless of whether a manufacturer chooses to rate their dual-fuel heat pumps with the DFUE metric. DOE also notes that the current representation requirements at 10 CFR 429.16 require representation of every individual heat pump combination distributed in commerce. As such, installing an outdoor HP unit and an indoor coil with an existing furnace (or other air mover) that is not being replaced would constitute distribution in commerce of a coil-only heat pump combination for which DOE requires a coil-only representation.

7. Rating Individual Components of Split Systems

(a) Background

DOE's test procedure in appendix M1 and its rating and certification requirements for central air conditioners and heat pumps in 10 CFR 429.16 have provisions that apply based on the configurations in which these products are distributed in commerce. This includes provisions for outdoor units of a split system that are not distributed in commerce with any indoor units, which DOE's regulations refer to as an outdoor unit with no match (''OUWNM'').

Specifically, 10 CFR 429.16(b)(2) requires that the ratings for basic models of split-system central air conditioners or heat pumps distributed in commerce as an OUWNM be based on the testing of a model of coil-only indoor unit meeting the requirements of section 2.2e of appendix M1. Section 2.2.e of appendix M1 requires that an OUWNM be tested using a coil-only indoor unit with a single cooling air volume rate whose coil has round tubes of outer diameter no less than 0.375 inches, and normalized gross indoor fin surface (''NGIFS,'' gross indoor fin surface divided by the measured cooling capacity) no greater than 1.0 square inch per British thermal unit per hour (sq in/Btu/hr). (10 CFR 429.16 (b)(2)(i) and appendix M1, section 2.2.e) These provisions were introduced in a final rule regarding CAC/HP test procedures published on June 8, 2016 (''June 2016 Final Rule''), to address outdoor-unit-only replacements of old R–22 outdoor units. 81 FR 36992, 37008–37012.

Effective January 1, 2010, EPA banned sales and distribution of CAC/HPs designed to use R–22, a hydrochlorofluorocarbon (''HCFC'') refrigerant that causes ozone depletion. 74 FR 66450 (Dec. 15, 2009). However, EPA continued to allow sale and distribution of ''components'' of CAC/HP systems for repair purposes, such as outdoor units. *Id.* at 74 FR 66452. In the June 2016 Final Rule, DOE introduced the testing provisions for OUWNMs to ensure that performance ratings for such installations would be representative of the replacement of outdoor units originally designed for R–22 and using the original indoor units. *See* 81 FR 36992, 37008–37011.

In a final rule published on October 24, 2023 (''October 2023 EPA final rule''), pursuant to provisions of the American Innovation and Manufacturing Act (''AIM Act''), enacted on December 17, 2020 (42 U.S.C. 7675), EPA restricted the installation of residential and light commercial systems that are designed for hydrofluorocarbon (''HFC'') refrigerants having a GWP greater than 700, starting January 1, 2025. 88 FR 73098. On December 26, 2023, EPA published an amendment to the October 2023 EPA Final Rule that extended the installation deadline to January 1, 2026, as long as the ''specified components'' being installed were manufactured or imported prior to January 1, 2025 (''December 2023 EPA interim final rule''). 88 FR 88825.

Split-system CAC/HPs are included in the scope of residential and light commercial systems As such, new split-system CAC/HPs designed for use with R–410A and sold as a combination of an outdoor and indoor unit would be banned for installation, per the October 2023 EPA Final Rule. However, EPA provides an exemption, permitting the sales of specified components, to allow consumers to service and repair existing systems that are over the GWP limits defined in the October 2023 EPA Final Rule, provided the specified components are used only to service existing systems and are subject to labeling and reporting requirements. 88 FR 73098, 73124–73125. This provides an exemption for individual specified components of R–410A based split-system CAC/HPs to be sold as replacements, including condensing units and evaporator units, similar to the component exemption adopted by the EPA when R–22 was phased out. 74 FR 66450, 66459–66460.

(b) NOPR Proposal

In the April 2024 NOPR, DOE noted that while the current OUWNM provisions were precipitated by EPA's ruling on R–22 units, DOE's intention was to apply them more broadly to any case where an outdoor unit is sold without an indoor unit. 89 FR 24206, 24230. DOE noted that the current OUWNM provisions apply for any outdoor units that are distributed in commerce without an indoor matching pair, regardless of the refrigerant the outdoor unit employs. *Id.* DOE clarified that per the October 2023 EPA Final Rule, any outdoor unit designed for R–410A or any banned refrigerant as per EPA regulations, when distributed in commerce without an indoor unit on or after January 1, 2026, would be deemed an outdoor unit with no match. *Id.* DOE further noted that, similar to EPA requirements for the R–22 ban, EPA is allowing such an outdoor unit to be installed as a replacement specified component for an existing system but not to be installed with indoor units for installation as a complete split CAC/HP system. *Id.*

DOE noted that appendix M1 currently does not explicitly define outdoor units with no match and that while AHRI 210/240–202X Draft and AHRI 1600–202X Draft define outdoor units with no match, the definition applies explicitly only to R–22 replacement outdoor units and outdoor units using refrigerants with properties similar to R–22. *Id.* Because the definition of outdoor unit with no match in AHRI 210/240–202X Draft and AHRI 1600–202X Draft is specifically focused on R–22 outdoor units, DOE proposed not to incorporate the definition by reference, and instead proposed a clarifying definition that is consistent with DOE's intention in the June 2016 Final Rule. *Id.*

DOE proposed the following definition for OUWNM in the April 2024 NOPR for appendix M1:

Outdoor Unit with No Match (OUWNM). An Outdoor Unit that is not distributed in commerce with any indoor units, and that meets any of the following criteria:

(a) Is designed for use with a refrigerant that makes the unit banned for installation when paired with an Indoor Unit as a system, according to EPA regulations,

(b) Is designed for use with a refrigerant that has a 95 °F midpoint saturation absolute pressure that is ± 18 percent of the 95 °F saturation absolute pressure for R–22, or

(c) Is shipped without a specified refrigerant from the point of manufacture or is shipped such that more than 2 pounds of refrigerant are required to meet the charge per section 5.1.8 of AHRI 210/240–202X Draft. This shall not apply if either (a) the factory charge is equal to or greater than 70 percent of the outdoor unit internal volume times the liquid density of refrigerant at 95 °F, or (b) an A2L refrigerant is approved for use and listed in the certification report.

DOE noted that the proposed definition of OUWNM for appendix M2 is the same as that for appendix M1, except that the reference in part (c) of the definition is to section 5.1.8 of AHRI 1600–202X Draft. *Id.*

DOE tentatively concluded that the proposed definition would further help clarify that the existing test procedure and rating requirements for outdoor units with no match are applicable to R–410A-based systems and any other refrigerants banned by EPA regulations from January 1, 2026, as they have been previously, for R–22 and any other ozone-depleting refrigerants. *Id.* As proposed, the definition would apply to all types of outdoor units (*i.e.,* heat pump, air conditioner, single-speed, two-speed, variable-speed, etc.) and outdoor units with no match would continue to be tested with an indoor coil having a nominal tube diameter of 0.375 in and an NGIFS of 1.0 or less (as determined in section 5.1.6.3 of AHRI 210/240–202X Draft and AHRI 1600–202X Draft). *Id.* DOE clarified that the determination of represented values, alternative efficiency determination method (''AEDM'') requirements, combinations selected for testing, and certification report requirements applicable to outdoor units with no match would remain the same as those specified in table 1 to paragraph (a)(1), paragraph (c)(2), table 2 to paragraph (b)(2)(i), and paragraph (e)(3), respectively, in 10 CFR 429.16. *Id.* DOE noted that existing outdoor models currently distributed in commerce as part of a split-system basic model that transition to a replacement outdoor unit only would need to be tested, rated, and recertified under the provisions in 10 CFR 429.16 for an outdoor unit with no match. *Id.* DOE noted that the basic model number would need to change to reflect that the outdoor unit is no longer part of a combination as previously certified, but rather as an outdoor unit with no match; however, the outdoor unit model could still be assigned the same individual model number. *Id.*

(c) Interaction With EPA Regulations

In response to its April 2024 NOPR, DOE received comments from stakeholders on a variety of issues related to compliance with DOE's regulations in the context of the October 2023 EPA Final Rule. These specific comments are addressed in the next section, but to ensure clarity this section first summarizes the key elements of compliance with DOE testing, rating, and certification requirements for these products during the period of implementation of the EPA rules.

As specified in the October 2023 EPA Final Rule, and modified in the December 2023 EPA interim final rule, installation of central air conditioner and heat pump systems manufactured or imported on or after January 1, 2025, that use a refrigerant with a GWP higher than 700 would be prohibited from being installed beginning on January 1, 2025. A system comprised of ''specified components'' manufactured or imported prior to January 1, 2025, can still be installed until January 1, 2026. The EPA's rule permits the continued manufacture, distribution, and installation of individual specified components that use higher GWP refrigerants on or after January 1, 2026, only as replacements for components in existing systems provided they are labeled for this use as specified in the EPA rule.

The DOE definition of the term ''central air conditioner or central air conditioning heat pump'' in 10 CFR 430.2 specifies that a central air conditioner or central air conditioning heat pump may consist of: A single-package unit; an outdoor unit and one or more indoor units; an indoor unit only; or an outdoor unit with no match. Further, the DOE definition specifies that in the case of an indoor unit only or an outdoor unit with no match, the unit must be tested and rated as a system (combination of both an indoor and an outdoor unit). In addition, DOE's requirements in 10 CFR 429.16(a) specify required representations based on how the model is distributed in commerce (*i.e.,* as part of a matched system, as an indoor unit only, or as an outdoor unit with no match).

DOE's rules for testing and rating covered products to establish compliance with energy conservation standards apply to basic models as distributed in commerce by the manufacturer (or importer). Although the deadlines for installation of specified components under EPA's rule apply to certain products based on their date of manufacture or import (*i.e.,* depending on whether they were manufactured prior to January 1, 2025), DOE's rules for how the manufacturer must test, rate, and certify their products apply based on the date of manufacture (or importation) and on how each basic model is distributed in commerce (*i.e.,* as part of a matched system or as an OUWNM), with the purpose being to ensure that each basic model complies with the energy conservation standard that applies to that basic model. A manufacturer or importer is not required to retest and/or recertify a basic model unless the manufacturer either makes a change to that basic model that would make it a new basic model under DOE's definition of that term in 10 CFR 430.2 or makes a change to the configuration in which it is being distributed in commerce such that a different tested combination requirement applies to it under 10 CFR 429.16. Stated within the context of the EPA's rule, a basic model of condensing unit that previously had been rated and certified to DOE in one or more combinations would not have to be re-tested and rated under the OUWNM provisions until such a time as the manufacturer ceases distribution of that basic model as part of a matched pair and begins distributing it as an OUWNM. At that point, the manufacturer must test, rate, and certify that condensing unit under the OUWNM as a new basic model, as under the basic model definition in 10 CFR 430.2 the model as an OUWNM cannot be the same basic model as it would have been in a combination.

For R–410A (or other refrigerant with GWP above 700) outdoor units manufactured (or imported) prior to January 1, 2025, which under the EPA's rule can still be installed as a system until January 1, 2026, the certifications of those models based on their tested combinations remain valid under DOE regulations as long as manufacturers continue to distribute them in commerce as a system. However, if at some point the manufacturer chooses to distribute in commerce the unit alone and not as a combination with any indoor units (either before January 1, 2026 or after that date as a service-only replacement component to comply with EPA's rule), the outdoor unit would have to be tested, rated, and certified in accordance with the OUWNM provisions. This also applies for R–410A (or other refrigerant with GWP above 700) outdoor units manufactured or imported on or after January 1, 2025, as DOE expects that manufacturers would cease distribution of the outdoor units

as part of a combination, as these systems could no longer be installed anywhere in the U.S. This certification as a new basic model must be made prior to the date at which the manufacturer begins distributing those outdoor units as an OUWMN and would be indicated to DOE in its certification reports via a discontinued model filing for the model as distributed in a combination and certification as a new basic model of OUWNM.

For an indoor unit intended only for replacement in an existing system and which is no longer distributed in commerce for installation as a combination, as would be the case for an existing system that uses a refrigerant banned by EPA, the requirement in 10 CFR 430.2 and table 1 of 10 CFR 429.16(a) for the indoor unit to be rated as part of a system would still apply even though the indoor unit is no longer being distributed in commerce as part of a combination. This rating requirement would apply regardless of whether the manufacturer of the indoor unit is an ICM. If the indoor unit uses a refrigerant allowed by EPA only for component replacement (*e.g.,* R–410A), the rating for such a unit would be based on a combination using that refrigerant, and per EPA regulations could not be distributed in commerce as a combination. However, this does not imply that the indoor unit cannot be rated, nor that the entire system would have to be replaced. DOE notes further that any such rating for the indoor unit must be compliant with current standards, and that any indoor units distributed in commerce for use in a system that uses a refrigerant subject to the EPA ban would need to have been certified to DOE as compliant with the applicable standards as part of a combination before January 1, 2025 and must have been tested and rated in every combination with an outdoor unit with which it has been previously distributed in commerce.

(d) Comments Received

In their response to the NOPR, the Joint Advocates and Lennox fully supported the proposed provisions for OUWNMs. The Joint Advocates agreed that DOE's clarifying definition for OUWNM will help ensure representative ratings and that the proposed definition is consistent with DOE's intent in the June 2016 Final Rule. (Joint Advocates, No. 30 at p. 3) Lennox strongly supported the DOE proposal that any outdoor unit designed for R–410A or any banned refrigerant as per EPA regulations, when distributed in commerce without an indoor unit on or after January 1, 2026, would be deemed an outdoor unit with no match. (Lennox, No. 24 at p. 2).

Several commenters requested more clarity or expressed concerns on DOE's OUWNM provisions. These are discussed in the following subsections.

(1) OUWNM Definition

AHRI commented that while the definition of "OUWNM" in AHRI 210/240-2024 and AHRI 1600-2024 is specifically focused on R-22 outdoor units, in line with the current regulations in the DOE test procedure, AHRI is taking steps to update the standards to ensure that OUWNM provisions are applicable to any outdoor units that are distributed in commerce without an indoor matching pair, regardless of the refrigerant the outdoor unit employs. (AHRI, No. 25 at p. 4) AHRI noted that it intends to expedite revisions to AHRI 210/240-2024 and AHRI 1600-2024 to reflect OUWNM definitions adopted in the final rule. (*Id.*) AHRI suggested modification to part of the proposed definition of OUWNMs (proposed additions *italics* and deletions in ~~strikeout~~) as follows:

An Outdoor Unit that is not distributed in commerce *by the manufacturer* with any indoor units, and that meets any of the following criteria:

(a) is designed for use with a refrigerant that makes the unit banned for installation when paired with *a new* Indoor Unit as a system, according to EPA regulations in 40 CFR chapter I, subchapter C,

[provisions (b) and (c) unchanged]

Rheem requested that DOE consider simplifying the proposed definition for OUWNMs because some of the bullet points may overlap or conflict with each other. (Rheem, No. 34 at p. 3) Rheem noted that in SNAP Final Rule 237, EPA has approved R–32, R–452B, R–454A, R–454B, R–454C, and R–457A for use in residential and light commercial air-conditioning and heat pump end use, which also includes CAC/HPs. (*Id.*) Rheem commented that among these substitutes, R–454C and R–457A have a 95 °F midpoint saturation absolute pressure within 18 percent of the 95 °F saturation absolute pressure for R–22, thus meeting the provisions in 4.1(b) and 3.1(b) of the proposed OUWNM definition at appendix M1 and appendix M2, respectively. (*Id.*) Rheem suggested that DOE simplify the definition of OUWNM to avoid confusion. (*Id.*)

DOE appreciates that AHRI is taking steps to update AHRI 210/240–2024 and AHRI 1600–2024 standards to broaden the OUWNM provisions beyond R–22 outdoor units and make them applicable to any outdoor units that are distributed in commerce without an indoor matching pair, regardless of the refrigerant the outdoor unit employs. Such an implementation would be consistent with DOE's proposed definition of OUWNMs in the April

2024 NOPR. DOE disagrees with the addition of ''by the manufacturer'' in the OUWNM definition to qualify distribution in commerce, since under EPCA the term ''distribution in commerce'' also applies to subsequent distribution after the initial offering by the manufacturer. The proposed addition would undercut the general applicability of that term across the distribution chain as established in EPCA. As explained in DOE's March 7, 2011, final rule that established the certification provisions in Part 429, application of the term ''distribution in commerce'' would depend on a particular manufacturer's production practices, business decisions, and the facts and circumstances of a particular case. 76 FR 12422, 12426. . However, DOE agrees with the inclusion of the term ''new'' to clarify that the EPA ban specifically pertains to new system installations, and for further clarification is including the term ''new'' to describe both the indoor unit with which the outdoor unit is paired and the newly created system. In addition, notwithstanding the broad applicability of the term ''distribute in commerce,'' DOE notes that under 10 CFR 429.102(a)(6) it is a prohibited act for a manufacturer or private labeler to distribute in commerce any new covered product or covered equipment that is not in compliance with an applicable energy conservation standard prescribed under the Act, and therefore the obligation to certify that basic models are in compliance with the standards lies with the manufacturer and importer. This is also the basis for the requirement in 10 CFR 429.12(a) that each manufacturer, before distributing in commerce any basic model of a covered product or covered equipment subject to an applicable energy conservation standard, certify that the model meets the applicable energy conservation standard.

DOE agrees with Rheem that certain SNAP-approved refrigerants, for example R–454C and R–457A, have pressure-temperature relationship characteristics similar to R–22 and would meet provision (b) of the proposed OUWNM definition. DOE notes that both these refrigerants have GWPs equal to or less than 150, and thus could potentially be under consideration for future reductions in GWP as compared with refrigerants R–454B and R–32, the primary near-term candidates for transition from R–410A. To ensure that these SNAP-approved refrigerants would not be subject to provision (b) of the proposed OUWNM definition, DOE is qualifying provision (b) with a GWP limit—specifically, only refrigerants with GWP greater than 150 (per EPA's measure) would be subject to provision (b).

In summary, DOE is making minor modifications to the OUWNM definition as follows:

An Outdoor Unit that is not distributed in commerce with any indoor units, and that meets any of the following criteria:

(a) Is designed for use with a refrigerant that makes the unit banned for installation when paired with a new Indoor Unit as a system, according to EPA regulations in 40 CFR chapter I, subchapter C;

(b) Is designed for use with a refrigerant that has a 95 °F midpoint saturation absolute pressure that is ±18 percent of the 95 °F saturation absolute pressure for R–22 and a global warming potential greater than 150 per EPA regulations in 40 CFR 84.64; or

(c) Is shipped without a specified refrigerant from the point of manufacture or is shipped such that more than 2 pounds of refrigerant are required to meet the charge per section 5.1.8 of AHRI 210/240–2024.[36] This shall not apply if either (a) the factory charge is equal to or greater than 70 percent of the outdoor unit internal volume times the liquid density of refrigerant at 95 °F, or (b) an A2L refrigerant is approved for use and listed in the certification report.

(2) Clarity on Interaction With EPA Rule

AHRI and Carrier requested further clarity on how DOE's OUWNM provisions will interface with the October 2023 EPA final rule, particularly in terms of timing and scope. (AHRI, No. 25 at pp. 2–4; Carrier, No. 29 at p. 3)

AHRI appreciated DOE's proposal to expand the OUWNM definition to include HFC refrigerants having a GWP greater than 700, in line with EPA's ban, but noted that the interaction between the EPA and DOE regulations are complex and implementation questions remain. (AHRI, No. 25 at p. 2) AHRI cautioned that care must be taken to ensure industry and downstream distribution partners understand and can remain compliant with applicable regulations and that consumers who recently installed products with R–410A refrigerant have meaningful access to service parts for the useful life of their equipment. (*Id.*) AHRI noted that while no date has been included with the DOE-proposed OUWNM definition, the NOPR preamble presents the proposed date of 2026. (AHRI, No. 25 at p. 3) AHRI sought clarification that OUWNM ratings would only be required for split-system outdoor units using HFC refrigerants having a GWP greater than 700 manufactured after January 1, 2025. (*Id.*) AHRI attached a spreadsheet (Exhibit 1) that contained requests for clarification from DOE on questions regarding the prohibitions for manufacture, distribution, and installation of various product types. (AHRI, No. 25 at pp. 5–6). Specifically, AHRI requested clarification on whether DOE's proposal applies to split-system CAC/HP products imported into the United States, but which are not for sale in the United States. (*Id.*)

Carrier appreciated DOE's intent to further clarify the OUWNM requirements and noted that it is clear that the OUWNM category is the equivalent of EPA's service-only condenser allowance in the market. (Carrier, No. 29 at p. 3) Carrier commented that it supports DOE stating the application of OUWNM requirements to a service-only R–410A condensing unit, but requested that DOE provide additional clarity in the final rule on certain aspects, including effective date, which unit types OUWNM applies to, and the indoor airflow requirements. (*Id.*) In particular, Carrier requested that DOE make the following clarifications to better help the regulated community in complying with applicable efficiency and refrigerant regulations: (1) R–410A condensing units manufactured or imported on or after January 1, 2025 would need to be tested and rated as an OUWNM because EPA prohibits the installation of those outdoor units with a new indoor unit; (2) any R–410A outdoor and indoor units manufactured before January 1, 2025 could be sold and installed utilizing the existing DOE-certified system rating, because EPA is allowing installation; (3) since EPA prohibits the sale and installation of any R–410A outdoor and indoor units in 2026 regardless of production date, any remaining pre-2025 inventory held by a manufacturer would be required to be recertified using the OUWNM procedure when distributed in commerce on or after January 1, 2026; and (4) any pre-2025 R–410A air conditioners in the Southeast or Southwest regions could not be installed without being recertified as an OUWNM. (Carrier, No. 29 at p. 3)

In response to AHRI, DOE clarifies that OUWNM ratings for split-system outdoor units employing refrigerants with GWP greater than 700 would be required for units distributed in commerce as service-only placement

[36] For Appendix M2, the definition references section 5.1.8 of AHRI 1600–2024.

components (*i.e.,* not as a combination) from the point of manufacture and thus subject to DOE's testing and rating requirements for outdoor units with no match in Appendix M1 and 10 CFR 429.16. As discussed in the previous section of this notice, DOE expects that manufacturers would need to make this transition for units manufactured after January 1, 2025, which it intends to make available as service-only replacement components for existing systems. Regarding units that are imported into the United States but not distributed and sold for installation within the United States, DOE notes that its requirements specified in 10 CFR parts 429, 430, and 431 shall not apply to any covered product or covered equipment if: (a) such covered product or covered equipment is manufactured, sold, or held for sale for export from the United States or is imported for export; (b) such covered product or covered equipment or any container in which it is enclosed, when distributed in commerce, bears a stamp or label stating ''NOT FOR SALE FOR USE IN THE UNITED STATES''; and (c) such product is, in fact, not distributed in commerce for use in the United States. 10 CFR 429.6.

DOE notes that the additional detail provided in the preceding section of this notice, and in the preceding paragraphs, is largely consistent with Carrier's suggestions. However, DOE wishes to correct two of Carrier's clarifications: (1) the recertification of remaining pre-2025 inventory would not be required provided those basic models were correctly certified based on how they were distributed at the time of their manufacture; and (2) the applicability of these provisions for units to be installed in the Southeast or Southwest do not differ from products subject to nationwide standards. The only difference for installation in the Southeast or Southwest is that the regional energy conservation standards would apply for such installations, as would otherwise be the case per 10 CFR 430.32(c)(6), and the efficiency rating as certified by the manufacturer must indicate those basic models comply with the applicable regional standards and may be installed in the Southeast and/or Southwest regions.

(3) Recertification of Units Already Distributed in Commerce

Several commenters expressed concern with the recertification as OUWNMs of units already distributed in commerce, when installed after January 1, 2026.

AHRI sought clarification on the intended meaning of the phrase ''distributed in commerce.'' (AHRI, No. 25 at p. 3) AHRI noted that the current DOE regulation places no restrictions on distribution of products if the product was initially certified and regional standards are not an issue for the product and location. (AHRI, No. 25 at p. 6) AHRI noted that DOE's NOPR proposal requires existing outdoor models currently distributed in commerce as part of a split-system basic model that transition to a replacement outdoor unit only to be tested, rated, and recertified under the provisions in 10 CFR 429.16 for an outdoor unit with no match. (*Id.*) AHRI noted that per EPCA, ''distribution in commerce'' means ''to sell in commerce, to import, to introduce or deliver for introduction into commerce, or to hold for sale or distribution after introduction into commerce,'' and that ''distribution in commerce'' applies to both the initial offering for sale by the manufacturer and the subsequent distribution by downstream partners (*i.e.,* sale by the distributor to the contractor, or the contractor to the homeowner). (*Id.*) AHRI cautioned that without linking the requirements to a manufacture/import date, DOE's proposal complicates the distribution of outdoor units manufactured pre-2025 that are no longer in possession of the manufacturer or private labeler. (*Id.*) AHRI questioned how DOE will enforce the proposal on products subject to national energy efficiency standards. (*Id.*)

AHRI contended that for products subject to national standards, DOE is constrained by the application of the base national standard, which ''applies to all products manufactured or imported into the United States on and after the effective date of the standard.'' [37] (AHRI, No. 25 at p. 6) Therefore, AHRI asserted that space-constrained products; small-duct high-velocity, air conditioners in the North; and heat pumps manufactured or imported prior to January 1, 2025 that were certified as compliant with the base national standard can still be installed in the United States until the inventory is depleted. (*Id.*) AHRI questioned how DOE could require manufacturers, distributors, or contractors to retroactively apply testing, rating, or certification requirements on outdoor units subject to national standards that were distributed in commerce and are no longer in the manufacturer's possession. (AHRI, No. 25 at pp. 6–7) AHRI requested for DOE to link the OUWNM definition to a manufacture/import date, as DOE's proposal complicates the distribution of outdoor units manufactured prior to January 1, 2025 that are no longer in possession of the manufacturer (or private labeler). (AHRI, No. 25 at p. 7) Similarly, for products subject to regional standards, AHRI questioned how DOE could require manufacturers, distributors, or contractors to retroactively apply testing, rating, or certification for outdoor units manufactured/imported in 2024 and no longer in possession of the manufacturer. (*Id.*) AHRI requested clarification on whether DOE intended that air conditioners slated for the Southeast and Southwest regions, manufactured/imported in 2024, and still in possession of the manufacturer be recertified as OUWNMs on January 1, 2025. (*Id.*)

AHRI noted that while the NOPR preamble states that ''the basic model number would need to change to reflect that the outdoor unit is no longer part of a combination as previously certified, but rather as an outdoor unit with no match, but the outdoor unit model could still be assigned the same individual model number,'' DOE has not described in the proposed regulatory text how the testing, rating, and recertification for outdoor units distributed in commerce by outdoor unit manufacturers (''OUMs'') for a former certified combination that transitions to OUWNMs for replacement will be completed. (AHRI, No. 25 at p. 6) AHRI expressed concern that this may create logistical complications, given that ''distributed in commerce'' applies to both the initial sale and the subsequent sale of products that have already entered commerce and are no longer in the possession of the manufacturer to be recertified. (*Id.*) AHRI contended that certification of a condensing unit as an OUWNM should apply to products manufactured after January 1, 2025. (*Id.*)

HARDI strongly opposed any restriction on the ability of its members to sell products already in inventory, including install date regulations, such as EPA's transitions program and the statutorily required install date in DOE's regional standards for split-system central air conditioners. (HARDI, No. 26 at pp. 1–2) HARDI commented that it believed install date requirements hinder the ability of the heating, ventilation, air-conditioning, and refrigeration industry to move to more energy-efficient or environmentally friendly products and that install date regulations that cause dead inventory are ineffective because they create waste, increase costs, and constitute a

[37] 42 U.S.C. 6295(o)(6)(E).

regulatory taking.[38] (*Id.*) HARDI commented that it was its understanding that the phrase ''currently distributed in commerce'' does not intend to include CAC/HP equipment already in distributors' warehouses, but it asserted that, just like with the confusing compliance regime caused by the install date associated with regional standards for split-system central air conditioners, if this phrase is used in the final regulation, local compliance officials will prevent repairs to existing systems if the outdoor unit does not have proof of meeting the minimum efficiency standard. (HARDI, No. 26 at p. 2) HARDI suggested that the best course of action is to apply the OUWNM testing and certification requirements at the same date of manufacture timeline as the EPA requirement for outdoor condensing units to be marked ''For servicing existing equipment only.'' (*Id.*) HARDI noted that for split-system CAC/HPs, EPA requires anything manufactured after January 1, 2025 to be marked ''For servicing existing equipment only.'' (*Id.*) HARDI further noted that while new split-system CAC/HPs can be installed until January 1, 2026 using R–410A or other high-GWP refrigerants, EPA requires those systems to be manufactured before January 1, 2025, and outdoor units manufactured after January 1, 2025 can only be used as components, thereby meeting the proposed definition of OUWNMs. (*Id.*) HARDI recommended that DOE limit the need to test, rate, and recertify equipment to only outdoor units manufactured after January 1, 2025, as this will ensure that equipment intended to be installed as an OUWNM does meet the minimum efficiency requirements while not affecting equipment originally sold for installation as a matched system. (*Id.*)

JCI expressed concerns with DOE's proposal to require recertification of units ''currently distributed in commerce'' to meet the OUWNM requirements, contending that requiring recertification of a component as part of a system that was previously certified as compliant and has already entered commerce, *i.e.,* is no longer in the possession of the original manufacturer, is overly burdensome for manufacturers, distributors, and contractors, and will be problematic for DOE to enforce without tying enforcement to the manufacture/import date. (JCI, No. 35 at p. 2) JCI recommended that for outdoor units that have entered commerce, the ''date of manufacture'' be used as the enforcement mechanism. (*Id.*) JCI commented that it was its understanding that outdoor units manufactured on or after January 1, 2025 would be required to meet DOE's OUWNM criteria if they were still in the possession of the original manufacturer. (*Id.*) JCI stated that clarifying that the OUWNM requirements would take effect on January 1, 2025, versus the NOPR date of January 1, 2026, reduces the amount of inventory in the channel that would require recertification. (*Id.*)

Rheem also expressed concern about language for OUWNMs applicable to ''existing outdoor models currently distributed in commerce,'' where these products would need to be recertified and given a new basic model number in the event that they are only eligible for component replacement per EPA's Technology Transitions rule. (Rheem, No. 34 at p. 3) Rheem asserted that the notion of obtaining proof of new rating and a different model number is unreasonable to require once the equipment has left manufacturer warehouses, as the application of new labels and rating certifications is impractical to carry out at the distributor and installer levels. (*Id.*) Rheem commented that EPA appears to recognize this impracticality and does not require relabeling of equipment made prior to January 1, 2025 to indicate ''for service only.'' (*Id.*) Rheem contended that a change in the test procedure should not render obsolete a product currently in commerce that was compliant at the time of manufacture. (*Id.*)

As indicated by AHRI, DOE notes that per EPCA, the terms ''to distribute in commerce'' and ''distribution in commerce'' mean to ''sell in commerce, to import, to introduce or deliver for introduction into commerce, or to hold for sale or distribution after introduction into commerce.'' (42 U.S.C. 6291(16)) Under the statutory definition, this term can apply to the initial offering of sale by a manufacturer or by subsequent distribution by downstream partners. As was discussed in the previous section, the December 2023 EPA Interim Final Rule allows for a 1-year sell-through period (until January 1, 2026) for any CAC/HP system employing a refrigerant with a GWP of 700 or greater, provided the specified component is manufactured or imported prior to January 1, 2025 (*see* 40 CFR 84.54(c)(1)). Since EPA prohibits the installation of any specified CAC/HP components to create a new system employing a refrigerant with a GWP of 700 or greater on or after January 1, 2026, irrespective of the manufacturing date, any remaining pre-2025 inventory (*i.e.,* imported or manufactured before January 1, 2025) held by any channel of distribution (manufacturer or distributor) could not be installed as a system after January 1, 2026.

DOE's rating and certification requirements in 10 CFR 429.16 for central air conditioners and heat pumps apply based on how a manufacturer distributes the models in commerce. If the manufacturer ceases distribution in commerce of a model of outdoor unit that was previously part of a combination and begins distributing it only as an OUWNM to allow for use as a service-only replacement under the EPA's rules for components of an R–410A system, that model of outdoor unit would need to be recertified under the OUWNM requirements regardless of when that transition occurs, since the manufacturer (or private labeler) has an obligation to ensure that any basic model it distributes is compliant with the applicable energy conservation standard for the configuration (or configurations) in which the manufacturer distributes it. However, the requirement to recertify those basic models does not apply retroactively to units of a basic model that were already distributed in commerce as part of a combination and had been correctly certified according to DOE's regulations.

Regarding AHRI's concern about enforcement of national standards, DOE notes that no changes were proposed to national standards in the April 2024 NOPR, and none are being finalized in this rulemaking. The purpose of the clarification provided in this rulemaking is to ensure that manufacturers have a clear understanding of how to comply with DOE's certification requirements for products that will be subject to EPA regulations. DOE's certification provisions in 10 CFR 429.12(a) specify that each manufacturer, before distributing in commerce any basic model of a covered product or covered equipment subject to an applicable energy conservation standard set forth in parts 430 or 431, and annually thereafter . . . shall submit a certification report to DOE certifying that each basic model meets the applicable energy conservation standard(s). To the extent that outdoor units that were previously certified as compliant as part of a matched system begin being distributed in commerce as outdoor units with no match, they are being distributed as a new basic model, and therefore, must certify compliance with the applicable energy conservation

[38] HARDI notes that a regulatory taking is a ''taking of property under the Fifth Amendment by way of regulation that seriously restricts a property owner's rights,'' *Blacks Law Dictionary,* 11th Edition. (HARDI, No. 26 at p. 1).

standards. The application of the base national standard, as referenced by AHRI, still applies to the outdoor unit based on its manufacture date, but compliance with that standard must be determined for the basic model distributed in commerce (*i.e.,* the OUWNM).

DOE notes that the EPA regulations include a 1-year sell-through period to reduce inventory of units that may be in danger of not complying with the EPA rule. DOE's rationale also applies to AHRI's concern on regional standards. However, DOE notes that there is confusion on the applicability of the EPA dates on the regional level. DOE clarifies, consistent with the national application, that air conditioners certified as able to be installed in the Southeast and Southwest regions manufactured or imported before January 1, 2025, and that have already been distributed in commerce, would not need to be certified as OUWNMs on January 1, 2025, provided the manufacturer had already certified compliance with the applicable energy conservation standards. For units intended for installation in the Southeast or Southwest regions, this would include a certification that they comply with those applicable standards. As previously explained in this notice, the only distinction from CAC/HP products that are not subject to regional efficiency standards is that split-system AC outdoor units certified as OUWNM would have to meet the applicable standards for the Southeast or Southwest regions to be installed in those regions.

DOE notes there may be confusion regarding the applicability of the compliance dates in the EPA rule and how these dates affect DOE regional standards requirements. To be clear, the EPA rule has no effect on DOE requirements. For certain split-system central air conditioning systems or certain OUWNMs to be installed in the Southeast or Southwest region consistent with DOE regional standards requirements, the system/OUWNM must be certified to DOE as compliant with the applicable regional standard(s), and the certification must indicate that the model/combination can be installed in the Southeast and/or Southwest region. While the EPA rule may change the approach a manufacture may take with respect to testing and certifying a particular model, it does not change DOE requirements.

In response to AHRI's concern that DOE has not described in the proposed regulatory text how the testing, rating, and recertification for OUWNMs will be completed, DOE notes that the testing requirements are laid out in section 4.2 of revised appendix M1 and section 3.2 of new appendix M2. Additionally, as noted in the April 2024 NOPR, and explained in the preceding section of this notice, existing outdoor models currently distributed in commerce as part of a split-system basic model that the manufacturer transitions to a replacement outdoor unit only would need to be tested, rated, and certified under the provisions in 10 CFR 429.16 for an outdoor unit with no match. 89 FR 24206, 24231. As described previously in this section, distribution of such a model as an OUWNM represents distribution in commerce of a new basic model, and accordingly, the basic model must be certified as compliant with the applicable energy conservation standards. DOE may consider additional certification requirements under a separate rulemaking regarding appliance and equipment certification.

In response to HARDI, DOE clarifies that the reporting obligations apply to manufacturers, and importers, and thus basic models previously distributed in commerce by the manufacturer that were certified by the manufacturer in accordance with 10 CFR 429.12 do not need to be recertified. Regarding HARDI's criticism of regulation based on install date requirements, DOE clarifies that, whereas the EPA rule is based on the date of installation, the application of the OUWNM provisions are based on the configuration in which the manufacturer (or importer) distributed the basic model from the point of manufacture (or import). It does not depend upon distributor or retail sales and offerings. DOE notes that the EPA regulations include a 1-year sell-through period for pre-2025 inventory to provide time to reduce inventory. The OUWNM provisions in this rulemaking simply align with the EPA action undertaken in the October 2023 EPA rule. In response to HARDI's recommendation to limit the need to test, rate, and recertify equipment to only outdoor units manufactured after January 1, 2025, DOE agrees that most inventory manufactured prior to January 1, 2025, will likely be distributed in commerce with indoor units and be installed prior to January 1, 2026; however, to the extent that any outdoor units manufactured prior to January 1, 2025, continue to be distributed in commerce by the manufacturer after January 1, 2026, as OUWNM, the manufacturer must test consistent with the requirements applicable to OUWNMs and certify the compliance of such models with the applicable energy conservation standard.

In response to JCI, DOE again stresses that the timing for implementation of the OUWNM provisions is tied to the EPA rule. Specifically, an outdoor unit no longer has a match when EPA requirements no longer allow installation with an indoor unit to create a new system, and thus must be certified to DOE as an OUWNM as it continues to be distributed in commerce. As discussed in III.E.7.c(2), DOE clarifies that any outdoor CAC/HP units manufactured or imported on or after January 1, 2025 and employing refrigerants with GWP greater than 700 (for example, R–410A), would need to be tested and rated as an OUWNM, consistent with the EPA requirement that such models be used ''for servicing existing equipment only.'' For units manufactured or imported before January 1, 2025 the existing DOE-certified system rating can be used, provided the manufacturer does not continue distribution of the outdoor units alone, because the EPA regulations permit installations of such systems until January 1, 2026. However, if the unit is distributed in commerce alone and not as a combination with any indoor units, as likely would be the case for products intended for installation as an individual replacement component of an existing system, the outdoor unit would have to be certified in accordance with the OUWNM provisions prior to the date at which the manufacturer begins distributing those outdoor units as an OUWMN, as indicated to DOE in its certification reports via a discontinued model filing for the model as distributed in a combination and certification as an OUWNM.

In response to Rheem's claim that EPA does not require relabeling of equipment made prior to January 1, 2025 to indicate ''for service only,'' DOE notes that the EPA labeling requirement at 40 CFR 84.58(b) states, ''Effective upon the date listed for each subsector in § 84.54(c) . . . any specified component . . . that uses or is intended to use any regulated substance, or blend containing any regulated substance . . . must have a permanent label compliant with paragraph (c) [39] of this section containing the information in paragraph (a)(1) of this section. For specified components that are intended for use

[39] The reference is to paragraph (c) but should be to paragraph (d), which specifies label design (*e.g.,* English language, durable and printed/affixed to the product exterior surface, readily visible and legible, etc.). Paragraph (c) addresses products in the foam or aerosol sector and is not relevant for the refrigeration, air-conditioning, and heat pump sector addressed in paragraph (b).

with a regulated substance or blends containing a regulated substance that exceed the applicable GWP limit or HFC restriction, the label must state ''For servicing existing equipment only'' in addition to the other required labeling elements.'' (*See* 40 CFR 84.58(b)) 40 CFR 84.58(c) requires the label to list, at a minimum, the refrigerant and the date of manufacture. DOE is aware that there are two dates listed in the relevant paragraph for split-system CAC/HPs under section § 84.54(c)—January 1, 2025 and January 1, 2026. As discussed above and in the preceding section of this notice the December 2023 EPA Interim Final Rule pushed back the restriction on R–410A and similar refrigerants such that components manufactured prior to January 1, 2025 could be installed as part of systems prior to January 1, 2026, and thereafter would be installable only for servicing existing equipment. Thus, unless EPA intended for the ''for servicing existing equipment only'' words to be on specified components starting January 1, 2025, when they would still be allowed to be used for system installations, EPA regulations effectively state that the required label would have to be applied or changed while the component is in distribution, *i.e.,* after leaving the manufacturer but before installation. However, DOE notes that these labeling provisions are separate from its own regulatory requirements and that manufacturers seeking more specific guidance on the implementation of these provisions should consult EPA.

Regarding Rheem's contention that a change in the test procedure should not render a currently compliant product obsolete, DOE notes that it is the EPA action, and not a change to the DOE test procedure, that would prevent the installation of a previously certified CAC/HP system. In accordance with this EPA action, DOE's OUWNM provisions in the test procedure provide a means for manufacturers to assign an energy efficiency rating to split-system outdoor units after the EPA has banned them for full-system installations. As discussed earlier in this section and in the preceding section, to the extent that the manufacturer of the outdoor unit of a previously certified CAC/HP system begins distributing it in commerce as an OUWNM, it would become a new basic model and the manufacturer would need to certify that it complies with the applicable energy conservation standard.

In a comment related to concerns regarding recertification as OUWNM of outdoor units already distributed in commerce, GE Appliances indicated that products currently in production would need redesign to comply with cut-out/cut-in temperature and CVP enforcement testing. (GE Appliances, No. 37 at p. 6) They commented that since import and production of legacy R–410A equipment will cease after January 1, 2025, there will be no need to redesign existing inventory, in order to comply with the cut-out/cut-in temperature and CVP enforcement test. *Id.* They pointed out that most of DOE's energy efficiency enforcements are based on date of import or manufacture, so exclusion of R–410A legacy equipment from CVP and cut-out/cut-in enforcement testing would be consistent with this practice, and that failing to exclude these products from such enforcement would lead to stranded inventory, resulting in the loss of embodied carbon in the inventory, with little/no energy efficiency saving. *Id.*

In response to the comment by GE Appliances, certifications required to be made by a manufacturer for the compressor and indoor blower speed of any variable capacity system at specific test conditions must represent normal operation. The CVP provisions established in this final rule describe how DOE would verify that certified values are appropriate for the purposes of DOE enforcement testing. Hence, DOE would expect existing properly-certified variable speed CAC/HPs and CHPs to pass the CVP enforcement with minimal or no adjustment to existing performance representations. Further, DOE certainly would not expect changes sufficient to call into question the compliance of such models with DOE efficiency standards. Similarly, although cut-out and cut-in temperatures are not currently required to be certified, DOE would expect manufacturers to have certified HSPF2 values that are consistent with the actual cut-out/cut-in characteristics of certified models. Manufacturers are not required themselves to conduct CVP testing. To the extent that manufacturers are correctly certifying performance of existing models, there would be no need to recertify or redesign such models in response to DOE implementing CVP testing for enforcement purposes. Therefore, DOE disagrees with the suggestion of GE Appliances, that there should be specific exclusions for legacy R–410A CAC/HPs from the CVP and cut-out/cut-in temperature enforcement provisions.

(4) Applicability to Multi-Head Mini-Splits, Multi-Splits, and Multi-Circuit Systems

AHRI and Carrier requested clarity on whether the OUWNM provisions are applicable to multi-head mini-split, multi-split, or multi-circuit systems. (AHRI, No. 25 at pp. 4–5; Carrier, No. 29 at pp. 3–4).

Carrier requested that DOE confirm that the OUWNM certification requirement is applicable to all split-system condensing units within the scope of appendix M1, which includes single-split, multi-head mini-split, multi-split (including VRF), and multi-circuit air conditioner and heat pump systems. (Carrier, No. 29 at pp. 3–4) Specifically, Carrier commented that it believes multi-head mini-split and multi-split systems should also require the OUWNM certification. (*Id.*) Carrier noted that while these systems are generally intended to be installed with multiple indoor units, they can be installed with a single indoor unit, which could be ducted or ductless, and that multiple manufacturers have combinations that utilize a mini-split (traditionally known as a ''ductless outdoor unit'') with a conventional ''ducted'' indoor unit and coil combination. (*Id.*) Carrier further noted that multi-split and mini-VRF outdoor units are able to be rated, certified, and used in combination with a single indoor unit as well as the typical multiple indoor units. (*Id.*) Carrier expressed concern that if OUWNM provisions are not required for these systems that can be installed with a single indoor unit, they could be used to replace the condenser on a system with an indoor unit that was never a certified combination, yielding poor system efficiencies. (*Id.*) Carrier commented that it was its understanding that EPA's reasoning to allow a service-only condenser was to address the customer concern of replacing their entire system upon a part failure in the condenser. (*Id.*) Carrier stated that in its experience, this does not happen regularly in the market, and if there is a premature part failure in the condenser, the part (*i.e.,* compressor, expansion valve, motor, control board, or coil) is replaced or repaired, especially in the case of complex outdoor units such as multi-split condensers. (*Id.*) Carrier noted that in the situation the condenser fails at end of life, it is common practice to replace the entire system. (*Id.*) For these reasons, Carrier requested that DOE clarify that all split-system condensing units within the scope of appendix M1 that are manufactured beginning January 1, 2025 with R–410A or any banned refrigerant must be certified as an OUWNM. (*Id.*).

AHRI noted that appendix M1 defines the tested combination of a multi-head mini-split, multi-split, or multi-circuit system to consist of one outdoor unit

with one or more compressors matched with between two and five indoor units. (AHRI, No. 25 at p. 4) AHRI further noted that appendix M1 requires that these indoor units must collectively have a nominal cooling capacity greater than or equal to 95 percent and less than or equal to 105 percent of the nominal cooling capacity of the outdoor unit. (*Id.*) AHRI requested that DOE confirm (1) if multi-head systems would test as OUWNM with one or two indoor units per appendix M1, section 2.2(e); and (2) if the preference is for testing multi-head systems with two (or more) indoor units, whether the coil-only indoor unit coil shall be split evenly between the two, or in another configuration. (AHRI, No. 25 at pp. 4–5).

DOE agrees with the reasons presented by Carrier and clarifies that the OUWNM provisions are applicable to all split-system CAC/HPs within the scope of appendix M1—including single-split, multi-head mini-split, multi-split (including VRF), and multi-circuit air conditioner and heat pump systems. As noted by AHRI, per appendix M1, the tested combination of a multi-head mini-split, multi-split, or multi-circuit system requires between two and five indoor units. However, the indoor unit requirements (which are based on the highest sales volume family) are not explicitly applicable for OUWNM testing. As indicated by Carrier, multi-head systems can be installed and are able to be rated with either a single indoor unit or multiple indoor units. To provide maximum flexibility to manufacturers and to limit test burden, DOE clarifies that, for multi-head systems being certified under the outdoor unit with no match provisions, (1) multi-head systems capable of being paired with a single indoor coil shall be tested with a single indoor coil; and (2) multi-head systems incapable of being paired with a single indoor coil shall be tested with the least amount (between two to five) of identical indoor coils. If testing with two or more indoor coils, all coils shall have the same dimensions. The current testing instructions in section 2.2(e) of appendix M1 [40] are written for a single indoor coil, but the same concept of the NGIFS can be extended to two or more identical indoor coils. Specifically, when evaluating NGIFS with two or more indoor coils, the total summation of the fin surface area would include all coils. DOE may consider certification requirements to include whether one or more indoor coils were used to evaluate an OUWNM rating in a separate rulemaking.

(5) Control Type and Communicating System

Carrier also requested that DOE clarify that OUWNM certification is required for all condensing units, regardless of the control type being used to generate the system rating. (Carrier, No. 29 at p. 4) Carrier noted that many of the communicating variable-speed condensers on the market today also have the capability to operate with a conventional 24–V non-communicating thermostat and that it would be extremely difficult to exclude these units from the OUWNM certification and ensure they were actually being matched with a certified communicating indoor unit that was previously installed. (*Id.*)

Conversely, GE Appliances commented that multi-head ductless split systems and VRF systems under 65k BTU, which are almost always variable-speed communicating systems, are unable to complete the existing test procedure for an OUWNM listing, as existing software does not support or allow a coil-only match without connection to a matched indoor unit. (GE Appliances, No. 37 at p. 4) GE asserted that the inability to provide replacement outdoor units to service existing communicating systems will lead to significant harm for consumers, the environment, and DOE's goals for heat pumps and variable-speed systems. (*Id.*) GE Appliances requested that DOE allow outdoor-unit-only listings for variable-speed communicating systems capable of supporting multiple indoor coils based on the lowest-performing system performance for the outdoor coil for any previously listed system or currently produced, compatible communicating coil. (*Id.*) GE Appliances asserted that because outdoor units for communicating systems can generally only work with matched indoor units using the same communications protocol, there is little risk of improper combinations to create systems that perform worse than efficiency levels required by DOE. (*Id.*) GE Appliances further commented that listing OUWNM units for these systems in this manner ensures accurate consumer information about expected product performance and also ensures service components' availability where they would otherwise be restricted. (*Id.*)

Mitsubishi also asserted that while it understands the broad industry support for DOE to extend the definition of OUWNM to R–410A outdoor units, the proposed language does not take into account the emergence and expansion of communicating variable-speed equipment. (Mitsubishi, No. 28 at p. 2) Mitsubishi contended that like every other inverter-driven variable-capacity ductless OEM, Mitsubishi systems and components are unable to test or operate with any coil in a lab or in the field that is not equipped with proprietary communication protocol and firmware, and that evaluating their outdoor units as OUWNMs renders these controls and advancements completely useless. (*Id.*) Mitsubishi requested that either communicating variable-speed systems be exempted from the OUWNM provisions, or that specific allowances be considered to enable communicating variable-capacity outdoor units to be tested in a way that demonstrates compliance with Federal efficiency minimum standards. (*Id.*)

DOE clarifies that the OUWNM requirements will apply to all split-system CAC/HPs units, whether they use proprietary controls to communicate conditioned-space temperature and/or humidity, use a generic thermostat, or allow either installation approach. Also, DOE understands that many ductless multi-split systems and VRF systems are variable-speed systems that employ software that requires the outdoor unit to be paired with a recognized indoor unit (*i.e.,* a pairing confirming system).[41] Manufacturers of ductless multi-split systems and VRF systems may already have the means to test these systems with a generic indoor unit or may need to reprogram their outdoor units to allow operation with a generic indoor unit, for units using a refrigerant with GWP greater than 700 that are manufactured after January 1, 2025. While the latter option may require additional software rework, this reprogramming would require limited engineering hours to implement, such that DOE does not consider it to be burdensome to manufacturers. In response to GE's proposal to allow outdoor-unit-only listings for such systems based on the lowest-performing system combination for the outdoor coil, and Mitsubishi's request for such systems to be exempted from the OUWNM provisions or given special

[40] These instructions are also included in sections 5.1.6.2 and 5.1.6.3 of AHRI 210/240–2024 and AHRI 1600–2024.

[41] While the term used by commenters to refer to such systems is ''communicating,'' DOE notes that the current test procedure uses this term differently. Specifically, ''communicating,'' per the current test procedure, refers to the ability of the system to communicate in-space temperature with both the outdoor and indoor units, instead of communication between the indoor and outdoor units. DOE also notes that neither the AHRI test standards (210/240 and 1600) nor the test procedure being finalized in this rule use the term ''communicating.'' To prevent confusion, DOE is referring to these systems as ''pairing confirming systems.''

allowances, DOE notes that neither approach provides confirmation that a given outdoor unit could not be field paired with a nonproprietary indoor unit(s). Therefore, to maintain consistency across all split-system CAC/HPs, irrespective of the control type, DOE is exempting neither pairing confirming variable-speed systems nor variable-speed communicating systems from the OUWNM provisions, nor allowing either category of outdoor units to be rated based on its lowest-performing combination.

(6) Service Coil Definition

GE Appliances and Mitsubishi requested revision to the ''service coil'' definition (*see* 10 CFR appendix M1, section 1.2) to also include integrated indoor blowers within the definition's scope. (GE Appliances, No. 37 at pp. 1–3; Mitsubishi, No. 28 at p. 2)

GE Appliances commented that mini-split, multi-split, and light VRF systems ("DFS systems") have become increasingly popular in the residential air-conditioning market and that these products are significantly different from traditional ducted systems. (GE Appliances, No. 37 at p. 2) GE Appliances noted that indoor units of such systems typically focus on using the smallest space possible and are composed of a tightly integrated blower fan, evaporator coil, and electronics package. (*Id.*) GE Appliances contended that when the coils on these indoor units fail, by far the most cost-effective means of repairing the system is to replace the entire indoor unit, which includes both the coil and the fan. (*Id.*) GE Appliances noted that DOE currently allows for replacement of indoor coils to repair an existing system without a listing of that indoor coil as a part of a system through the service coil provisions of 10 CFR 430 appendix M1, and that these provisions allow service of existing systems using a legacy refrigerant where the system as a whole has been delisted under OUWNM requirements of 10 CFR 429.16(a)(3). (GE Appliances, No. 37 at pp. 1–2) However, GE Appliances noted that the service coil definition explicitly excludes integrated indoor blowers (*Id.*) To account for more recent prevalence of DFS systems in the market since the last refrigerant transition, GE Appliances suggested that DOE amend the definition of "service coil" to include units with integrated fans from the factory. (GE Appliances, No. 37 at p. 3) GE Appliances proposed the following definition for service coil (proposed additions *italicized* and deletions in ~~strikeout~~):

Service coil means an arrangement of refrigerant-to-air heat transfer coil(s), condensate drain pan, sheet metal or plastic parts to direct/route airflow over the coil(s), which may or may not include external cabinetry and/or a cooling mode expansion device.~~,~~ *A service coil may also include a fan if that fan is integrated into the service coil assembly at the factory. A service coil may be* distributed in commerce solely for replacing an uncased coil or cased coil that has already been placed into service, and ~~that has been~~ *must be* labeled "for indoor coil replacement only" on the nameplate and in manufacturer technical and product literature. The model number for any service coil must include some mechanism (*e.g.*, an additional letter or number) for differentiating a service coil from a coil intended for an indoor unit. (GE Appliances, No. 37 at p. 3)

GE Appliances contended that revising the definition of service coil to account for DFS systems is essential to protect consumers who have recently installed DFS systems using R–410A refrigerant and that without these revisions, indoor replacement units to repair DFS systems during their expected useful life may be limited, and consumers may be required to replace entire systems instead of merely components. (*Id.*) GE further commented that if DFS systems are not able to have indoor coil replacements, there is a risk of significant negative consumer sentiment toward DFS systems. (*Id.*)

Mitsubishi asserted that circumstances where full replacement of ductless indoor units would be significantly less costly than field replacement of individual parts would needlessly impact the pocketbooks of homeowners and consume scarce technician labor hours. (Mitsubishi, No. 28 at p. 2) Mitsubishi recommended a carve out or alteration of the current definition of service coil to allow ductless indoor units to be sold for purposes of service, as it would remedy this concern and be better aligned with the EPA Technology Transitions rule and guidance. (*Id.*)

DOE concurs with GE Appliances that mini-split, multi-split, and VRF systems have become more prevalent in the residential air-conditioning market. As noted by GE Appliances, the current service coil definition does not include indoor units that have integrated indoor blowers. DOE also notes that the service coil definition in AHRI 210/240–2024 and AHRI 1600–2024, the industry standards DOE is referencing in this final rule, also do not include integrated indoor blowers within the service coil definition. Both appendix M1 (see section 1.2 of appendix M1) and the AHRI standards define ''indoor unit'', which includes integrated blowers within the definition's scope. The indoor unit definition in Appendix M1 also explicitly notes that a service coil is not an indoor unit. In relevance to the EPA rule, the labelling requirements at 40 CFR 84.58(b) clarify the installation allowances of indoor units. Specifically, 40 CFR 84.58(b) notes that, after January 1, 2025, specified components intended for use with banned refrigerants shall have the label ''For servicing existing equipment only'' attached. Any indoor units that are intended to be used with banned refrigerants (such as R–410A) fall within the scope of specified components and under the aforementioned regulatory provisions under the EPA's rule would need to have this label attached.

As was noted in the previous section of this notice, the CAC/HP definition in 10 CFR 430.2 includes a requirement that indoor units sold alone be rated as part of a combination. Specifically, the definition states ''A central air conditioner or central air conditioning heat pump may consist of: A single-package unit; an outdoor unit and one or more indoor units; *an indoor unit only;* or an outdoor unit with no match. In the case of an indoor unit only or an outdoor unit with no match, the unit must be tested and rated as a system (combination of both an indoor and an outdoor unit).'' Such indoor units may be distributed by indoor coil manufacturers (''ICMs'') which, as defined in Appendix M1, manufacture indoor units but do not manufacture single-package units or outdoor units. They may also be distributed in commerce alone and not as part of a combination by non-ICMs for the replacement market. For an indoor unit intended only for replacement in an existing system and which is no longer distributed in commerce for installation as a combination, as would be the case for an existing system that uses a refrigerant banned by EPA, the requirement in table 1 of 10 CFR 429.16(a) for the indoor unit to be rated as part of a system would still apply even though the indoor unit is no longer being distributed in commerce as part of a combination. This rating requirement would apply regardless of whether the manufacturer of the indoor unit is an ICM. If the indoor unit uses a refrigerant allowed by EPA only for component replacement (*e.g.,* R–410A), the rating for such a unit would be based on a combination using that refrigerant, and per EPA regulations could not be distributed in commerce as a combination. However, this does not imply that the indoor unit cannot be rated, nor that the entire system would have to be replaced, as suggested by GE. DOE notes further that any such rating

for the indoor unit must be compliant with current standards, and that any indoor units distributed in commerce for use in a system that uses a refrigerant subject to the EPA ban would need to have been certified to DOE as compliant with the applicable standards as part of a combination before January 1, 2025.

(7) Space-Constrained Systems

NCP commented that it performed analysis, testing, and simulations of through-the-wall space-constrained R–410A systems to evaluate available options to meet the proposed OUWNM requirement for applicable outdoor condensing units. (NCP, No. 27 at p. 2) NCP contended that the results of this testing [42] indicated that its space-constrained outdoor condensing units would not meet applicable minimum efficiency requirements when rated using a generic indoor coil as specified by the OUWNM requirements. (*Id.*) NCP asserted that it was not aware of any space-constrained outdoor condensing units from other manufacturers that could meet efficiency requirements when rated as an OUWNM. (*Id.*) NCP asserted that the OUWNM requirements in DOE's proposed rule would effectively prohibit any space-constrained R–410A outdoor condensing unit after January 1, 2026, and leave manufacturers with stranded inventory. (NCP, No. 27 at p. 2) NCP contended that occupants of multifamily housing units with recently installed space-constrained R–410A split systems would be left without options for service replacement of their outdoor condensing unit section, beyond installation of the entire indoor and outdoor split system. (*Id.*) To provide relief from excessive cost burdens, NCP suggested that DOE should include language in the final rule that coil-only ratings for space-constrained split-system outdoor units with R–410A are permissible until January 1, 2028, for units manufactured before January 1, 2025. (*Id.*) Alternatively, NCP suggested that DOE should use its enforcement discretion to provide additional 2-year sell through before OUWNM ratings are required for through-the-wall space-constrained R–410A outdoor condensing units. (*Id.*)

DOE reviewed the confidential data provided by NCP for select outdoor unit models and agrees that the data suggests that these models cannot meet applicable minimum efficiency requirements when tested as OUWNMs. However, DOE notes that the data provided does not include performance data or estimates for designs with any technology improvements, *e.g.,* two-stage or variable-speed compressors. Thus it is not clear that compliance with Federal standards is impossible for space-constrained OUWNMs.

DOE further notes that NCP suggests a delay of the OUWNM requirement until January 1, 2028, but the need for replacement outdoor units would still exist after January 1, 2028, only 3 years after EPA's transition date for R–410A. This would suggest that NCP believes that space-constrained outdoor unit designs can be developed to be compliant with standards using the OUWNM test requirements starting on that date. Regarding stranded inventory, as clarified earlier in section III.E.6.c.1, DOE notes that the EPA rule includes a 1-year sell-through period that would enable any accumulated inventory to be distributed, beyond which any space-constrained CAC/HP outdoor units using R–410A would need to certify as OUWNMs. As discussed elsewhere in this final rule, to the extent that units are distributed in commerce as OUWNMs, they would be distributed as a different basic model as compared to distribution in commerce when paired with an indoor unit.

For these reasons, DOE has determined that there is not sufficient justification for delaying the OUWNM requirements for R–410A space-constrained CAC/HP products. Additionally, as discussed previously in this section, the timing of permitted installations of R–410A systems and components is based on EPA's refrigerant regulations. DOE is clarifying the applicability of the test procedure requirements in this final rule to allow for component installations consistent with EPA's requirements.

(8) Representativeness of Paired Indoor Coil

Rheem questioned the appropriateness of the indoor coil specifications currently required for OUWNM testing. (Rheem, No. 34 at pp. 2–3) Rheem provided historical background of DOE's OUWNM provisions by citing language from past rulemaking notices, noting some of the following key points:

(1) DOE first proposed an NGIFS for rating and certifying the performance of outdoor units designed for R–22 in the November 9, 2015 SNOPR, where DOE proposed an upper limit on NGIFS equal to 1.15. 80 FR 69278, 69404.

(2) DOE indicated that its analysis supporting NGIFS values for OUWNM testing was based on reverse-engineered SEER 13 split systems (blower-coil combinations) designed for R–22. 81 FR 36992, 37010.

(3) However, DOE set the upper limit on NGIFS at 1.0 in the June 08, 2016 Final Rule, arguing that a lower NGIFS better reflected the installed base of indoor units, since the installed base also included 10 SEER split systems. 81 FR 36992, 37010.

(4) In the August 24, 2016 SNOPR, DOE acknowledged that legacy (existing) indoor units matched with no-match outdoor units would not always be indoor units designed for R–22, and that the NGIFS 1.0 upper limit did not provide a good representation of the heat transfer performance of indoor coils with newer designs. 81 FR 58164.

Rheem also commented on the DOE proposal in the August 8, 2016 SNOPR to adopt a maximum NGIFS requirement generally for testing of single-split coil-only systems. Because this proposal did not address OUWNM outdoor units and because DOE did not adopt the proposal, Rheem stated that it is not relevant to the OUWNM discussion. Based on the historical context provided from prior rules, Rheem requested DOE review the test provisions for OUWNMs, the definition of NGIFS, and its upper limit to accurately represent the current installed base of indoor coils with which such condensing units would be matched in the field. (Rheem, No. 34 at p. 3)

DOE appreciates Rheem's comment charting the historical development of the OUWNM testing provisions. As noted earlier in section III.E.7 and indicated by Rheem's comment, the current instruction at section 2.2.e of appendix M1 requires that an OUWNM be tested using a coil-only indoor unit coil that has round tubes of outer diameter no less than 0.375 inches and NGIFS of no greater than 1.0 sq in/Btu/hr. These indoor coil specifications were initially finalized for appendix M in the June 8, 2016 Final Rule and extended to appendix M1 in the January 2017 Final Rule. 81 FR 36992, 82 FR 1426. DOE did not propose revision of the requirements in the April 2024 NOPR.

In response to Rheem's comment, DOE reviewed historical data, starting with shipments analysis supporting the energy conservation standards direct final rule published on January 6, 2017 (''January 2017 DFR''). 82 FR 1786. DOE conducted analysis to determine whether a substantial percentage of CAC system replacements in 2025 would occur in residences in which the indoor unit would have been installed prior to 2010, *i.e.,* when the representative indoor unit would have been part of a

[42] NCP shared results of its analysis in confidential exhibits A and B.

13 SEER R–22 system, consistent with DOE's initial analysis to establish the NGIFS requirements. To conduct this analysis, DOE used national impact analysis results provided in the January 2017 DFR and its supporting documents and spreadsheets. (*See* 82 FR 1786, 1822–1824) In this assessment, DOE considered that a portion of system replacements have been outdoor-unit-only installations, consistent with the January 2017 DFR assumptions for the percentage of installations involving just an outdoor unit. This factor increases the average age of an existing indoor unit, since, for some portion of the existing residences, the indoor unit would not have been replaced during the last outdoor unit replacement.

The results of this analysis indicate that more than 60 percent of system replacements in 2025 would involve a residence where the indoor unit was installed before 2010. DOE also considered sensitivity of this analysis to differences between shipment projections made to support the January 2017 DFR and actual recent-year shipments and found that an analysis updated for recent shipment data would suggest a slightly higher percentage for pre-2010 indoor units. Thus, DOE concludes that the NGIFS limit initially established in the June 8, 2016 Final Rule is still representative, and DOE is not revising it in this final rule.

(9) Single Cooling Air Volume Rate

AHRI, the CA IOUs, Carrier, and Daikin recommended that DOE retain the requirement to test OUWNMs with a single cooling air volume rate. (AHRI, No. 25 at p. 5; CA IOUs, No. 32 at pp. 2–3; Carrier, No. 29 at p. 4; Daikin, No. 36 at p. 2)

AHRI recommended that the testing instructions proposed for OUWNMs at section 4.2 of appendix M1 also include the current regulatory requirement that the coil-only indoor unit has a ''single cooling air volume rate.'' (AHRI, No. 25 at p. 5) The CA IOUs also recommended that DOE retain the requirement for testing OUWNMs with a ''single cooling air volume rate'' in section 4.2 of the proposed revision to appendix M1 and include an identical requirement in section 3.2 of appendix M2. (CA IOUs, No. 32 at p. 2) The CA IOUs commented that they believe this specific requirement of a single cooling air volume rate was inadvertently left out of the new AHRI standards. (*Id.*) The CA IOUs reasoned that because OUWNMs are compatible with any existing air handler that continues to remain as the primary air-moving system after the originally paired outdoor unit is replaced, DOE cannot guarantee that such systems will have controls capable of varying airflow during operation and should, therefore, continue to require a single air volume rate. (*Id.*) Carrier also noted that the current appendix M1 requirements for OUWNM testing require a single cooling air volume rate, and it recommended that DOE continue to require a single cooling air volume rate. (Carrier, No. 29 at p. 4) Daikin strongly suggested that DOE maintain the single airflow rate requirement for all OUWNMs, reasoning that OUWNMs do not include an indoor unit change and would, therefore, not have any enhancements, such as non-bleed expansion valves or blower delays, to improve cyclic performance. (Daikin, No. 36 at p. 2)

The current requirements at section 2.2e of appendix M1 require that an OUWNM be tested using a coil-only indoor unit at a single cooling air volume rate. DOE notes that this requirement was inadvertently left out of the April 2024 NOPR. DOE agrees with the reasoning presented by commenters advocating that this requirement be retained. Therefore, DOE is including language at section 4.2 of revised appendix M1 and section 3.2 of new appendix M2, requiring the use of a single cooling air volume rate when testing OUWNMs.

(10) Use of Default Degradation Coefficient for OUWNM Testing

AHRI, the CA IOUs, and Daikin recommended that DOE use the default degradation coefficient of 0.25 for all OUWNMs, for both heating and cooling modes. (AHRI, No. 25 at p. 5; CA IOUs, No. 32 at p. 3; Daikin, No. 36 at p. 2)

AHRI noted that the existing provisions for OUWNMs for degradation coefficient in enforcement is to use the default value (0.25), whereas the published versions of AHRI 210/240–2024 and AHRI 1600–2024 allow for testing of CD for OUWNMs. (AHRI, No. 25 at p. 5) AHRI strongly recommended that DOE adopt the default degradation coefficient of 0.25 for all OUWNMs, for both heating and cooling modes. (*Id.*) AHRI reasoned that a significant portion of OUWNM units are applied in multifamily apartment dwelling situations, where the probability of being properly paired with an indoor product that can be retrofitted to have a time delay, or having an indoor product that is retrofitted with a non-bleed thermal expansion valve or an electronic expansion valve is relatively low (since many multifamily apartment dwelling indoor systems are ceiling-mount blower coil systems or wall-mount blower coil systems). (*Id.*) Therefore, AHRI contended that a substantial portion of OUWNMs installed in multifamily applications would not have the lower CD in the real world, as experienced in testing. (*Id.*) The CA IOUs also suggested that the cyclic degradation default values in proposed appendices M1 and M2 align with the current requirement in 10 CFR part 429 for OUWNMs. (CA IOUs, No. 32 at p. 3) The CA IOUs noted that they supported the use of default values because the metering device, which is unknown for an OUWNM, significantly affects cyclic degradation. (*Id.*) Daikin also suggested that the default value of 0.25 be used for both cooling and heating degradation coefficients for OUWNMs. (Daikin, No. 36 at p. 2)

As noted by commenters, the current enforcement requirement at 10 CFR 429.134(k)(2)(ii) states that DOE will use the default cooling and heating degradation coefficients when testing models of OUWNMs. DOE agrees with the reasoning presented by commenters and notes that this enforcement requirement was put in place on the basis of the same rationale. Additionally, the requirement was intended to be adopted broadly for testing, not just for enforcement, as indicated in the June 2016 Test Procedure Final Rule. 81 FR 36992, 37011. To clarify that this requirement also applies to testing, DOE is including provisions at section 4.2 of revised appendix M1 and section 3.2 of new appendix M2 to require that testing of OUWNMs only use the default degradation coefficients (0.25) for both cooling and heating modes.

8. Inlet and Outlet Duct Configurations

Both appendix D of the AHRI 210/240–202X Draft and appendix D of the AHRI 1600–202X Draft define lists of clarifications/exceptions to their referenced version of ASHRAE Test Standard 37 (ANSI/ASHRAE 37–2009). These clarifications/exceptions have been revised repeatedly throughout the version history of the AHRI 210/240 standard. In the April 2024 NOPR, DOE noted that both appendix D of AHRI 210/240–202X Draft and appendix D of AHRI 1600–202X Draft contain updates regarding inlet and outlet duct configurations, including the duct revisions investigated in RP 1581 and RP 1743 to accommodate smaller environmental chambers. These updates are consistent with the draft of an update of ANSI/ASHRAE Standard 37 (''May 2023 ASHRAE 37 Draft''). DOE surmised that the inclusion of these May 2023 ASHRAE 37 Draft updates in appendix D of the relevant AHRI drafts represented industry consensus, and DOE tentatively determined that the

updates are appropriate for CAC/HP testing. 89 FR 24206, 24231. Consequently, DOE proposed to incorporate by reference appendix D of AHRI 210/240–202X Draft at appendix M1 and to incorporate by reference appendix D of AHRI 1600–202X Draft at appendix M2. *Id.*

DOE noted that AHRI 210/240–202X Draft and AHRI 1600–202X Draft reference the current version of ASHRAE Test Standard 37, ANSI/ASHRAE 37–2009, because the May 2023 ASHRAE 37 Draft had not yet been finalized and published. *Id.* DOE further noted that it may choose to update its incorporation by reference to the final published version of the May 2023 ASHRAE 37 Draft in a future rulemaking. *Id.*

DOE did not receive any comments regarding the aforementioned proposals in the April 2024 NOPR. AHRI 210/240–2024 and AHRI 1600–2024 finalized the updates regarding inlet and outlet duct configurations without substantial change. Both standards continue to reference ANSI/ASHRAE 37–2009 since the May 2023 ASHRAE 37 Draft has not yet been finalized. Therefore, consistent with the April 2024 NOPR proposal, DOE is incorporating by reference Appendix D of AHRI 210/240–2024 and AHRI 1600–2024, at appendix M1 and appendix M2, respectively. DOE is also continuing to maintain reference to ANSI/ASHRAE 37–2009 since the May 2023 ASHRAE 37 Draft has not yet been finalized.

9. Heat Comfort Controllers

A heat comfort controller enables a heat pump to regulate the operation of the electric resistance elements such that the air temperature leaving the indoor section does not fall below a specified temperature (*see* section 1.2 of appendix M1).

In the April 2024 NOPR, DOE noted that appendix M1 does not currently specify additional steps for calculating the HSPF2 of heat pumps having a heat comfort controller and having a variable-speed compressor. 89 FR 24206, 24231. DOE noted that AHRI 210/240–202X Draft and AHRI 1600–202X Draft specify additional steps for calculating the HSPF2 and SHORE of heat pumps having a variable-capacity compressor and a heat comfort controller and that these additional steps are similar to the additional steps for calculating the HSPF2 and SHORE of other system types having a heat comfort controller. *Id.* DOE tentatively determined that the inclusion of these additional steps for calculating HSPF2 and SHORE is appropriate for heat pumps having a variable-capacity compressor and a heat comfort controller, because these provisions provide representative measures of unit operation when installed with heat comfort controllers. *Id.* Therefore, DOE proposed to incorporate by reference the additional steps for calculating the HSPF2 of heat pumps having a variable-capacity compressor and a heat comfort controller outlined in section 11.2.2.5 of AHRI 210/240–202X Draft, at appendix M1. *Id.* Likewise, DOE proposed to incorporate by reference the additional steps for calculating the SHORE of heat pumps having a variable-capacity compressor and a heat comfort controller outlined in section 11.2.2.5 of AHRI 1600–202X Draft, at appendix M2. *Id.*

DOE did not receive any comments regarding these proposals. AHRI 210/240–2024 and AHRI 1600–2024 finalized the updates to the heat comfort controller calculations without substantial change. Therefore, consistent with the April 2024 NOPR proposals, DOE is incorporating by reference section 11.2.2.5 of AHRI 210/240–2024 and AHRI 1600–2024, at appendix M1 and appendix M2, respectively.

F. Long-Term Changes in the CAC Test Procedure

The following sections discuss issues that affect the CAC/HP test procedure in the long term—*i.e.,* they will be effective when new CAC/HP standards are established in terms of the efficiency metrics SCORE and SHORE in appendix M2. As previously explained, these long-term revisions would be implemented at the new appendix M2 via incorporation by reference of the relevant industry consensus test procedure, AHRI 1600–2024. DOE has reviewed AHRI 1600–2024 and has concluded that it satisfies the EPCA requirement that test procedures should not be unduly burdensome to conduct and should be representative of an average use cycle. (42 U.S.C. 6293(b)(3)) These long-term amendments in appendix M2 would alter the measured efficiency of CAC/HPs and would require representations in terms of new cooling and heating test metrics, SCORE and SHORE, respectively.

1. Power Consumption of Auxiliary Components

AHRI 1600–202X Draft introduces SCORE and SHORE as replacements for the current cooling and heating performance metrics, SEER2 and HSPF2, used to determine the measured efficiency of CAC/HPs. Unlike SEER2 and HSPF2, which are seasonal efficiency metrics that don't include all energy consumed by the systems, these new metrics do address energy use of all components and operational modes, specifically including the standby and off mode power consumption of auxiliary components. These include those components discussed previously (*i.e.,* crankcase heaters and indoor fans utilizing constant circulation) for both SCORE and SHORE, and, additionally, base pan heaters for SHORE.

SEER2 and HSPF2 are both ratio metrics that include all calculated space conditioning in the numerator and all energy use associated with space conditioning in the denominator. In contrast, AHRI 1600–202X Draft includes two new quantities—$E_{s,c}$ (measured in watt-hours), added to the denominator of the calculation for SCORE, meant to represent all auxiliary component energy usage during cooling mode (*i.e.,* during both cooling conditioning hours and cooling-season shoulder hours, as applicable), and $E_{s,h}$ (also measured in watt-hours), added to the denominator of the calculation for SHORE, that is meant to represent all auxiliary component energy usage during heating mode (*i.e.,* during both heating conditioning hours and heating-season shoulder hours, as applicable). Table 14 and table 16 of AHRI 1600–202X Draft outline instructions for determining each component's number of standby power operating hours in cooling mode and heating modes, and appendix G of AHRI 1600–202X Draft [43] outlines instructions for determining the average power of all auxiliary components considered in the calculations of either $E_{s,c}$ or $E_{s,h}$.

In the April 2024 NOPR, DOE tentatively concluded that the respective inclusions of $E_{s,c}$ and $E_{s,h}$ into the calculations of the new cooling and heating performance metrics, SCORE and SHORE, represent industry consensus regarding whether to reflect the power consumption of auxiliary components in the efficiency metrics for CAC/HPs. 89 FR 24206, 24236. DOE tentatively determined that inclusion of the energy consumed by auxiliary components in the efficiency metrics for CAC/HPs would result in more representative measures of efficiency. *Id.* Therefore, DOE proposed to incorporate by reference the new cooling and heating performance metrics, SCORE and SHORE, as

[43] In the April 2024 NOPR, DOE incorrectly referred to appendix H of AHRI 1600–202X Draft as the appendix regarding the determination of average power of auxiliary components (*see* 89 FR 24206, 24236). This was a typographical error, since the appendix regarding the determination of average power of auxiliary components is at appendix G of AHRI 1600–202X Draft.

included in AHRI 1600–202X Draft, and the associated provisions regarding the standby and off mode power consumption of auxiliary components, in appendix M2. *Id.*

DOE did not receive any comments regarding this proposal. AHRI 1600–2024 finalized the new cooling and heating performance metrics, SCORE and SHORE, and the associated provisions regarding the standby and off mode power consumption of auxiliary components, without substantial change. Therefore, consistent with the April 2024 NOPR proposal, DOE is incorporating by reference AHRI 1600–2024, and adopting the SCORE and SHORE metrics, and the associated provisions regarding the standby and off mode power consumption of auxiliary components, at appendix M2.

2. Impact of Defrost on Performance

In order for HPs to undergo a defrost cycle, which aims to remove the moisture collected as frost on the outdoor coil, an HP temporarily switches to cooling mode operation. This enables an HP to transfer heat from the indoor coil to the outdoor coil, thus providing the heat needed to warm the coil above freezing temperature and melt the frost.

In the April 2024 NOPR, DOE explained how AHRI 1600–202X Draft introduces two changes to the treatment of defrost performance of CAC/HPs: (1) it simplifies the demand defrost credit by uniformly applying a 3-percent increase to the SHORE rating for all HPs equipped with demand defrost, and (2) it accounts for the use of supplementary heat during defrost using a new defrost heat and defrost overrun debits. 89 FR 24206, 24236–24238. DOE surmised that AHRI 1600–202X Draft's introduction of the simplified demand defrost credit in AHRI 1600–202X Draft represented industry consensus regarding improvements to the accuracy of the credit, incentives for more efficient defrost control strategies, and more accurate representations of modern defrost control technologies in the test procedure. 89 FR 24206, 24237. DOE tentatively determined that a simplified demand defrost credit would disincentivize unnecessary early defrosts (90 minutes after the termination of the prior defrost cycle), accurately represent defrost energy use while limiting test burden, and consequently allow for more advanced and efficient defrost control strategies. Similarly, DOE tentatively determined that the defrost heat and defrost overrun debits associated with accounting for use of supplementary heat during defrost represented industry consensus and that these debits result in more representative CAC/HP efficiencies for models with supplementary heat during defrost. Therefore, DOE proposed to incorporate by reference at appendix M2 the defrost-related provisions from AHRI 1600–202X Draft.

In response to DOE's proposal, the Joint Advocates stated that they acknowledge the improvements made to the treatment of defrost in the proposed appendix M2. (Joint Advocates, No. 30 at p. 4) However, the Joint Advocates also commented that, by assigning the defrost credit and debits based on a yes or no framework, the proposed appendix M2 does not capture the true differentiation that exists between defrost controls. (*Id.*) The Joint Advocates encouraged DOE to collect information about defrost mechanisms and consider how defrost impact may be better represented in a future update to the CAC/HP Federal test procedures. (*Id.*)

In response to the Joint Advocates, DOE notes that it will continue to review the defrost credit and debits and may propose changes once more information is made available. However, since little or no information is currently available and the defrost credit and debits represent industry consensus, DOE is adopting the defrost credit and debits without modification, as proposed.

DOE did not receive any other comments regarding this proposal. AHRI 1600–2024 finalized the defrost related provisions discussed in the aforementioned paragraphs, without substantial change. Therefore, consistent with the April 2024 NOPR proposal, DOE is incorporating by reference AHRI 1600–2024 and adopting the defrost-related provisions at appendix M2.

3. Updates to Building Load Lines and Temperature Bin Hours

In the April 2024 NOPR, DOE discussed several changes introduced in AHRI 1600–202X Draft with regard to the building load lines and temperature bin hours used when determining the new seasonal metrics, SCORE and SHORE. 89 FR 24206, 24238–24239. Specifically, DOE noted that (1) the new metrics use total hours instead of fractional hours; (2) total hours are split into conditioning hours and shoulder hours, with the cooling conditioning hours and cooling-season shoulder hours for each bin listed in table 15 of AHRI 1600–202X Draft [44] and the heating conditioning hours and heating-season shoulder hours for each bin listed in table 18 of AHRI 1600–202X Draft; [45] and (3) the cooling and heating building load lines were revised based on PNNL EnergyPlus simulations. *Id.*

DOE surmised that the switch from fractional hours to total hours, the associated values of the conditioning hours and shoulder hours, and changes in the building load line equations represented industry consensus for calculations of the new cooling and heating performance metrics, SCORE and SHORE. 89 FR 24206, 24239. DOE proposed to incorporate by reference the new cooling conditioning hours, cooling-season shoulder hours, heating conditioning hours, heating-season shoulder hours, and the updated building load line equations in AHRI 1600–202X Draft, at appendix M2. *Id.*

In response to DOE's proposal, Copeland asserted that, while a differentiated load line for variable-speed systems is indeed consistent with AHRI 1600–2024, it may no longer be representative of how various compressor-staging technologies are sized and installed in the field by the time ratings in terms of SCORE and SHORE take effect. (Copeland, No. 31 at pp. 2–3) Copeland pointed to a recent (February 2024) revision of the capacity range sizing recommendations for two-stage systems in the third edition of Air Conditioning Contractors of America's (''ACCA's'') Manual S® [46] as the source of its concern, remarking that these revisions were not available when the AHRI Standards Technical Committee discussions regarding AHRI 210/240–2024 and AHRI 1600–2024 took place. (*Id.*)

Copeland also noted that the slope factors used to differentiate the heating building load line for variable-speed HPs from single-stage and two-stage HPs in the current appendix M1 (*i.e.,* C and C_{VS}) were derived from an Oak Ridge National Laboratory (''ORNL'') analysis [47] and influenced by the capacity range sizing recommendations in the second edition of ACCA's Manual S. (Copeland, No. 31 at pp. 2–3) Copeland commented that the second

[44] In the relevant April 2024 NOPR preamble discussion, there were instances where DOE mistakenly referred to section table 13 of AHRI 1600–202X Draft. This has been corrected to table 15 of AHRI 1600–202X Draft in this final rule preamble discussion.

[45] In the relevant April 2024 NOPR preamble discussion, there were instances where DOE mistakenly referred to table 15 of AHRI 1600–202X Draft. This has been corrected to table 18 of AHRI 1600–202X Draft in this final rule preamble discussion.

[46] To access the normative section of the third edition of the ACCA Manual S, *see www.acca.org/standards/technical-manuals/manual-s.*

[47] *See www.regulations.gov/document/EERE-2016-BT-TP-0029-0002.*

edition of ACCA's Manual S allowed a range of capacity from 0.9 to 1.15 for single-stage and two-stage HPs and 0.9 to 1.3 for variable-speed HPs, which, if used to calculate a size adjustment factor for variable-speed HPs, equals 1.07 (by dividing (0.9 + 1.3) by (0.9 + 1.15)). (*Id.*) Taking this same approach with the third edition of ACCA's Manual S, which allows oversizing for two-stage HPs up to 1.25 and up to 1.3 for variable-speed HPs, Copeland stated that the size adjustment factor for variable-speed HPs would be 1.02 (by dividing (0.9 + 1.3) by (0.9 + 1.25)) instead of 1.07. (*Id.*)

Rather than adjusting the values of C and C_{VS}, however, Copeland encouraged DOE to consider eliminating the differentiated load line altogether, since a building's load calculation is not dependent on the compression technology of a heating and/or cooling system. (Copeland, No. 31 at pp. 2–3) Copeland also commented that it could not find any field data to support the idea that technicians vary oversizing practices based on compression technologies. Copeland asserted it is more likely that technicians calculate the load of the building and then select the next-larger capacity an OEM has available in a good, better, best offering when presenting quotes to homeowners. (*Id.*)

In response to Copeland's comment encouraging DOE to consider eliminating the differentiated load line altogether, DOE notes that similar concerns were raised and addressed in the previous CAC/HP final rule, published by DOE on January 5, 2017 (''January 2017 Final Rule''). 82 FR 1426. In the January 2017 Final Rule, DOE noted that the incorporation of differentiated slope factors does not suggest any difference in building load when using different technology. 82 FR 1426, 1456. Rather, the slope factor simply represents the ratio of building load to heat pump capacity. *Id.* DOE acknowledged that variable-speed products are slightly more oversized in comparison to the building heating load than are single-speed and two-stage products. *Id.* Keeping the building load constant and increasing the variable-speed HP capacity reduces the building load/capacity ratio; hence DOE selected a lower slope factor (*i.e.,* C_{VS}, equal to 1.07) for variable-speed HPs as compared to the slope factor for single-stage and two-stage HPs (*i.e.,* C, equal to 1.15). *Id.* In the absence of robust data showing average load/capacity ratios for different products, DOE based its building load factors on ACCA's Manual S recommendations, at the time using the second edition. The topic of a differentiated building load line for variable-speed units was also discussed during the development of the AHRI 210/240 and 1600 standards, and consensus was formed that it was appropriate to retain the differentiated line. Notably, both AHRI 210/240–2024 and AHRI 1600–2024 include a differentiated building load line for variable-speed units.

In response to Copeland's comment, DOE notes that additional changes to the capacity range sizing recommendations were made in the third edition of ACCA's Manual S that were not mentioned in Copeland's comment. Specifically, the minimum capacity factor recommended for variable-speed heat pumps was increased from 0.9 in the second edition of ACCA's Manual S to 1.0 in the third edition of ACCA's Manual S.[48] Incorporating this change into the approach taken by Copeland (as described in the preceding paragraphs), the size adjustment factor for variable-speed HPs as compared with two-stage heat pumps would remain 1.07 (by dividing (1 + 1.3) by (0.9 + 1.25)). DOE agrees that a future revisit of these issues, taking into consideration the revision to Manual S and any new data that could be collected to shed light on potential sizing differences, and allowing for a robust discussion of the issues among relevant stakeholders, may be appropriate when the AHRI test standards and DOE test procedure undergo amendments in future. However, DOE notes the committee consensus for retaining the 1.07 factor in the test standards, as reflected in AHRI 1600–2024, and is finalizing the DOE test procedure with this factor in this document.

AHRI 1600–2024 finalized the updates to the building load lines and temperature bin hours, without substantial change from AHRI 1600–202X Draft. Therefore, consistent with the April 2024 NOPR proposal, DOE is incorporating by reference AHRI 1600–2024 and adopting the associated building load lines and temperature bin hours, at appendix M2. DOE is also clarifying that representations of SHORE made using the ''Cold Climate Average'' heating conditioning hours and shoulder season hours in table 18 of AHRI 1600–2024 are optional.

[48] *See* table N1.16.2.4 in the normative section of the third edition of ACCA's Manual S, available here: *www.acca.org/standards/technical-manuals/manual-s.*

4. Default Fan Power Coefficients for Coil-Only Systems

Coil-only air conditioners are matched split systems consisting of a condensing unit and indoor coil that are distributed in commerce without an indoor blower or separate designated air mover. Such systems installed in the field rely on a separately installed furnace or a modular blower for indoor air movement. Because coil-only CAC/HP combinations do not include a designated air mover to circulate air, the DOE test procedures prescribe default values for power input and heat output to represent the furnace fan with which the indoor coil would be paired in a field installation. The default values are equal to the measured airflow rate (in scfm) multiplied by a defined coefficient (expressed in Watts (''W'') per 1,000 scfm (''W/1,000 scfm'') for fan power, and Btu/h per 1,000 scfm (''Btu/h/1,000 scfm'') for fan heat), hereafter referred to as the ''default fan power coefficient'' and ''default fan heat coefficient.'' The resulting fan power input value is added to the electrical power consumption measured during testing. The resulting fan heat output value is subtracted from the measured cooling capacity of the CAC/HP for cooling mode tests and added to the measured heating capacity for heating mode tests.

In appendix M1, separate fan power and fan heat equations are provided for different types of coil-only systems (*e.g.,* the equations for mobile home or space-constrained are different than for ''conventional'' non-mobile home and non-space-constrained, and the equations for single-stage are different than for two-stage and variable speed).[49] *See, e.g.,* appendix M1, section 3.3. For single-stage coil-only units installed in mobile homes and for single-stage space-constrained systems, appendix M1 defines a default fan power coefficient of 406 W/1,000 scfm and a default fan heat coefficient of 1,385 Btu/h/1,000 scfm. *See, e.g.,* appendix M1, section 3.3.d. For single-stage coil-only units installed in ''conventional'' (*i.e.,* non-mobile-home and non-space-constrained) systems, appendix M1 defines a default fan power coefficient of 441 W/1,000 scfm and a default fan heat coefficient of 1,505 Btu/h/1,000

[49] The different default fan power and default fan heat coefficients for mobile-home and space-constrained systems as compared to conventional systems reflect the lower duct pressure drop expected for such systems in field operation—the lower values are consistent with the lower ESP levels required in testing of blower-coil systems intended for mobile home and spaced-constrained applications (*see* table 4 of appendix M1).

scfm. *See, e.g.,* appendix M1, section 3.3.e.

In addition to the aforementioned default fan powers for single-stage coil-only systems, which reflect full-load operation, appendix M1 defines lower-load default fan powers at a reduced air volume rate of 75 percent for two-stage and variable-speed coil-only systems. Appendix M1 then uses these full-load and lower-load default fan powers to interpolate default fan power coefficients and default fan heat coefficients for the full-load and part-load tests, depending on the air volume rate used for each test expressed as a percentage of the cooling full-load air volume rate (''%FLAVR''). *See, e.g.,* appendix M1, section 3.3, equations for $DFPC_{MHSC}$ and $DFPC_{C}$. Appendix M1 interpolates the default fan power coefficient for two-stage and variable speed coil-only units installed in mobile homes and for two-stage and variable-speed space-constrained coil-only systems (''$DFPC_{MHSC}$''), using assumptions for full-load default fan power at 406 W (*i.e.,* the same as for single-stage systems) and a lower-load default fan power at a reduced air volume rate of 75 percent, at 308 W. For ''conventional'' non-mobile-home and non-space-constrained two-stage and variable-speed systems, appendix M1 interpolates the default fan power coefficient (''$DFPC_{C}$'') using assumptions for full-load default fan power at 441 W (*i.e.,* the same as for single-stage systems) and a lower-load default fan power at a reduced air volume rate of 75 percent, at 335 W. The default fan power values used in the determination of the default fan power coefficients were a result of empirical analysis presented by DOE in the October 2022 Final Rule. (*See* 87 FR 64550, 64555–64559).

In the April 2024 NOPR, DOE noted that AHRI 1600–202X Draft defines revised lower-load default fan powers at a reduced air volume rate of 65 percent (rather than 75 percent) for two-stage and variable-speed coil-only systems and updates the default fan power values used in each interpolation to better reflect the fan power values used by coil-only systems today (on average). 89 FR 24206, 24239–24240. AHRI 1600–202X Draft also moves mobile home systems from the default fan power coefficient equation for space-constrained systems to the equation for ''conventional'' non-space-constrained systems, because insufficient evidence was presented to the AHRI Standards Technical Committee to justify that default fan power coefficients for mobile home systems should be different from ''conventional'' systems. Therefore, solely for space-constrained coil-only systems, AHRI 1600–202X Draft uses a full-load default fan power of 293 W and a lower-load default fan power of 135 W in the default fan power coefficient interpolation (''$DFPC_{SC}$''). 89 FR 24206, 24239–24240. For non-space-constrained coil-only systems, AHRI 1600–202X Draft uses a full-load default fan power of 346 W and a lower-load default fan power of 159 W in the default fan power coefficient interpolation (''$DFPC_{NSC}$''). *Id.* All default fan powers are lower than those used in the calculation of $DFPC_{MHSC}$ and $DFPC_{C}$ in appendix M1.

DOE surmised that the new equations for default fan power coefficients and default fan heat coefficients (and their reduced full-load default fan powers and their reduced lower-load default fan powers at a reduced air volume rate of 65 percent) in AHRI 1600–202X Draft represented industry consensus regarding the assumed power input and heat output of an average furnace fan or modular blower with which the test procedure assumes the indoor coil is paired in a field installation. *Id.* DOE tentatively determined that the reduced full-load and low-load default fan powers more accurately reflected the average design of the current installed base for blowers paired with coil-only CAC/HP installations, which increasingly use more efficient fan motors (with lower wattages). *Id.* DOE also tentatively determined that the reduced air volume rate more accurately reflected the average low-load air volume rate of the currently installed base for blowers paired with coil-only CAC/HP installations. *Id.* Therefore, DOE proposed to incorporate by reference the default fan power coefficient equations and default fan heat coefficient equations, and associated default fan powers used to interpolate such coefficients, in AHRI 1600–202X Draft, at appendix M2. *Id.*

DOE did not receive any comments regarding this proposal. AHRI 1600–2024 finalized the changes to the default fan power coefficients for coil-only systems, without change. Therefore, consistent with the April 2024 NOPR proposal, DOE is incorporating by reference AHRI 1600–2024 and the associated provisions for default fan power coefficients, at appendix M2.

5. Airflow Limits To Address Inadequate Dehumidification

In the April 2024 NOPR, DOE explained that, to address adequate dehumidification in hot and warm, humid climates, AHRI 1600–202X Draft established new airflow limits for the cooling mode tests to avoid high sensible heat ratios. 89 FR 24206, 24240. Specifically, section 6.1.5.2 of AHRI 1600–202X Draft sets a maximum airflow limit at 37.5 scfm per 1000 Btu/h (*i.e.,* 450 cubic feet per minute (''cfm'') per ton of capacity) for cooling full airflow. *Id.* Additionally, section 6.1.5.3 of AHRI 1600–202X Draft sets a maximum airflow limit at 50 scfm per 1,000 Btu/h (*i.e.,* 600 cfm per ton of capacity) for cooling low airflow. *Id.* Should the cooling full airflow or cooling low airflow specified by the manufacturer exceed these limits, AHRI 1600–202X Draft requires that airflows be reduced to meet these limits for testing. *Id.*

In the April 2024 NOPR, DOE surmised that the addition and selection of specific cooling airflow limits in AHRI 1600–202X Draft represented industry consensus regarding the issue of inadequate dehumidification. 89 FR 24206, 24240. DOE tentatively determined that such airflow limits were appropriate to ensure that CAC/HPs provide adequate dehumidification during cooling mode operation and, therefore, DOE proposed to incorporate by reference the cooling full airflow and cooling low airflow limits specified in the AHRI 1600–202X Draft, at appendix M2. *Id.*

DOE did not receive any comments regarding this proposal. AHRI 1600–2024 finalized the cooling full airflow and cooling low airflow limits without change. Therefore, consistent with the April 2024 NOPR, DOE is incorporating by reference AHRI 1600–2024 and the associated airflow limits at appendix M2.

G. General Comments Received in Response to the April 2024 NOPR

In response to the April 2024 NOPR, DOE received several general comments not specific to any one test procedure provision. This section discusses those general comments received.

The Joint Advocates commented that before appendix M2 is enforced, DOE should encourage manufacturers to optionally rate their systems using SCORE and SHORE, *i.e.,* the appendix M2 energy efficiency metrics. (Joint Advocates, No. 30 at p. 1) The Joint Advocates commented that such ratings would allow DOE to do an appropriate crosswalk from SEER2 to SCORE, and HSPF2 to SHORE, to support the next round of CAC/HP standards rulemaking. (*Id.*) As discussed in section II of this document, use of appendix M2 would not be required until the compliance date of amended energy conservation standards denominated in terms of SCORE and SHORE, should DOE adopt such standards. However,

manufacturers may choose to make optional representations based on the metrics in appendix M2 and are encouraged to provide any test data to DOE to help support an analysis of the crosswalk of the energy efficiency metrics from appendix M1 to appendix M2.

Additionally, the Joint Advocates commented that the bin method used to calculate HSPF2 and SHORE assumes that an HP will provide as much capacity as possible and resistance heat will meet the remaining building load. (Joint Advocates, No. 30 at p. 4) However, the Joint Advocates asserted that control logic will ultimately determine the relative operation of these heat sources, which may not fit with the bin calculation method assumption described. (*Id.*) The Joint Advocates stated that, in the case that an HP uses more resistance heat than assumed by the bin calculation method, a lower efficiency would be observed in the field than the efficiency rated for an HP; subsequently, the Joint Advocates encouraged DOE to consider this aspect of the CAC/HP Federal test procedure in a future rulemaking. (*Id.*)

In response to the Joint Advocates' comment, at this time DOE has not determined an approach to account for the controls of the heat pump working in tandem with electric resistance heat, and is not adopting such an approach in this final rule. DOE notes that it may consider such an approach in the future.

H. Represented Values

In the following sections, DOE discusses requirements regarding represented values. To the extent that DOE is amending the requirements specified in 10 CFR part 429 regarding representations of CAC/HPs, such amendments to 10 CFR part 429, if made final, would be required starting 180 days after publication in the **Federal Register** of this final rule. Prior to 180 days after publication in the **Federal Register** of this final rule, the current requirements would apply. However, manufacturers would be permitted to choose between using the current or new requirements for a period between 30 days and 180 days after publication in the **Federal Register** of this test procedure final rule.

1. Represented Values for the Federal Trade Commission

As described in a final rule regarding EnergyGuide labels published on October 12, 2022, the Federal Trade Commission (''FTC'') is responsible for periodical updates to energy labeling for major home appliances and other consumer products, including CAC/HPs, to help consumers compare competing models. 87 FR 61465, 61466. Among other disclosures, EnergyGuide labels for CAC/HPs include estimated annual energy costs for both cooling and heating, which are based on the represented values for each basic model's efficiencies (SEER2 and HSPF2, as applicable), cooling capacities, and estimates for cooling load hours (''CLH'') and heating load hours (''HLH'') in a year. CLH and HLH can be thought of as the hours of run time at full capacity required to provide seasonal conditioning (in Btu) as calculated in the test procedure to determine seasonal efficiencies. Currently, the FTC uses 1,000 and 1,572 hours as estimates for CLH and HLH, respectively, for all ratings of CAC/HP basic models.[50]

In the April 2024 NOPR, DOE proposed to retain the current CLH and HLH estimates in appendix M1, for use in conjunction with SEER2 and HSPF2 representations. 89 FR 24206, 24242–24243.

For appendix M2, DOE proposed new estimates for CLH and HLH for use in conjunction with the proposed appendix M2 efficiency metrics, SCORE and SHORE. 89 FR 24206, 24243. DOE noted that unlike SEER2 and HSPF2, SCORE and SHORE are integrated metrics (that include off mode and standby power) and use updated weather data for the United States' average number of conditioning and shoulder-season hours per temperature bin. *Id.* Therefore, DOE tentatively determined that the proposed appendix M2 required new CLH and HLH values for use by the FTC. *Id.* Specifically, DOE proposed to use 1,457 and 972 hours as estimates for CLH and HLH, respectively, for use in conjunction with SCORE and SHORE representations. *Id.* DOE presented step-by-step derivations of proposed appendix M2 CLH and HLH values in a docketed white paper titled ''Derivation of Proposed Appendix M2 Cooling Load Hours and Heating Load Hours for the Federal Trade Commission.'' [51] *Id.*

In response to DOE's proposal, Keith Rice requested that the basis for these revised cooling and heating load hours (and the revised building load lines and temperature bin hours, discussed in section III.F.3 of this final rule) be well documented in a published report. (Keith Rice, No. 33 at p. 1) Keith Rice commented that this is important considering that the proposed CLH and HLH values for appendix M2 give a much higher weighting to cooling energy use performance relative to heating. (*Id.*)

In response to Keith Rice, DOE notes that the CLH and HLH values presented in its docketed white paper were derived from the building load lines and temperature bin hours presented in AHRI 1600–202X Draft. Therefore, the report requested by Keith Rice (*i.e.,* a report detailing the basis for the revised building load lines and temperature bin hours in AHRI 1600–2024) would need to be provided by AHRI. DOE understands the value of publicizing the weather analysis that forms the basis of the building load lines and temperature bin hours under appendix M2. Subsequently, DOE is willing to support AHRI in the process of publicizing a weather analysis report, as requested by Keith Rice.

DOE did not receive any other comments regarding the proposal for new CLH and HLH values under appendix M2. Therefore, for the reasons discussed in the preceding paragraphs and the April 2024 NOPR, DOE is adopting different CLH and HLH values under appendix M2 than under the current appendix M1, as proposed.

In response to DOE's proposals for CLH and HLH, Keith Rice also commented on the proposed calculations of annual operating costs in the April 2024 NOPR. (Keith Rice, No. 33 at p. 1) Keith Rice noted that the calculations of annual operating costs for single- versus variable-speed HPs in the current appendix M1 and proposed appendix M2 give a 7-percent additional energy savings benefit to variable-speed systems when compared on an equal rated capacity basis. (*Id.*) Keith Rice recommended, reasoning that consumers would expect that operating cost comparisons would be on the basis of equal house loads, that the existing appendix M1 and proposed appendix M2 operating cost calculation approaches be modified to remove the extra 7-percent benefit. (*Id.*) Keith Rice commented that, in the current appendix M1 and proposed appendix M2, the seasonal energy performance factors (*i.e.,* SEER2 and HSPF2 for appendix M1 and SCORE and SHORE for appendix M2) for variable-speed systems have already been boosted by the assumption of lower cooling and heating building loads for a given cooling capacity. (*Id.* at pp. 1–2) Subsequently, Keith Rice suggested that the V-factor of 0.93 in cooling mode and the lower 1.07 C_x factor in heating mode be removed from the operating cost calculations for energy labeling so as to not result in a type of double counting

[50] *See* table 21 of appendix M1 for the current CLH and HLH estimates used for rating values.

[51] *See* Docket No. EERE–2022–BT–TP–0028–0019.

of energy savings benefits for variable-speed units. (*Id.*)

DOE appreciates Keith Rice's comments regarding the calculations of annual operating costs and understands that, if a variable-speed product is compared with a single- or two-stage product on an apples-to-apples basis (*i.e.,* if both products hypothetically had the same represented cooling capacity and same represented SEER2 or HSPF2 under appendix M1 or SCORE or SHORE under appendix M2), the calculations of annual operating costs for a variable-speed product would yield 7-percent lower results. However, DOE notes that this 7-percent difference has been used by FTC for some time—since it was adopted in the January 2017 Final Rule. 82 FR 1426, 1473–1475. Additionally, DOE notes that this 7-percent difference in annual operating costs is relatively marginal compared to other factors of variability, such as electricity rates, consumer usage patterns, etc. For these reasons, DOE is adopting the calculations of annual operating costs as proposed in the April 2024 NOPR, which are unchanged from the existing calculations of annual operating costs.

2. Off Mode Power

Off mode power, $P_{W,OFF}$, is a required represented value for all CAC/HPs, as specified in 10 CFR 429.16(a)(1). Currently, section 3.13 of appendix M1 includes testing instructions to determine off-mode power ratings for CAC/HPs. In the April 2024 NOPR, DOE proposed to incorporate by reference AHRI 210/240–202X Draft at appendix M1, and it noted that section 11.3 and appendix G of AHRI 210/240–202X Draft [52] include the same test instructions to determine $P_{W,OFF}$ as are present in the current appendix M1. 89 FR 24206, 24243. Therefore, DOE proposed no changes in representation requirement for off mode testing when testing per appendix M1. *Id.*

For appendix M2, DOE noted that the applicable metrics, SCORE and SHORE, directly incorporate off mode power consumption and as such, requiring representation of $P_{W,OFF}$ would be redundant for appendix M2. 89 FR 24206, 24243. Therefore, DOE proposed to clarify at 10 CFR 429.16(a)(2) that represented values of $P_{W,OFF}$ are only required when testing in accordance with appendix M1. *Id.*

[52] In the April 2024 NOPR preamble discussion, there were instances where DOE mistakenly referred to section 11.2.3 and appendix H of AHRI 210/240–202X Draft. This has been corrected to section 11.3 and appendix G of AHRI 210/240–202X Draft in this final rule preamble discussion.

Additionally, 10 CFR 429.16(b)(2)(ii) currently allows flexibility for manufacturers to not test each individual model/combination (or tested combination) for $P_{W,OFF,}$ but at a minimum, test at least one individual model/combination for $P_{W,OFF}$ among individual models/combinations with similar off mode construction. In the April 2024 NOPR, DOE proposed to retain this flexibility for testing to appendix M1. 89 FR 24206, 24243.

For appendix M2, DOE extended similar flexibility for determining off mode power values P_1 (off mode power in shoulder season) and P_2 (off mode power in heating season), which are used to calculate the SCORE and SHORE metrics when testing to appendix M2. 89 FR 24206, 24243. Specifically, DOE proposed at 10 CFR 429.16(b)(2)(iii) that when testing in accordance with appendix M2 and determining SCORE and SHORE, each individual model/combination is not required to be tested for values of P_1 (off mode power in shoulder season) and P_2 (off mode power in heating season). *Id.* Instead, at a minimum, among individual models/combinations with similar off mode construction (even spanning different models of outdoor units), a manufacturer must test at least one individual model/combination, for which P_1 and P_2 are the most consumptive. *Id.*

In response to the April 2024 NOPR, Carrier, Lennox, and Rheem all commented in support of DOE's proposal pertaining to off mode power. (Carrier, No. 29 at p. 5; Lennox, No. 24 at p. 4; Rheem, No. 34 at p. 5) Therefore, for the reasons discussed in the preceding paragraph and the April 2024 NOPR, DOE is adopting these changes as proposed.

3. AEDM Tolerance for SCORE and SHORE

DOE's existing regulations allow the use of an AEDM, in lieu of testing, to simulate the efficiency of CAC/HPs. 10 CFR 429.16(d). For models certified with an AEDM, results from DOE verification tests are subject to certain tolerances when compared to certified ratings. 10 CFR 429.70(e)(5)(v). The current tolerance specified for efficiency metrics for CAC/HPs (*i.e.,* SEER2, HSPF2, and EER2) requires that the result from the DOE verification test must be greater than or equal to 0.95 multiplied by the certified represented value.

In the April 2024 NOPR, to maintain consistency with the existing efficiency metrics, DOE proposed to extend the same tolerance requirement to the new efficiency metrics measured per appendix M2—EER, SCORE and SHORE. 89 FR 24206, 24243.

DOE did not receive any comments regarding this proposal pertaining to AEDM tolerances on the new metrics and, therefore, DOE is adopting the change as proposed.

4. Removal of the AEDM Exception for Split-System CAC/HPs

Currently, the AEDM requirements at 10 CFR 429.70(e) allow that, until July 1, 2024, non-space-constrained single-split-system CAC/HPs rated based on testing in accordance with appendix M1 are allowed to test a single-unit sample from 20 percent of the basic models distributed in commerce to validate the AEDM. On or after July 1, 2024, validation of the AEDM has to be based on complete testing of each basic model. *See* 10 CFR 429.70(e)(2)(i)(A). Corresponding provisions are also included at 10 CFR 429.16, paragraphs (b)(2)(i) and (c)(1)(i)(B).

In the April 2024 NOPR, DOE noted that since amendments proposed in the NOPR are not expected to be finalized and made effective before July 1, 2024, the AEDM exception for non-space-constrained single-split-system CAC/HPs would no longer apply at the time this rulemaking finalizes. 89 FR 24206, 24243. As such, DOE proposed to remove the date-based application of the AEDM requirement and instead clarify that AEDM validation for all CAC/HPs, including non-space-constrained single-split-system CAC/HPs, must be based on complete testing of each basic model. *Id.* DOE did not receive any comments regarding this proposal and is adopting the change as proposed.

I. Enforcement Provisions

1. Verifying Cut-Out and Cut-In Temperatures

In the April 2024 NOPR, DOE proposed that for assessment and enforcement testing of HP models, the cut-out and cut-in temperatures may be verified using the test method in appendix J of AHRI 210/240–202X Draft and AHRI 1600–202X Draft, and that if this method is conducted, the cut-in and cut-out temperatures determined using this method will be used to calculate the relevant heating metric for purposes of compliance. 89 FR 24206, 24243.

AHRI 210/240–2024 and AHRI 1600–2024, the industry standards DOE is referencing in this final rule, finalized the relevant test method for determining cut-out and cut-in temperatures in appendix J without any substantial change. Therefore, consistent with the April 2024 NOPR, DOE is adding product-specific provisions at 10 CFR

429.134(k)—specifically, DOE is adding provisions that for assessment and enforcement testing of HP models, the cut-out and cut-in temperatures may be verified using the method in appendix J of AHRI 210/240–2024 or AHRI 1600–2024, and that if this method is conducted, the cut-in and cut-out temperatures determined using this method will be used to calculate the relevant heating metric for purposes of compliance.

In response to the April 2024 NOPR, the Joint Advocates encouraged DOE to adopt a requirement for manufacturers to report and certify cut-out and cut-in temperatures for all HPs as part of a separate rulemaking. (Joint Advocates, No. 30 at p. 2) DOE maintains that it will consider certification requirements for CAC/HPs, including the potential requirement for certification of cut-out and cut-in temperatures, in a separate rulemaking, as noted in the April 2024 NOPR. 89 FR 24206, 24243.

Additionally, the Joint Advocates expressed uncertainty regarding whether DOE intended to limit cut-out and cut-in temperature verification to CCHPs, specifically pointing to the following sentence [53] of the April 2024 NOPR preamble: ''DOE is proposing that for assessment and enforcement testing of CHP models, the cut-out and cut-in temperatures may be verified using the method in appendix J and that if this method is conducted, the cut-in and cut-out temperatures determined using this method will be used to calculate the relevant heating metric for purposes of compliance.'' (Joint Advocates, No. 30 at p. 2) DOE surmises that the Joint Advocates' uncertainty stems from the use of the acronym ''CHP'' in this sentence. DOE clarifies that ''CHP'' stands for ''central heat pump,'' not ''cold climate heat pump,'' and that the cut-out and cut-in temperature verification test in appendix J of the respective AHRI Drafts applies to all central heat pumps.

2. Controls Verification Procedure

(a) DOE's Proposal

In the April 2024 NOPR, DOE proposed to establish requirements for DOE's use of the CVP per appendix I of AHRI 210/240–202X Draft and AHRI 1600–202X Draft for the purposes of assessment and enforcement testing. 89 FR 24206, 24243–24244.

DOE proposed that if after conducting the CVP a unit is determined to be either a variable-capacity compressor system; variable-capacity certified, single-capacity system; or variable-capacity certified, two-capacity system, and meets the tolerances on capacity measurement (6 percent) and efficiency [54] (10 percent) for the applicable CVP load intervals, the efficiency metrics for the unit will be evaluated by conducting the prescribed DOE rating tests per appendix M1 or appendix M2 applicable to that system. 89 FR 24206, 24244. DOE clarified that these tests will be conducted based on the override instructions from the manufacturer for setting the appropriate compressor and fan speeds for each test. *Id.*

However, if either of the full- or minimum-load CVP intervals fail to meet the required tolerances, and the control device allows monitoring and adjustment of the compressor and indoor blower speeds, and is the same control device used for certification and CVP tests,[55] DOE proposed that it will conduct certification tests by setting the speeds for the tests to the average values observed during the corresponding failed CVP interval.[56] 89 FR 24206, 24244. Alternatively, if either of the full- or minimum-load CVP intervals fail to meet the required tolerances, and the control device does not allow adjustment of the compressor and indoor blower speeds or is not the same control device used for certification tests, DOE proposed to use the average capacity and power(s) or, for CVP intervals that do not meet the operating tolerances and condition tolerances, time-averaged integrated capacity and time-averaged integrated power(s), measured during the CVP, in order to calculate SEER2, HSPF2, and EER2 for appendix M1, and SCORE, SHORE, and EER, for appendix M2. *Id.* For certification tests that do not have a corresponding CVP interval, DOE proposed to calculate the corresponding efficiency by adjusting the capacity and power, by application of a ratio to the corresponding CVP interval.[57] *Id.*

For CHPs determined to be a variable-capacity certified, single-capacity system or variable-capacity certified, two-capacity system that are certified/marketed for use with only a proprietary control device, DOE proposed to utilize two options: (1) contact the manufacturer to provide override control instructions consistent with the full- and, if applicable, minimum-speed operation observed during the CVP, to enable tests without a corresponding CVP interval to be conducted at the appropriate speeds; or (2) conduct the tests for $H1_{Nom}$, $H2_{Full}$, $H2_{Low}$, and $H3_{Low}$, as applicable, using the certified instructions, and for other certification tests, calculate the corresponding efficiency by adjusting the capacity and efficiency, by application of a ratio to the corresponding CVP interval.[58] 89 FR 24206, 24244. Otherwise, DOE proposed that the same simulated thermostat low-voltage signal that resulted in full-speed compressor operation for the full-load intervals shall be used for all certification full-load tests (for variable-capacity certified, single-capacity system or variable-capacity certified, two-capacity systems), and the same simulated thermostat low-voltage signal that resulted in low-speed compressor operation for the low-load intervals shall be used for all certification low-load tests (for variable-capacity certified, two-capacity system). *Id.*

(b) Comments Received

In response to these proposals, DOE received several comments related to various aspects of the CVP's adoption for enforcement and assessment testing. The comments are summarized in the following subsections.

(1) General Feedback

Lennox, the CA IOUs, Rheem, and GE Appliances all supported DOE's proposed CVP enforcement provisions utilizing the methods in the AHRI 210/240 and AHRI 1600 standards. (Lennox, No. 24 at p. 5; CA IOUs, No. 32 at p. 2; Rheem, No. 34 at p. 5; GE Appliances, No. 37 at p. 4) The CA IOUs commented that the new provisions in AHRI 210/240 will help consumers realize that heat pumps are an efficient means for space heating and cooling. (CA IOUs, No. 32 at p. 2)

AHRI pointed out the differences between the CVP outlined in AHRI 210/

[53] *See* 89 FR 24206, 24243.

[54] EER2 and COP2 for cooling load intervals and heating load intervals, respectively, when tested in accordance with appendix M1, and EER and COP, for cooling load intervals and heating load intervals, respectively, when tested in accordance with appendix M2.

[55] For the purpose of the CVP, ''adjustment'' means that the control device has the ability to make discrete adjustments, as required, to the compressor and indoor blower speeds without the need of any additional hardware or non-publicly available software.

[56] For tests that do not correspond to any load intervals of the CVP, DOE proposed to adjust the compressor speed as follows: the compressor speeds for tests B_{Full}, B_{Low}, $H_{3,low}$, and $H0_{Low}$ will be set at the same speeds observed in the CVP load intervals associated with the A_{Full}, F_{Low}, $H3_{Full}$, $H4_{Full}$, and $H1_{Low}$ tests, respectively.

[57] As an example per the proposal, the capacity at B_{Full} condition, $Q_{B,Full}$, will be calculated by the following equation: $Q_{B,Full} = Q_{B,Full,Certification} \times Q_{CVP,A,Full} Q_{A,Full,Certification}$, where $Q_{B,Full,Certification}$ is the capacity at B_{Full} condition, $Q_{CVP,A,Full}$ is the full-load interval capacity in cooling mode, and $Q_{A,Full,Certification}$ is the capacity at A_{full} condition.

[58] As an example, the capacity at HO_{Low} condition, $Q_{H0,Low}$, will be calculated by the following equation: $Q_{H0,Low} = Q_{H0,Low,Certification} \times Q_{CVP,H1,Low}/Q_{H1,Low,Certification}$.

240 and AHRI 1600, and the CVP outlined in the ENERGY STAR® Version 6.1 (''EPA Energy Star CVP'')

Specifications for CACs and Air-Source Heat Pumps (''ASHPs''),[59] which are shown in table III.1. (AHRI, No. 25 at pp. 8–9)

TABLE III—1 SUMMARY OF CVP IN AHRI 210/240 AND THE EPA ENERGY STAR CVP

[AHRI, No. 25 at pp. 8–9]

Test type	Test segments CAC	Test segments CHP	Test duration for CAC	Test duration for CHP
AHRI 210/240 and AHRI 1600—Appendix I	3	6	9–19 hours	18–38 hours.
EPA Energy Star CVP	None	1	None	Up to 2 hours.

Similarly, LG commented that even though the Energy Star CVP is used to certify ENERGY STAR CCHPs, DOE's Cold Climate Heat Pump Technology Challenge (''DOE CCHP Tech Challenge'')[60] implemented a ''Min/Mild'' CVP test.[61] (LG, No. 38 at p. 3) LG suggested that the presence of multiple CVPs to certify identical products would place undue test burden on manufacturers, and DOE should incorporate the ''Min/Mild'' CVP in their CVP enforcement provisions, rather than going with the CVP outlined in the AHRI 210/240 and 1600 standards. (*Id.*)

In response to AHRI's comment, DOE notes that the scope of the ENERGY STAR CVP only includes ENERGY STAR CCHPs, specifically performance at the 5 °F test condition. In contrast, the CVP outlined in AHRI 210/240–202X Draft and AHRI 1600–202X Draft is applicable more broadly to all variable-capacity CAC/HPs. Because of the increased scope of the latter CVP, more heating test conditions are included, resulting in increased heating tests, both in number and duration. The CVP outlined in appendix I of AHRI 210/240–202X Draft and AHRI 1600–202X Draft also includes a 5 °F test for all CHPs that report performance at the H4 conditions, and is functionally the same test as the ENERGY STAR CVP.

In response to LG, DOE notes that although the ''Min/Mild'' CVP is a load-based method, it has a different method of inducing the conditioning load on the indoor psychrometric chamber as opposed to the CVP outlined in AHRI 210/240–202X Draft and AHRI 1600–202X Draft. As DOE detailed in the January 2023 RFI, the ''Min/Mild'' CVP uses the test chamber-induced load application scheme, where a fixed cooling or heating load is applied to the psychrometric chamber, and the unit under test responds to the test chamber-induced load to maintain the desired set point temperature. 88 FR 4091, 4094–4095. In contrast, the CVP in AHRI 210/240–202X Draft and AHRI 1600–202X Draft uses the virtual load approach, where the load is varied to simulate the building response if the capacity of the unit under test does not match the imposed load. *Id.* DOE notes that the CVP outlined in appendix I of AHRI 210/240–202X Draft and AHRI 1600–202X Draft represents industry consensus to ensure that fixed-speed settings of variable-speed systems would be achieved using native (unfixed) control. 89 FR 24206, 24222. Therefore, DOE considers that the CVP in appendix I of AHRI 210/240–202X Draft and AHRI 1600–202X Draft is the most suitable option to support enforcement associated with testing conducted in accordance with appendices M1 and M2.

(2) Delaying CVP Compliance Due to Uncertain CVP Tolerances

As noted in section III.E.1 of this document, DOE proposed in the April 2024 NOPR that systems determined to be variable-capacity compressor systems; variable-capacity certified, single-capacity systems; or variable-capacity certified, two-capacity systems after conducting the CVP, must meet tolerances of 6 percent and 10 percent on capacity and energy efficiency, respectively. 89 FR 24206, 24244.

Lennox commented that the proposed tolerances appeared to be reasonable from Lennox's testing, but it noted that DOE should ensure that the proposed tolerances are not very stringent and expressed its openness to talk with DOE on the matter. (Lennox, No. 24 at p. 5) The Joint Advocates also supported the proposed tolerance values and requested that DOE continue evaluating appropriate values for the tolerances. (Joint Advocates, No. 30 at p. 1).

AHRI, Carrier, Daikin, GE Appliances, JCI, LG, and Rheem had several issues with the aforementioned tolerances on capacity and energy efficiency for the CVP enforcement proposed by DOE, and they requested that DOE delay the compliance date CVP enforcement testing. (AHRI, No. 25 at p. 8; Carrier, No. 29 at p. 2; Daikin, No. 36 at pp. 3–4; GE Appliances, No. 37 at p. 4; JCI, No. 35 at pp. 2–3; LG, No. 38 at p. 1; Rheem, No. 34 at p. 5)

AHRI commented that even though the tolerances proposed by DOE were discussed with all stakeholders during development of the AHRI 210/240 and AHRI 1600 standards, AHRI is aiming to conduct CVP testing during 2025, analyze the proposed tolerances, and provide the relevant information to DOE by spring 2026, which will determine if the proposed tolerances are supported by test data. (AHRI, No. 25 at p. 8) Therefore, AHRI requested that DOE defer the effective date of CVP enforcement provisions to July 2026 at the earliest. (*Id.* at p. 9)

Carrier recommended that DOE delay the compliance date of the CVP enforcement to be 360 days after the publication of the final rule and revisit the proposed tolerances on capacity and efficiency once the industry has test data available to confirm appropriate tolerance values. (Carrier, No. 29 at p. 2) Carrier further commented that even though the tolerances proposed by DOE were discussed with stakeholders during the Unitary Small Equipment Standards Technical Committee (''USE STC'') negotiations, the consensus was

[59] *See: www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20Version%206.1%20Central%20Air%20Conditioner%20and%20Heat%20Pump%20Final%20Specification%20%28Rev.%20January%20%202022%29.pdf.*

[60] On May 19, 2021, DOE, in conjunction with EPA and NRCan, announced the DOE CCHP Tech Challenge as part of the Energy, Emissions, and Equity (''E3'') Initiative. The specification of the DOE CCHP Tech Challenge is available at *https://www.energy.gov/eere/buildings/cchp-technology-challenge-specifications.*

[61] The ''Min/Mild'' test is a load-based test conducted at outdoor conditions of 47 °F dry bulb temperature, and 43 °F wet bulb temperature, and indoor conditions of 70 °F dry bulb temperature and 60 °F wet bulb temperature, in order to validate the minimum capacity (at 47 °F outdoor dry bulb temperature) of CCHPs participating in the DOE CCHP Tech Challenge.

to not specify any tolerances at that time due to a lack of lab test data and uncertainty in the CVP. (*Id.*) Carrier expressed concern that the proposed tolerances would result in inappropriate characterization of system performance and may require manufacturers to retest and recertify products, thereby increasing the cost of testing. (*Id.*)

Daikin commented that it does not have sufficient test data from Daikin's own test laboratories to agree or disagree with the tolerances proposed by DOE. (Daikin, No. 36 at pp. 3–4) Daikin requested that DOE be open to delay CVP enforcement dates and changes to the tolerances once stakeholders can provide test data to either validate or modify the current tolerances. (*Id.*)

GE Appliances commented that it agrees with AHRI's recommendation on delaying CVP enforcement to no sooner than July 2026. (GE Appliances, No. 37 at p. 4) GE Appliances further commented that this will allow time for lab testing to validate DOE's proposed tolerances, and for building additional lab capacity for CVP testing, which takes longer than some existing CVP procedures, such as the ENERGY STAR CVP. (*Id.* at pp. 4–5) GE Appliances expressed concern that there are some items [62] in the CVP in AHRI 210/240 that may require changes to the tolerances proposed by DOE. (*Id.*) GE Appliances pointed to a mismatch between the text and the equations in 10 CFR 429.134(k)(4)(iii)(B), stating that the language regarding capacity and efficiency tolerances provide for a two-sided tolerance, while the formulas only allow for one side of the range. (*Id.* at p. 5) GE Appliances recommended that the capacity equations should be modified to show a two-sided tolerance (ensuring consistency with the text), but since a one-sided tolerance seems appropriate for efficiency, the text in 429.134(k)(4)(iii)(D) should be updated to note that the equations are not ''within'' the specified tolerance and are one sided. (*Id.*)

JCI commented that since the CVP tests proposed in AHRI 210/240 are complex and time consuming, it is crucial for laboratories under the AHRI audit program to put in place tolerances that are achievable. (JCI, No. 35 at p. 3) JCI requested that DOE delay CVP enforcement testing until sufficient CVP test data has been collected by labs to establish such tolerances. (*Id.*)

LG commented that since the CVP is a new and untried procedure, the capacity and efficiency tolerances proposed by DOE, of 6 percent and 10 percent respectively, should be reevaluated before finalizing the CVP enforcement. (LG, No. 38 at p. 1) LG asserted that the proposed tolerances may not be sufficient to compare a certification test with the CVP test, noting that the certification tests utilize fixed compressor speed and airflow rate while the CVP tests modulate compressor speed and airflow rate to optimize thermal comfort and system performance. (*Id.*) Additionally, LG commented that even though the CVP would only be utilized during enforcement testing, manufacturers would need to verify CVP test values in order to internally assess the products, for which third-party testing may also be required to obtain reliable test data. (*Id.* at p. 3) LG asserted that while self-verification in the manufacturer's internal lab may be available, this option also requires additional testing time and cost. (*Id.*) Therefore, LG requested that DOE align the compliance date of the CVP enforcement with appendix M2's effective date, since manufacturers will have to do some retesting and recertification with the advent of appendix M2, and this would help reduce their overall test burden. (*Id.*)

Similarly, Rheem questioned if there was adequate test data available to justify the tolerances on capacity and energy efficiency proposed by DOE for the full- and minimum-load intervals. (Rheem, No. 34 at p. 5) Rheem requested delaying the compliance data of the CVP to July 2026 so that the CVP test data collected by AHRI in 2025 may be analyzed and help validate the proposed tolerances. (*Id.*) Rheem referred to a residential furnace fans final rule published by DOE in the **Federal Register** on July 3, 2014 (''July 2014 Furnace Fan Final Rule''), in which the fan energy rating (''FER'') metric's enforcement was delayed by DOE. (*Id.* at p. 6) Rheem commented that DOE should utilize the aforementioned flexibility in delaying enforcement provisions, in order to delay enforcement of the CVP. (*Id.*) Rheem noted that section I5.1.5 from appendix I of AHRI 210/240–2024 and AHRI 1600–2024—which prescribes a maximum allowable variation in EER/COP equal to 5 percent—is redundant, given that all condition and operating tolerances have already been prescribed in section I5 and in the CVP enforcement provisions by DOE at 10 CFR 429.134(k). (*Id.* at p. 7)

As noted by AHRI, the CVP tolerances on capacity and efficiency, 6 percent and 10 percent, respectively, were discussed with the stakeholders during the development of the AHRI standards. During these discussions, DOE presented unit capacity, compressor speed, and efficiency data on 10 different variable-speed CHPs—five (5) ducted split CHPs and five (5) ductless mini-split CHPs. The CHP units were from seven (7) different manufacturers and had capacities ranging from 1.5 tons to 3 tons. Regulatory cooling and heating tests were conducted on these units as per the existing appendix M1 procedure, and CVP tests were conducted using the test chamber-induced load application scheme, as explained in section III.I.2.b.(1) of this document. The SEER2 and HSPF2 metrics were evaluated for the units using both the regulatory test values and those obtained from the CVP. Table III–2 shows the comparison of the regulatory and CVP capacities and energy efficiency for each of the 10 units, for cooling full load, cooling low load, heating full load, and heating low load. The following can be observed, if 10% is the allowable tolerance for capacity and efficiency, when comparing the regulatory and CVP values: (1) unit 1 was out of tolerance on the cooling full load, and heating low load capacity and efficiency, (2) unit 3 was out of tolerance on the cooling low load capacity, and heating low load capacity and efficiency, (3) unit 6 was out of tolerance on the heating full load and heating low load capacity and efficiency, (4) unit 9 was out of tolerance on the cooling low load and heating low load efficiency, and (5) unit 10 was out of tolerance on the cooling low load and heating low load capacity and efficiency. For the aforementioned units, the SEER2 values were recalculated by use of the tested out of tolerance CVP load intervals and adjustment of the applicable load intervals without a CVP for full load or low load efficiencies and capacities, using the following equations:

[62] GE Appliances, in its example, pointed out that the target sensible load for the full-load and low-load tests were set at 97 percent and 103 percent respectively, which may lead to unbalanced bilateral tolerance.

$$\dot{q}_{B,Full} = \dot{q}_{B,Full,Certification} \times \frac{\dot{q}_{CVP,A,Full}}{\dot{q}_{A,Full,Certification}}$$

$$P_{B,Full} = P_{B,Full,Certification} \times \frac{P_{CVP,A,Full}}{P_{A,Full,Certification}}$$

$$\dot{q}_{B,Low} = \dot{q}_{B,Low,Certification} \times \frac{\dot{q}_{CVP,F,Low}}{\dot{q}_{F,Low,Certification}}$$

$$P_{B,Low} = P_{B,Low,Certification} \times \frac{P_{CVP,F,Low}}{P_{F,Low,Certification}}$$

TABLE III–2—REGULATORY AND CVP CAPACITY AND ENERGY EFFICIENCY OF 10 VARIABLE SPEED CHPS

Unit No.	Test	Certification capacity (Btu/hr)	CVP capacity (Btu/hr)	Certification efficiency *	CVP efficiency *	%age difference in capacity	%age difference in efficiency
1	Cooling Full	22,515	25,343	13.2	11.6	−13	12
	Cooling Low	6,521	6,870	23.6	22.5	2	5
	Heating Full	18,853	18,659	2.0	2.0	1	0
	Heating Low	10,138	15,309	4.4	3.8	27	14
2	Cooling Full	18,614	17,423	15.0	15.2	6	−2
	Cooling Low	11,444	12,325	17.6	15.8	5	10
	Heating Full	10,787	15,961	2.3	2.1	−48	11
	Heating Low	9,837	10,591	3.7	2.5	7	32
3	Cooling Full	33,062	32,397	12.7	12.7	2	0
	Cooling Low	16,969	23,183	19.1	18.2	19	5
	Heating Full	19,038	19,120	2.0	2.1	0	−3
	Heating Low	16,373	20,290	4.9	4.3	21	13
4	Cooling Full	34,439	33,290	13.0	12.7	3	3
	Cooling Low	13,196	13,660	24.2	24.5	1	−1
	Heating Full	18,707	25,224	2.1	1.9	−35	11
	Heating Low	9,880	10,081	4.1	4.1	1	1
5	Cooling Full	22,655	21,477	13.5	13.8	5	−2
	Cooling Low	6,373	7,031	24.0	23.3	3	3
	Heating Full	19,415	18,423	2.1	2.0	5	3
	Heating Low	10,092	10,011	4.5	3.8	0	16
6	Cooling Full	21,668	22,734	12.7	12.1	−5	5
	Cooling Low	11,124	11,018	20.8	18.8	0	9
	Heating Full	12,992	22,441	2.6	1.9	−73	26
	Heating Low	9,197	10,934	5.2	4.5	13	13
7	Cooling Full	33,470	33,290	12.7	12.7	1	0
	Cooling Low	12,503	13,660	23.9	24.5	3	−2
	Heating Full	17,430	17,217	2.0	2.0	1	−1
	Heating Low	9,871	9,915	4.4	4.3	0	2
8	Cooling Full	35,324	38,800	13.7	13.4	−10	3
	Cooling Low	20,254	20,824	19.9	19.1	2	4
	Heating Full	37,690	37,498	2.4	2.4	1	0
	Heating Low	20,128	19,479	4.5	4.4	−2	2
9	Cooling Full	22,515	22,455	13.2	13.4	0	−2
	Cooling Low	6,521	6,602	23.6	18.3	0	22
	Heating Full	18,853	18,890	2.0	2.0	0	1
	Heating Low	10,138	10,199	4.4	3.9	0	12
10	Cooling Full	15215	14969	14.1	13.3	2	6
	Cooling Low	4,752	5,497	30.3	27.3	5	10
	Heating Full	20,509	18,824	2.2	2.1	8	6
	Heating Low	3,644	4,998	6.1	5.1	7	17

* EER2 for cooling tests (in Btu/hr/W), COP2 for heating tests.

The recalculated SEER2 for units 1, 3, 6, 9 and 10, are shown in table III–3, indicating that the highest difference between the recalculated (or adjusted) SEER2 was no greater than 9.7%. Unit 6 was in tolerance for both the full and low load intervals and the reduction in SEER2 using the adjusted values was 6.3%. Therefore, it was concluded that a maximum energy efficiency tolerance of 10% would be appropriate for CVP enforcement of variable capacity compressor systems.

TABLE III–3—COMPARISON OF RECALCULATED SEER2 WITH THE CERTIFIED SEER2 FOR UNITS THAT WERE OUT OF TOLERANCE ON CAPACITY AND/OR EFFICIENCY

Unit No.	Certified SEER2	Adjusted SEER2	%age difference between adjusted and certified SEER2
1	17.50	16.66	−4.9
3	17.02	16.22	−4.7
6	18.88	17.69	−6.3
9	17.51	15.81	−9.7
10	23.84	22.64	−5.0

For capacity, the tolerance of 6% was proposed in the April 2024 NOPR, as a result of discussions with stakeholders during development of appendix I of the AHRI 210/240–202X Draft and AHRI 1600–202X Draft. 89 FR 24206, 24243–24244. In appendix I of the AHRI 210/240–202X Draft and AHRI 1600–202X Draft, equations I2 and I3 show the calculation of the cooling virtual sensible load at outdoor conditions of 95 °F and 67 °F, respectively, and equations I9, I10, and I11 show the calculation of the heating virtual load at outdoor conditions of 5 °F, 17 °F, and 47 °F, respectively. Each of these equations provide a 3% factor on the cooling and heating full load and low load target virtual loads. Based on the data presented above in table III–2 and the discussions with relevant stakeholders during the development of appendix I of the AHRI 210/240–202X Draft, DOE has determined 6% as an appropriate tolerance for capacity measurements during the CVP test.

During development of the AHRI Standards, no counter data was presented by any of the stakeholders to suggest revising the tolerances of 6% on unit capacity, and 10% on unit efficiency, for CVP enforcement. DOE has also not received any CVP test data in response to the April 2024 NOPR to indicate that the proposed tolerances are not appropriate. Therefore, DOE is finalizing the aforementioned tolerances as part of the CVP enforcement provisions at 10 CFR 429.134(k).

Regarding delaying the CVP enforcement date so that stakeholders have sufficient time to conduct CVP testing and for DOE to wait for AHRI's CVP testing in 2025 to help inform the proposed capacity and efficiency tolerances, DOE notes that the CVP is not required as part of testing, and a manufacturer is currently required to certify the compressor and indoor blower speed at settings that represent normal operation for any variable capacity system. Therefore, some form of validation to determine the settings for normal operation should already be in place to allow the manufacturers to properly certify these settings. The CVP outlined in appendix I of AHRI 210/240–202X Draft and AHRI 1600–202X Draft is intended to standardize such a procedure. Hence, even if manufacturers wanted to prepare to conduct the CVP on their products to prepare for potential enforcement by DOE, the test burden is limited.

Regarding Rheem's comment on DOE delaying the enforcement of the FER metric for furnace fans, DOE clarifies that the FER metric was established as a regulatory metric, and is hence not comparable to the CVP procedure in appendix I of AHRI 210/240–202X Draft and AHRI 1600–202X Draft, which DOE intends to utilize only for the purposes of assessment and enforcement testing of variable-capacity compressor systems. As discussed, the enforcement provisions explain what DOE may do in the case of enforcement testing for CAC/HPs and are not a requirement for manufacturer testing. As such, DOE does not see reason to delay the CVP enforcement provisions from their current effective date, *i.e.,* 180 days after publication of this final rule in the **Federal Register**.

DOE considers that the proposed tolerances on capacity and energy efficiency, of 6 percent and 10 percent, respectively, are currently the most appropriate values based on the variable-speed test data analyzed by DOE. At this time, no additional data is available nor has been provided by stakeholders and, therefore, DOE is finalizing its proposals on the tolerances and is not establishing a delayed effective date for the CVP. DOE welcomes any additional CVP test data as it becomes available.

DOE agrees with GE Appliances' comment on the mismatch between the text and the equations in 10 CFR 429.134(k)(4)(iii)(B). (GE Appliances, No. 37 at p. 5) DOE`s intent was to maintain a one-sided tolerance on capacity and efficiency since the unit under enforcement should not be penalized for better performance during the CVP load interval, when compared to the corresponding certification test. Therefore, DOE is maintaining the equations on capacity tolerance evaluation, but it is making corrections to the text in 10 CFR 429.134(k)(4)(iii)(B) and 10 CFR 429.134(k)(4)(iii)(C) as follows (additions shown in *italics*, deletions shown in ~~strikethrough~~):

The measured capacity for each full-load interval, as evaluated per the CVP conducted in paragraph (k)(4)(i)(A) or paragraph (k)(4)(i)(B) of this section, shall ~~agree with the corresponding certification test within 6 percent~~ *be no more than 6 percent less than the corresponding certification test capacity*, as follows:

The measured capacity for each minimum-load interval, as evaluated per the CVP conducted in paragraph (k)(4)(i)(A) or paragraph (k)(4)(i)(B) of this section, shall ~~agree~~

In response to Rheem's comment (Rheem, No. 34 at p. 5) regarding the tolerances specified in section I5 in appendix I of AHRI 210/240–202X Draft and AHRI 1600–202X Draft being redundant, DOE clarifies that this tolerance was incorporated in order to determine if the variable-capacity compressor system under test met the stability requirements and subsequently determines the appropriate CVP test interval to be evaluated. Therefore, DOE disagrees with Rheem that this tolerance is redundant in the AHRI drafts.

~~with the corresponding certification test within 6 percent of the cooling or heating mode full-load certification test capacity~~ *be no more than 6 percent less than the corresponding certification test capacity*, as follows:

Similarly, DOE agrees with GE Appliances that a one-sided tolerance on efficiency will be appropriate. Therefore, DOE is maintaining the equations on efficiency tolerance evaluation, but it is making corrections to the text in 10 CFR 429.134(k)(4)(iii)(D), as follows (additions shown in *italics*, deletions shown in ~~strikethrough~~):

The measured efficiency for the full- and minimum-load interval, as evaluated per the CVP conducted in paragraph (k)(4)(i)(A) or paragraph (k)(4)(i)(B) of this section, shall ~~agree with the corresponding certification test within 10 percent~~ *be no more than 10 percent less than the corresponding certification test efficiency*, as follows:

(3) Clarification on Enforcement Provisions

Several commenters requested more clarity on the CVP enforcement provisions and made their own recommendations for some of the calculations and provisions proposed by DOE.

The Joint Advocates pointed to DOE's proposal for evaluation of CVP results when tolerances on capacity and energy efficiency are not met, and the control used for conducting CVP does not provide means for overriding compressor and indoor blower speeds (10 CFR 429.134(k)(4)(v)(B)) to adjust power measurements. (Joint Advocates, No. 30 at p. 2) In this case, the Joint Advocates commented that DOE proposed that power adjustment should be done by multiplication with the ratio of the efficiency measured during the CVP test interval divided by efficiency measured during the certification test (for the corresponding CVP interval). (*Id.*) The Joint Advocates noted that because of the 6-percent tolerance allowed for the full-load CVP interval-capacity measurements, the capacity ratio may not be equal to 1, and hence it may not be appropriate to use the ratio of efficiencies (EER2 or COP2, as applicable). (*Id.*) The Joint Advocates suggested that DOE consider adjusting power by multiplying the ratio of powers, as follows:

$$P_{B,Full,} = P_{B,Full,Certification} \times \frac{P_{CVP,A,Full}}{P_{A,Full,Certification}}$$

Additionally, the Joint Advocates pointed to the provisions in 10 CFR 429.134(k)(4)(v)(A) and (B)—where DOE proposed that for CVP tests for which capacity and efficiency tolerances are not met, the certification tests must be conducted by using the compressor speeds determined in the corresponding CVP test (or certification test results must be adjusted) and the certification tests will be used for calculating the unit's efficiency metrics. (*Id.* at p. 3) The Joint Advocates expressed concern that if the recalculated efficiency metric is compliant, but is lower than the value certified to DOE, this will result in a misleading efficiency rating and average energy cost printed on the FTC label. (*Id.*) The Joint Advocates pointed toward the rerate and recertify provision [63] for VRF multi-split air conditioners and heat pumps (''VRF

[63] In the October 2022 VRF Final Rule, DOE specifies that if a manufacturer becomes aware that any of the certified operational settings for the critical parameters are determined to be invalid according to the results of a CVP, whether that CVP be performed by the manufacturer or another party, the manufacturer would be required to recertify the operational settings of those critical parameters for all affected basic models, as well as rerate and recertify the affected basic models.

multi-split systems''), which was specified by DOE in a final rule on October 20, 2022, suggesting that a similar provision should be adopted for CAC/HPs (''October 2022 VRF Final Rule''). 87 FR 63894.

In response to the Joint Advocates' comment on adjustment of power of certification tests for which a corresponding CVP interval did not exist, DOE did an analysis on an example case for a variable-capacity CAC unit. DOE assumed that for a hypothetical variable-capacity compressor 3-ton CAC unit, with a certified $EER2_{A,Full}$ of 12, the capacity at B_{Full} condition was 40,000 Btu/hr, and the $EER2_{B,Full}$ was 15. It was assumed that after conducting the CVP on the unit, the value of the EER2 measured using the full-load CVP test dropped to 11.28, as shown in table III.4. DOE then evaluated the capacity and power at the B_{Full} condition—the power was adjusted by using the energy efficiency ratios first, as proposed by DOE in the April 2022 CAC NOPR, and was separately adjusted by using the power ratios, as suggested by the Joint Advocates.

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Table III-4 Evaluating the Capacity and Power Measurement Adjustments for Certifications Tests with No CVP Interval, in the Event that CVP Tolerances Are Not Met

Certification test values			
$\dot{q}_{A,Full,Certification}$	36,000 Btu/h		
$P_{A,Full,Certification}$	3,000 W		
$EER2_{A,Full,Certification}$	12.0 Btu/Wh		
$\dot{q}_{B,Full,Certification}$	40,000 Btu/h		
$P_{B,Full,Certification}$	2,667 W		
$EER2_{B,Full,Certification}$	15.0 Btu/Wh		
CVP test values			
$\dot{q}_{CVP,A,Full}$	33,840 Btu/h		
$P_{CVP,A,Full}$	3,000 W		
$EER2_{CVP,A,Full}$	11.28 Btu/Wh		
Adjustments of power and energy efficiency using energy efficiency ratios			
$\dot{q}_{B,Full} = \dot{q}_{B,Full,Certification} \times \frac{\dot{q}_{CVP,A,Full}}{\dot{q}_{A,Full,Certification}}$	3,7600 Btu/hr	$\frac{\dot{q}_{B,Full} - \dot{q}_{B,Full,Certification}}{\dot{q}_{B,Full,Certification}} \times 100$	-6.0%
$P_{B,Full} = P_{B,Full,Certification} \times \frac{EER2_{CVP,A,Full}}{EER2_{A,Full,Certification}}$	2,837 W	$\frac{P_{B,Full} - P_{B,Full,Certification}}{P_{B,Full,Certification}} \times 100$	-6.4%
$EER2_{B,Full} = \frac{\dot{q}_{B,Full}}{P_{B,Full}}$	13.25	$\frac{EER2_{B,Full} - EER2_{B,Full,Certification}}{EER2_{B,Full,Certification}} \times 100$	-11.6%
Adjustments of power and energy efficiency using power ratios			
$\dot{q}_{B,Full} = \dot{q}_{B,Full,Certification} \times \frac{\dot{q}_{CVP,A,Full}}{\dot{q}_{A,Full,Certification}}$	3,7600 Btu/hr	$\frac{\dot{q}_{B,Full} - \dot{q}_{B,Full,Certification}}{\dot{q}_{B,Full,Certification}} \times 100$	-6.0%
$P_{B,Full} = P_{B,Full,Certification} \times \frac{P_{CVP,A,Full}}{P_{A,Full,Certification}}$	2,667 W	$\frac{P_{B,Full} - P_{B,Full,Certification}}{P_{B,Full,Certification}} \times 100$	0.0%
$EER2_{B,Full} = \frac{\dot{q}_{B,Full}}{P_{B,Full}}$	14.10 W	$\frac{EER2_{B,Full} - EER2_{B,Full,Certification}}{EER2_{B,Full,Certification}} \times 100$	-6.0%

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DOE observed that adjusting the power using the energy efficiency ratios resulted in the certification and CVP values for energy efficiency being out of tolerance, *i.e.,* −11.6 percent, whereas adjusting the power using the power ratios resulted in this difference being −6 percent. Additionally, DOE revisited its analysis of the regulatory and CVP test data of the 10 variable-speed CHPs that was used to develop the 6-percent tolerance on capacity and 10-percent tolerance on efficiency, as explained in section III.I.2.b.(2) of this document. DOE observed that for one of the units, the power ratio adjusted $EER2_{B,Low}$ value was only 5.9 percent lower than the actual EER2 for the B_{low} CVP test, , but the efficiency ratio adjusted $EER2_{B,Low}$ was 26 percent higher than

the . DOE realizes that using the efficiency ratios to adjust power measurements may result in inflated energy efficiencies of the variable-capacity compressor units that DOE will run a CVP on. Therefore, DOE is adopting the proposed revision by the Joint Advocates and modifying the equations at 10 CFR 429.134(k)(4)(v)(B) that are used to adjust the power measurements for certification tests requiring adjustment with no CVP interval (any required certification test other than A_{Full}, F_{Low}, $H1_{Low}$, $H3_{Full}$, and $H4_{Full}$), as follows:

Cooling full power:

$$P_{B,Full} = P_{B,Full,Certification} \times \frac{P_{CVP,A,Full}}{P_{A,Full,Certification}}$$

Cooling minimum power:

$$P_{B,Low} = P_{B,Low,Certification} \times \frac{P_{CVP,F,Low}}{P_{F,Low,Certification}}$$

Heating minimum power:

$$P_{H0,Low} = P_{H0,Low,Certification} \times \frac{P_{CVP,H1,Low}}{P_{H1,Low,Certification}}$$

Regarding the Joint Advocates' recommendation to establish a rerate and recertify provision similar to the one in the October 2022 VRF Final Rule (*see* § 429.43(b)(5)), DOE notes that if a variable-capacity compressor system meets the minimum standards after the CVP assessment or enforcement, but the recalculated metric is lower than the value certified to DOE, DOE may choose to take enforcement action regarding invalid certification of the basic model. At this time, DOE is not adopting the rerate and recertify provision but may consider inclusion in a future certification rulemaking.

In response to the CVP enforcement provisions, Rheem requested several clarifications and made its own recommendations, including some changes and corrections to the finalized standards, AHRI 210/240–2024 and AHRI 1600–2024.

Rheem requested clarification from DOE on the provisions in 10 CFR 429.134(k)(4)(iii)(B) and (D). 89 FR 24206, 24259. (Rheem, No. 34 at p. 6) Rheem noted that at 10 CFR 429.134(k)(4)(iii)(B) and (D), DOE proposed maximum allowable tolerances between the heating capacity and heating efficiency measured during the full-load interval of the CVP and the corresponding certification test. (*Id.*) Rheem commented that the proposed regulatory text in the section reads as if the full-load interval of the heating mode CVP must be conducted at both 17 °F and 5 °F, while section I4.2.1 of AHRI 210/240–2024 and AHRI 1600–2024 does not require full-load interval of the heating CVP to be conducted at both 17 °F and 5 °F for all heat pumps. (*Id.*) Additionally, Rheem noted that in 10 CFR 429.134(k)(4)(i)(C), DOE proposed that the CVP will be allowed to be terminated without conducting the minimum load interval if, according to 10 CFR 429.134(k) (4)(ii)(B), a system is determined to be a variable-capacity certified, single-capacity system. 89 FR 24206, 24258. (Rheem, No. 34 at p. 6) Rheem commented that it interprets this provision to mean that in such a case, capacity, and energy efficiency tolerance at low-load intervals, as per 10 CFR 429.134(k)(4)(iii)(C) and (D), will not be necessary. (*Id.*) In 10 CFR 429.134(k)(v)(B), Rheem noted that DOE proposed to use the capacity slope factor (''CSF'') and power slope factor (''PSF'') for extrapolating an ''adjusted'' heating capacity and heating power consumption at H3 (17 °F outdoor dry bulb temperature) test condition when the compressor is operating at low stage, using the system's measured performance during the heating mode CVP's low-load interval. (*Id.*) 89 FR 24206, 24260–24261. Rheem commented that the values of CSF and PSF will be adopted from AHRI 210/240–2024 or from section 3.6.4.1(b) of the current appendix M1, and it questioned their accuracy for low-speed compressor operation, since they were derived for compressor operation at full speed. (Rheem, No. 34 at p. 6) In its comment, Rheem also questioned the extrapolation using these CSF and PSF values for minimum-speed-limiting heat pumps, as defined [64] in AHRI 210/240–2024 and AHRI 1600–2024. (*Id.*) Finally, Rheem pointed to a typographical error in sections I4.3.1.4 of AHRI 210/240–2024 and AHRI 1600–2024, and it made suggestions for correcting it.[65] (*Id.*) Rheem commented that since no indoor entering wet bulb temperature is prescribed for any of the load and transition intervals of the heating CVP, corrections should be made in section I5.1 and section I5.1.3 of AHRI 210/240–2024 and AHRI 1600–2024 to reflect that any tolerances on indoor entering wet bulb temperatures should only be applicable to the cooling mode CVP tests. (*Id.* at p. 7)

In response to Rheem's comments, DOE clarifies that since the CVP for enforcement will be carried out as per appendix I of the AHRI 210/240 and AHRI 1600 standards, the full-load interval of the heating mode CVP at 5 °F will only be enforced for those CHPs that have reported regulatory

[64] Minimum-speed-limiting variable-speed HPs are defined at section 3.2.32 of AHRI 210/240–202X Draft and 3.2.31 of AHRI 1600–202X Draft as: A *heat pump* for which the minimum compressor speed (represented by revolutions per minute or motor power input frequency) is higher than its minimum value for operation in a 47 °F ambient temperature for any bin temperature *tj* for which the calculated heating load is less than the calculated intermediate-speed capacity.

[65] Rheem suggested that either the phrase ''. . . where the range of capacity does not vary by more than 15 percent'' should be deleted fully, or the words ''. . . does not vary'' should be replaced with the word ''varies,'' since the AHRI USE STC's intent when developing this requirement was to encapsulate systems that cycle on/off, instead of modulating between compressor speeds/stages.

performance at the $H4_{full}$ test, while the CVP at 17 °F will be carried out for all CHPs, including units for which performance at $H4_{full}$ conditions has not been reported. Additionally, DOE clarifies that for systems that are determined to be variable-capacity certified, single-capacity systems, as per 10 CFR 429.134(k) (4)(ii)(B), there will be no need to conduct the minimum load interval, and therefore, Rheem's understanding that capacity and energy efficiency tolerance at low load intervals, as per 10 CFR 429.134(k)(4)(iii)(C) and (D), will not be applicable, is correct. Regarding Rheem's comment on the use of CSF and PSF values from the AHRI standards, DOE notes that it has not received any test data from stakeholders that would indicate that the use of these slope factors is inaccurate at low compressor speed tests. In the absence of any test data, DOE is maintaining the CSF values of 0.0204/°F for split systems and 0.0262/°F for single-package units, and PSF value of 0.00455/°F, as per the April 2024 NOPR, to extrapolate an adjusted heating capacity and heating power consumption at H3 (17 °F) test conditions when the compressor is operating at low stage, using tested system performance during the heating CVP's low load interval. The CSF and PSF values are used for extrapolation at the $H3_{Low}$ test condition capacity and heating power consumption only for Variable Capacity Certified, Two Capacity Systems, when the control device for conducting the CVP and certification tests does not meet the requirements of monitoring and adjustment of the compressor speed and indoor blower speed, as outlined in 10 CFR 429.134 (k)(4)(v)(A).

In response to Rheem's comment on questioning this extrapolation for minimum-speed-limiting heat pumps, no evidence has been provided by Rheem to argue that the current CSF and PSF values may be inexact for the aforementioned extrapolation. However, DOE recognizes the concern raised by Rheem, and notes that systems determined to be Variable Capacity Certified, Two Capacity Systems, after conducting the CVP, will not be subject to extrapolation using the minimum speed limiting heat pump adjustments, as per equations 11.189 to 11.194 of AHRI 210/240–2024 when tested in accordance with appendix M1, and per equations 11.199 to 11.204 of AHRI 1600–2024, when tested in accordance with appendix M2. Additionally, DOE clarifies that there are no typographical errors in sections I4.3.1.4 of AHRI 210/240 and AHRI 1600—the phrase ''. . . where the range of capacity does not vary by more than 15 percent'' is referring to the range of capacity the unit can modulate from its high-/on-capacity value and is therefore consistent with the intent of this section. Regarding Rheem's comment on tolerances on indoor entering wet bulb temperature and indoor leaving wet bulb temperature (in sections I5.1 and I5.1.3, respectively) in AHRI 210/240 and AHRI 1600, being applicable to cooling mode CVP tests only, DOE agrees, and it is making amendments at 10 CFR 429.134(k)(4)(iii)(A) as follows (additions shown in *italics*):

The data collected in the CVP per paragraph (k)(4)(i)(A) or paragraph (k)(4)(i)(B) of this section shall be evaluated for the duration of the individual CVP full or minimum load interval, excluding the preliminary 30 minutes of equilibrium data, to determine compliance with test condition tolerances and test operating tolerances listed in section I5.1 of appendix I of AHRI 210/240–2024 (incorporated by reference, *see* § 429.4) (if testing in accordance with appendix M1); or of AHRI 1600–2024 (incorporated by reference, see § 429.4) (if testing in accordance with appendix M2), *with the exception that the indoor entering wet bulb deviation in section I5.1 and test operating tolerance in section I5.1.3 are applicable only for cooling mode CVP.*

JCI also requested clarity on various aspects of the CVP enforcement provisions. (JCI, No. 35 at pp. 2–3). In particular, JCI expressed concern about systems that utilize variable-capacity compressors rated as ''coil only'' systems and ''certified'' to DOE as variable-capacity systems, but which are rated and tested per two-speed test procedures.[66] (*Id.*) JCI asserted that its concern stems from the broad definition of variable-capacity systems in AHRI 210/240–2024.[67] (*Id.*) JCI commented that according to its interpretation, if such a system is certified to DOE as a multi- or variable-stage design but is tested to the coil-only two-stage test procedure, then the system is subject to CVP test requirements. (*Id.*)

In a similar vein, JCI requested clarification on whether such systems, classified as OUWNMs (since they are sold in commerce without matching indoor units), would be subject to rating and testing per the CVP requirements. (JCI, No. 35 at pp. 2–3) Finally, JCI requested for clarification on whether DOE-certified, two-stage systems that have discrete fixed capacities and airflow rates, but are equipped with variable-capacity compressors, will be subject to the CVP enforcement or not. (*Id.* at p. 3)

In response to JCI's comment regarding the variable-speed coil-only (''VSCO'') test provisions in the October 2022 CAC TP Final Rule, DOE clarifies that once the revised appendix M1 and the new appendix M2 are finalized, the VSCO test provisions for non-communicating and communicating systems in the current appendix M1 will be sunset. This is because these provisions are not part of the AHRI 210/240 and AHRI 1600 standards, which are the basis of the revised appendix M1, and new appendix M2, respectively. Therefore, all VSCO systems will be certified and tested as variable-capacity compressor systems, and DOE may conduct the CVP on such units, to see if they comply with the variable-speed definition. JCI's question regarding OUWNMs is unclear—however, DOE clarifies that the CVP is applicable to all variable-speed systems, and therefore, if such systems are certified as variable-speed systems, they will be subject to CVP enforcement. Finally, DOE clarifies that the CVP enforcement is applicable only to systems that are certified as variable-capacity compressor systems, as defined in section 3.2.80 of AHRI 210/240–2024 and AHRI 1600–2024. Therefore, any systems that are certified as two-capacity (or two-stage) systems, as defined in section 3.2.76 of AHRI 210/240–2024 and AHRI 1600–2024, will not be subject to CVP enforcement by DOE.

GE Appliances supported the addition of a CVP for enforcement testing of variable-speed systems, but it commented that a number of lingering issues require resolution before DOE utilizes the CVP for enforcement testing.

[66] In the October 2022 CAC Final Rule, DOE defined ''variable-speed communicating coil-only central air conditioner or heat pump'' and ''variable-speed non-communicating coil-only central air conditioner or heat pump.'' 87 FR 64550,64589. DOE's understanding is that JCI is referring to non-communicating variable-speed coil-only (''VSCO'') CAC/HPs in their comment, since the October 2022 CAC Final Rule established a two-stage test procedure for non-communicating VSCO CAC/HPs. 87 FR 6450, 64591–64597. Such systems will only be tested using an on-off control signal and will not have any tests at intermediate speeds. *Id.*

[67] AHRI 210/240–2024 section 3.2.81 defines Variable Capacity System (Variable Capacity Air-conditioner or Variable Capacity Heat Pump): an air-conditioner or heat pump that has either a) a variable capacity compressor, or b) a digital compressor, and that controls the system by monitoring system operation and automatically modulating the compressor output, indoor airflow, and other system parameters as required in order to maintain the indoor room temperature.

(GE Appliances, No. 37 at p. 4) GE Appliances also commented that additional test data is required for validation of some provisions proposed by DOE in the April 2024 NOPR. (*Id.*) GE Appliances commented that the AHRI 210/240 standard specifies that the CVP tests should be done either with a proprietary control or with a simulated thermostat control, but it requested that DOE clarify when a control is considered proprietary, since multiple types of control systems are available, including those with hybrid control capability.[68] (*Id.* at pp. 5–6)

In response to GE Appliances, DOE clarifies that the differences between a proprietary control and simulated (generic) thermostat were discussed in detail with the stakeholders during the development of the AHRI 210/240 and AHRI 1600 standards. It is DOE's understanding and intent for implementation of the CVP that the ''control'' is the device that senses temperature in the conditioned space, has a user interface that allows setting of a desired space temperature (the ''set point''), and provides a signal or communication to the CAC or HP system that initiates system operation and/or steps or level of operation to reduce the gap between the temperature and the set point. Accordingly, as per the example scenario presented by GE Appliances in their comment, an adapter[69] provided as part of the system or specified for installation that allows the basic model to connect with any generic (non-proprietary) thermostat is not the ''control.'' In the case in which such an adapter allows a generic thermostat to be installed in the conditioned space, the generic thermostat is the control, and the simulation of the generic thermostat (as described in section I3.1 of AHRI 210/240–2024 and AHRI 1600–2024) would be used. Only when the device measuring the space temperature and providing user input to adjust the set point is proprietary would installation of the proprietary device for the test be used. Any system having a ''hybrid'' control approach that could use either a generic or proprietary ''control'' would be tested using the generic approach.

[68] GE Appliances gave an example of hybrid control where an adaptor can be connected to a 24–V thermostat and variable-speed communicating equipment. For such control systems, the thermostat sends an on/off signal, and the adaptor then decides the set point temperature during unit operation.

[69] DOE would like to clarify that if the adapter is an integral part of every unit shipped without a proprietary control that would otherwise not operate, the adapter would be connected to the simulated thermostat signal.

LG also made several comments in response to the CVP enforcements proposed by DOE in the April 2024 NOPR. 89 FR 24206, 24258–24261. LG pointed out that as per the CVP, the indoor room's set point is controlled according to the virtual load approach, in which the range of temperature difference between the thermostat set point and the indoor room condition during the proposed CVP test is 0–3 °F. (LG, No. 38 at pp. 1–2) LG questioned whether the virtual load is appropriate for variable-capacity systems that do not operate at minimum speed when the indoor room temperature is not close to the thermostat set point. (*Id.*) LG further expressed concern that the term ''certification'' test was not fully specified, as it could mean either (1) the tested value of the certification test, or (2) the value of the enforcement test conducted under the same conditions as the certification test. (*Id.* at p. 2) LG commented that if the ''certification'' test was (1), it requests clarification if this would be a mean value of the two or more tested samples. (*Id.*) However, if it was (2), then LG requested that DOE provide more information on sample size and election.[70] (*Id.*) Finally, LG recommended that due to existing deviations during testing, instead of comparing the CVP test values with the certification test values during enforcement, they should be compared to values provided by the manufacturer in the DOE database.[71] (*Id.*)

In response to LG's comment, DOE clarifies that the return air temperature equation in appendix I of AHRI 210/240–2024 is a function of the previous return air temperature target, *RAT(t),*time, the calculated virtual load (VL_s for cooling mode CVP, and *VL* for heating mode CVP) at target outdoor ambient dry-bulb temperature T_j, measured unit capacity, and a thermal mass constant, *C.* The difference between the thermostat set-point and indoor room dry-bulb temperature is dependent on the unit control and operation. The virtual load and return air temperature equations ensure the temperature difference between the thermostat set-point and indoor room dry-bulb temperature are within 1 °F for systems that control the unit properly. The difference between the thermostat set-point and indoor room dry-bulb temperature could reach 3 °F only if the unit could not achieve the virtual load target capacity at each test interval.

[70] Currently, 10 CFR 429.16 (b)(3) describes the sampling plan for enforcement of CAC/HPs.

[71] DOE's interpretation is that LG is referring to the Compliance Certification Database, available at *www.regulations.doe.gov/ccms.*

Further, DOE clarifies that ''the corresponding certification test'' refers to an enforcement test conducted in accordance with appendix M1 or appendix M2, as applicable. The sample size of the selected units will be in accordance with provisions in 10 CFR 429.110. Finally, DOE clarifies that during the CVP enforcement, comparisons of the CVP full and minimum load intervals will be made to the certification test conducted just before the CVP tests.

Carrier requested clarity from DOE on determining variable-speed unit operation when the intermediate tests do not show satisfactory variable-speed characteristics. (Carrier, No. 29 at p. 2) Specifically, Carrier commented that it was unclear on whether DOE's proposal on a system's cycling between stages is an accurate way of determining it is a single-capacity versus a two-capacity system, if the intermediate CVP requirement is not met. (*Id.*)

In response to Carrier's comment, DOE clarifies that 10 CFR 429.134(k)(4)(C)(ii)(B) and (k)4)(C)(ii)(C) state that after conducting the CVP enforcement tests, the unit under test will be determined to be a variable-capacity certified, single-capacity system, or a variable-capacity certified, two-capacity system, on the basis of the test results as per appendix I of AHRI 210/240 and AHRI 1600 (*see* section III.E.1 of this document for details). DOE reiterates that this determination, on whether a system is single capacity or two capacity, on the basis of its cycling between off and single-stage/capacity level and cycling between more than one stage/capacity level, respectively, represents industry consensus on this matter. This is because this determination was discussed and agreed upon with AHRI and all other stakeholders, during development of appendix I of the AHRI 210/240 and AHRI 1600 standards.

J. Test Procedure Costs and Impacts

EPCA requires that test procedures proposed by DOE not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) As discussed, DOE is updating the current Federal test procedure for CAC/HPs at appendix M1 consistent with the relevant industry consensus test procedure, AHRI 210/240–2024. DOE is also establishing a new Federal test procedure at 10 CFR part 430, subpart B, appendix M2, consistent with the new industry consensus test procedure, AHRI 1600–2024. Appendix M2 would not be required for use until the compliance date of amended standards for CAC/HPs. DOE is also amending its

representation and enforcement provisions for CAC/HPs.

1. Appendix M1

In the April 2024 NOPR, DOE proposed to incorporate by reference AHRI 210/240–202X Draft and relevant industry standards referenced in AHRI 210/240–202X Draft at appendix M1. 89 FR 24206, 24244. DOE also proposed to amend certain provisions for representations and enforcement in 10 CFR part 429, consistent with the changes proposed to the test procedure. *Id.* DOE noted that the proposed revisions to appendix M1 would retain the current efficiency metrics (*i.e.,* EER2, SEER2, and HSPF2). *Id.* DOE walked through the anticipated compliance costs associated with the proposed test procedure at appendix M1 and tentatively determined that proposed amendments would not result in an increase in testing cost relative to the current test procedure. *Id.* DOE also tentatively concluded that the proposed revisions to the test procedure in appendix M1 would not change efficiency ratings for CAC/HPs, and therefore would not require retesting or redesign solely as a result of DOE's adoption of the proposed amendments to the DOE test procedure, if made final. *Id.* DOE requested comment on these tentative determinations under Issue 5 of the April 2024 NOPR. *Id.*

In response, Lennox was supportive of DOE's tentative determinations, commenting that it believes the proposed appendix M1 amendments in the April 2024 NOPR should result in a test procedure that is not unduly burdensome to conduct, consistent with EPCA statutory requirements. (Lennox, No. 24 at p. 6) While less supportive overall, Carrier commented that it agrees the proposed amendments to appendix M1 in the April 2024 NOPR would not result in any retesting or any increase in testing cost for a typical CAC/HP. (Carrier, No. 29 at p. 5) In addition, Carrier asserted that test costs and burden would increase, however, for certain products as a result of the proposed CVP- and CCHP-related provisions. (*Id.*)

In addition to Carrier, Rheem and LG were also less supportive of DOE's tentative determinations, citing the additional test costs and burden associated with CVP testing. (Carrier, No. 29 at p. 5; LG, No. 38 at p. 3; Rheem, No. 34 at p. 7) More specifically, Rheem commented that additional costs associated with the proposed test procedure will stem from modifications to psychrometric test cells in order to comply with the CVP. (Rheem, No. 34 at p. 7) LG commented that an extensive amount of time and associated costs are necessary to conduct CVP testing. (LG, No. 38 at p. 3) LG asserted that, in addition to 30 minutes of stabilization time, it takes a minimum of 11.5 hours and a maximum of 20.5 hours for the cooling CVP test, and a minimum of 16.5 hours and a maximum of 28.5 hours for the CCHP heating CVP test, resulting in third-party testing costs between 13,000 and 24,000 U.S. dollars. (*Id.*)

In response to the Carrier, Rheem, and LG comments regarding additional test costs and burden associated with the CVP, DOE reiterates that the proposed CVP for variable-capacity compressor systems in appendix I of AHRI 210/240–2024 is not mandatory for manufacturers to perform. In the April 2024 NOPR, DOE also noted that, to the extent that a manufacturer has not already verified the appropriateness of the fixed performance during regulatory tests as compared to native control operation (*i.e.,* the system may currently be improperly certified), a manufacturer may need to adjust fixed-speed overrides used in regulatory tests in accordance with the CVP and subsequently rerun the regulatory tests. 89 FR 24206, 24244–24245. However, having no strong evidence to the contrary, DOE noted it expects that current variable-capacity certifications are generally consistent with system performance. *Id.* As such, DOE concluded that any such cost to verify performance and potentially retest is negligible. *Id.*

In response to Carrier's comment regarding additional test costs and burden associated with CCHP provisions (*i.e.,* the required $H4_2$ test for products claimed as CCHPs), DOE reiterates that a manufacturer's claim of CCHP status for its product is optional. 89 FR 24206, 24244–24245. DOE also reiterates that it anticipates products choosing to certify as CCHPs are most likely to be already testing at the 5 °F condition, and hence have no added costs or test burden associated with them. *Id.*

In this final rule, DOE is updating the incorporation by reference to AHRI 210/240–2024, the finalized version of AHRI 210/240–202X Draft. DOE is also referencing the relevant industry standards referenced in AHRI 210/240–2024 at appendix M1. As noted earlier, there are no substantial differences between AHRI 210/240–2024 and AHRI 210/240–202X Draft. As such, DOE's assessment of test procedure costs for appendix M1 are consistent with the April 2024 NOPR.

DOE has determined that the amendments to appendix M1 and the representation and enforcement provisions would improve the representativeness, accuracy, and reproducibility of the test results and would not be unduly burdensome for manufacturers to conduct. DOE has determined that the amendments would not result in an increase in testing cost from the current test procedure. The revisions to the test procedure in appendix M1 for measuring EER2, SEER2, and HSPF2 per AHRI 210/240–2024 would not increase third-party laboratory testing costs per unit relative to the current DOE test procedure. DOE estimates the current costs for physical testing, including off mode testing, to range from $10,800 to $19,800, depending on the configuration of the CAC/HP (single-stage, two-stage, variable-capacity). Further, DOE has concluded that the revisions to the test procedure in appendix M1 would not change efficiency ratings for CAC/HPs, and therefore would not require retesting or redesign solely as a result of DOE's adoption of the proposed amendments to the DOE test procedure.[72]

2. Appendix M2

In the April 2024 NOPR, DOE proposed to incorporate by reference AHRI 1600–202X Draft and relevant industry standards referenced in AHRI 1600–202X Draft at appendix M2. 89 FR 24206, 24245. DOE also proposed to establish provisions for determining SCORE and SHORE, the new efficiency metrics applicable to appendix M2. *Id.* DOE walked through the anticipated compliance costs associated with the proposed test procedure at appendix M2 and tentatively determined that proposed amendments would not result in an increase in testing cost relative to the current test procedure. *Id.* DOE tentatively concluded that the proposed revisions to the test procedure in appendix M2 would change efficiency ratings for CAC/HPs—however, DOE noted testing and recertification based on appendix M2 would not be required until DOE adopts any amended CAC/HP standards in terms of the new metrics in a future energy conservation standards rulemaking. *Id.* DOE requested comment

[72] Manufacturers are not required to perform laboratory testing on all basic models. In accordance with 10 CFR 429.16, CAC/HP manufacturers may elect to use AEDMs. An AEDM is a computer modeling or mathematical tool that predicts the performance of non-tested basic models. These computer modeling and mathematical tools, when properly developed, can provide a means to predict the energy usage or efficiency characteristics of a basic model of a given covered product or equipment and to reduce the burden and cost associated with testing.

on these tentative determinations under Issue 6 of the April 2024 NOPR. *Id.*

In response, Lennox was supportive of DOE's tentative determinations, commenting that it believes the proposed appendix M2 in the April 2024 NOPR should result in a test procedure that is not unduly burdensome to conduct, consistent with EPCA statutory requirements. (Lennox, No. 24 at p. 6) Carrier agreed that the proposed appendix M2 in the April 2024 NOPR would not result in any increase in testing cost for a typical CAC/HP from the proposed appendix M1. (Carrier, No. 29 at p. 6) Rheem commented that it is not aware of available data to support the use of a different cost basis for appendix M2 testing. (Rheem, No. 34 at p. 7)

In this final rule, DOE is updating the incorporation by reference to AHRI 1600–2024, the finalized version of AHRI 1600–202X Draft. DOE is also referencing the relevant industry standards referenced in AHRI 210/240–2024 at appendix M1. As noted earlier, there are no substantial differences between AHRI 1600–2024 and AHRI 1600–202X Draft. As such, DOE's assessment of test procedure costs for appendix M2 are consistent with the April 2024 NOPR.

DOE has determined that the amendments to appendix M2 and the representation and enforcement provisions would improve the representativeness, accuracy, and reproducibility of the test results and would not be unduly burdensome for manufacturers to conduct. DOE has determined that the amendments would not result in an increase in testing cost from the current test procedure. The revisions to the test procedure in appendix M2 for measuring EER2, SCORE, and SHORE per AHRI 1600–2024 would not increase third-party laboratory testing costs per unit relative to the current DOE test procedure. DOE estimates the current costs for physical testing to range from $10,800 to $19,800, depending on the configuration of the CAC/HP (single-stage, two-stage, variable-capacity). DOE has concluded that the proposed revisions to the test procedure in appendix M2 would change efficiency ratings for CAC/HPs—however, testing and recertification based on appendix M2 would not be required until DOE adopts any amended CAC/HP standards in terms of the new metrics in a future energy conservation standards rulemaking.

K. Effective, Compliance, and Other Required Use 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 an amended test procedure, beginning 180 days after publication of the final rule in the **Federal Register**. (42 U.S.C. 6293(c)(2)) However, CAC/HPs are not required to be tested according to the test procedure in appendix M2 (that relies on the SCORE and SHORE metrics) until the compliance date of amended energy conservation standards denominated in terms of SCORE and SHORE, should DOE adopt such standards.

EPCA provides an allowance for individual manufacturers to petition DOE for an extension of the 180-day period if the manufacturer may experience undue hardship in meeting the deadline. (42 U.S.C. 6293(c)(3)) To receive such an extension, petitions must be filed with DOE no later than 60 days before the end of the 180-day period and must detail how the manufacturer will experience undue hardship. (*Id.*) 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 430.27(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 adopted in this document pertain to issues addressed by waiver granted to Samsung (88 FR 36558, Case No. 2022–009), as discussed in section III.E.4 of this final rule. To the extent that such interim waiver permits the petitioner to test according to an alternate test procedure to appendix M1, the interim waiver will terminate on the date the amendments to the appendix M1 test procedure take effect (*i.e.,* 180 days after publication of the test procedure final rule in the **Federal Register**).

Notably, the amendments adopted in this final rule do not pertain to issues addressed by the interim waiver granted to Johnson Controls Inc. (''JCI'') (88 FR 72449, Case No. 2023–005) This interim waiver permits JCI to test certain basic models of CAC/HPs that use variable-speed, oil-injected scroll compressors (''VSS systems'') with a 72-hour break-in period, in lieu of the 20-hour break-in limit prescribed in appendix M1. (*Id.*) The 72-hour break-in period permitted to the specific VSS systems listed in JCI's interim waiver is unique to the CAC/HP market, and DOE continues to assess whether there is a generalizable need for an extended break-in period for certain VSS systems beyond the specific basic models subject to the interim waiver granted to JCI. As such, DOE is not amending the test procedure to address the issues presented in the interim waiver granted to JCI at this time. To the extent the interim waiver permits JCI to test according to an alternate test procedure to appendix M1, the interim waiver will terminate on the date testing is required according to appendix M2, which will occur on the compliance date for updated efficiency standards. DOE notes that JCI may petition for another waiver at the time testing is required according to appendix M2.

Additionally, as discussed in section III.E.7 of this final rule, DOE recognizes that stakeholders have requested clarification regarding the interaction of EPA's refrigerant regulations and DOE's certification and rating requirements for CAC/HPs. See table III–5 for a consolidated summary of the interaction of DOE's OUWNM certification and rating requirements under the EPA regulations timeline.

TABLE III–5—SUMMARY OF CERTIFICATION AND RATING REQUIREMENT TIMELINES

Indoor or outdoor unit manufactured or imported	Distributed as	Outdoor units with >700 GWP refrigerant	Indoor units with >700 GWP refrigerant
Before 1/1/2025	Matched System	Per EPA, matched systems can be installed prior to January 1, 2026 as long as they were manufactured prior January 1, 2025.	
	.....	Must be certified/rated in combinations with indoor units as distributed in commerce before 1/1/2025 and the matched system must comply with applicable standard; *i.e.,* do not need to be certified/rated as OUWNM.	Must be certified/rated in combinations with outdoor units distributed in commerce before 1/1/2025 and the matched system must comply with the applicable standard.
	Indoor Unit or Outdoor Unit.	Per EPA, indoor and outdoor units can also be installed as replacement units on or after January 1, 2025.	
On or after 1/1/2025	Matched System	Per EPA, matched systems can no longer be installed on or after January 1, 2026.	
	Indoor Unit or Outdoor Unit.	Per EPA, indoor and outdoor units can be installed only as replacement units on or after January 1, 2026.	
		Must be certified/rated and as OUWNM and comply with the applicable standard. Re-certification/rerating required if previous ratings were matched combinations. No new certification of matched systems allowed.	Must be certified/rated in combinations with outdoor units distributed in commerce before 1/1/2025 and the matched system must comply with the applicable standard. No new certification of matched systems allowed.

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 this 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 this rulemaking will not have a significant impact on a substantial number of small entities. Compliance with this test procedure is not required unless and until new energy conservation standards are established for covered CAC/HPs—accordingly, there are no compliance costs stemming directly from this rulemaking.

Still, although it is not required, DOE has undertaken a review of CAC/HP small business manufacturers and, in the following, is presenting the costs that those business may expect if testing on the basis of this test procedure were required in the future.

1. Estimated Number of Small Entities

For the April 2024 NOPR, DOE conducted a focused inquiry into small business manufacturers of the products covered by this rulemaking. DOE used the SBA's small business size standards to determine whether any small entities would be subject to the requirements of the rule. The size standards are listed by North American Industry Classification System (''NAICS'') code as well as by industry description and are available at *www.sba.gov/document/support-table-size-standards.* Manufacturing CAC/HPs is classified under NAICS 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 as a small business for this category. DOE used available public information to identify potential small manufacturers. DOE accessed the Compliance Certification Database [73] (''CCD''), the Modernized Appliance Efficiency Database System [74] (''MAEDbS''), and the National Resources Canada database [75] (''NRCan'') to create a list of companies that import or otherwise manufacture the products covered by this final rule. Once DOE created a list of potential manufacturers, DOE used market research tools to determine whether any met the SBA's definition of a small entity—based on the total number of employees for each company including parent, subsidiary, and sister entities—and gather annual revenue estimates.

Based on DOE's analysis, DOE identified 23 OEMs manufacturing CAC/HPs covered by this test procedure. DOE screened out companies that do not meet the small entity definition and, additionally, screened out companies that are largely or entirely foreign owned and operated. Of the 23 OEMs identified OEMs, six were identified as domestic small businesses. DOE did not receive comments on the April 2024 NOPR in regard to its estimate of domestic small businesses.

2. Estimate of Small Business Testing Costs

This final rule adopts updated industry test standards for CAC/HPs. DOE is updating the current Federal test procedure for CAC/HPs at appendix M1 consistent with the finalized version of the relevant industry consensus test procedure, AHRI 210/240–2024. DOE is also proposing a new Federal test procedure at 10 CFR part 430, subpart B, appendix M2, consistent with the finalized version of the industry consensus test procedure, AHRI 1600–2024. More specific amendments to the DOE test procedure are summarized in the following subsections.

(a) Cost and Compliance Associated With Appendix M1

In appendix M1, DOE is incorporating by reference AHRI 210/240–2024 for CAC/HPs and to amend certain provisions for representations and enforcement in 10 CFR part 429, consistent with the changes to the test procedure. 89 FR 24206, 24244. The revisions to appendix M1 would retain the previous test procedure's efficiency metrics—EER2, SEER2, and HSPF2. The testing requirements in appendix M1 are generally consistent with those in AHRI 210/240–2024, which in turn references ANSI/ASHRAE 37–2009, ANSI/ASHRAE 16–2016, and ANSI/ASHRAE 116–2010. This revision to the test procedure in appendix M1 for measuring EER2, SEER2, and HSPF2 would not increase third-party laboratory testing costs per unit relative to the current DOE test procedure. The Controls Verification Procedure (''CVP'') for variable-capacity compressor systems in appendix I of AHRI 210/240–2024 is not mandatory for manufacturers to perform, and DOE considers these developmental costs to be negligible and not burdensome to manufacturers. The $H4_{full}$ test (outdoor dry-bulb temperature of 5 °F) will be mandatory, but DOE anticipates no added costs as units that will certify as CCHPs are likely currently testing at the 5 °F condition. The determination of cut-in and cut-out temperatures in appendix J of the AHRI 210/240–2024 would be included in DOE's enforcement provisions and would not be mandatory for manufacturer testing, and thus manufacturers will not incur additional costs. Additionally, CAC/HPs equipped with mandatory circulation systems will have their cyclic degradation coefficients evaluated using respective cyclic tests, but DOE anticipates no added costs to manufacturers since cyclic tests are already often conducted on CAC/HPs (regardless of whether they are equipped with a mandatory constant circulation system) to improve the default cyclic degradation coefficients.

DOE has concluded that the revisions to the test procedure in appendix M1 would not change efficiency ratings for CAC/HPs, and therefore would not require retesting as a result of DOE's adoption of this amendment to the test procedure.[76] Further, the test procedure in appendix M1 would not increase third-party laboratory testing costs per unit; DOE estimates that the costs for physical testing prior to these amendments would range from $10,800 to $19,800, depending on the configuration of the CAC/HP (single-stage, two-stage, variable-capacity). Therefore, DOE does not expect that the test procedure amendments in appendix M1 would result in manufacturers, including small manufacturers, incurring additional testing costs.

(b) Cost and Compliance Associated With Appendix M2

In appendix M2, DOE is establishing a new test procedure that references the industry test procedure, AHRI 1600–2024, for measuring new efficiency metrics, SCORE and SHORE. 89 FR 24204, 23245. Appendix M2 will not be effective until new standards are established for CAC/HPs that rely on metrics present in appendix M2, should DOE adopt such standards. The testing requirements in appendix M2 are generally consistent with those in AHRI 1600–2024, which in turn references ANSI/ASHRAE 37–2009, ANSI/ASHRAE 16–2016, and ASHRAE 116–2010. This revision to the test procedure in appendix M2 for measuring EER, SCORE, and SHORE is not expected to increase third-party laboratory testing costs per unit relative to the prior DOE test procedure. The standby and off-mode power consumption of auxiliary components is determined using appendix G of AHRI 1600–2024 and does not differ substantially from the process to determine off-mode power from the current version of appendix M1, in section 3.13. The adoption of the new cooling and heating metric will not result in increased testing costs as compared to the previous test procedure. The other amendments—which include (a) building load lines and temperature bin hours for calculation of SCORE and SHORE, (b)

[73] U.S. Department of Energy Compliance Certification Management System, available at *www.regulations.doe.gov/ccms* (last accessed July 30, 2023).

[74] California Energy Commission's Modernized Appliance Efficiency Database System, available at *cacertappliances.energy.ca.gov/Login.aspx.* (Last accessed Sept. 22, 2023).

[75] Natural Resources Canada searchable product list, available at *oee.nrcan.gc.ca/pml-lmp/* (last accessed Sept 19, 2023).

[76] Manufacturers are not required to perform laboratory testing on all basic models. In accordance with 10 CFR 429.16, CAC/HP manufacturers may elect to use AEDMs. An AEDM is a computer modeling or mathematical tool that predicts the performance of non-tested basic models. These computer modeling and mathematical tools, when properly developed, can provide a means to predict the energy usage or efficiency characteristics of a basic model of a given covered product or equipment and to reduce the burden and cost associated with testing.

default fan power coefficients for coil-only systems, and (c) air flow limits to address inadequate dehumidification—also will not affect testing costs.

The overall testing cost is not expected to increase with appendix M2. DOE estimates the costs of physical testing for the new metrics SCORE and SHORE to range from $10,800 to $19.800, depending on the configuration of the CAC/HP (single-stage, two-stage, variable-capacity). Additionally, DOE allows the use of AEDMs. The use of an AEDM is expected to be less costly than physical testing of large numbers of CAC/HP models; DOE estimates the cost to develop an AEDM to be $19,383 per AEDM for a basic model, which includes the cost of physical testing done at a third-party laboratory to validate the AEDM.[77] The development of the AEDM would reduce the need for physical testing on the part of manufacturers. Once the AEDM is developed, DOE estimates that it would take five minutes of an engineer's time to determine efficiency for each individual model within a basic model using the AEDM.

DOE understands all manufacturers currently certifying in the AHRI Directory (including small businesses) will be testing their models in accordance with AHRI 1600–2024, the industry test procedure DOE is referencing at appendix M2. As stated, testing and certification of the SCORE and SHORE metrics will not be required until the compliance date of any future energy conservation standards based on these metrics; however, DOE anticipates manufacturers will need to re-test their models to rate them in terms of the SCORE and SHORE metrics to comply with the AHRI certification program, and the re-rating will occur prior to a possible future energy conservation standards rulemaking. Accordingly, DOE has determined that the test procedure amendments would not add any additional testing burden to manufacturers—including the six domestic small manufacturers.

3. Certification Statement

Based on the de minimis cost impacts, DOE certifies that this final rule does not have a ''significant economic impact on a substantial number of small entities,'' and determined that the preparation of a FRFA is not warranted. DOE will transmit 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 CAC/HPs 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 CAC/HPs. (*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 CAC/HPs in this final rule. Instead, DOE may consider proposals to amend the certification requirements and reporting for CAC/HPs 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 CAC/HPs. 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 (February 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

[77] DOE estimates that a mechanical engineer would take 60 hours to create an AEDM. The fully burdened wage of a mechanical engineer is 68.05 based on an unburdened median wage of $47.84 and on wages representing 70.3 percent of labor costs. Average cost of third-party testing would be $14,400 given the previously described range of costs. See *www.bls.gov/oes/current/oes172141.htm* for the wage figure and *www.bls.gov/news.release/archives/ecec_06182024.pdf* for the wage percentage of labor costs figure.

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 proposed rule or policy that may affect family well-being. When developing a Family Policymaking Assessment, agencies must assess whether: (1) the action strengthens or erodes the stability or safety of the family and, particularly, the marital commitment; (2) the action strengthens or erodes the authority and rights of parents in the education, nurture, and supervision of their children; (3) the action helps the family perform its functions, or substitutes governmental activity for the function; (4) the action increases or decreases disposable income or poverty of families and children; (5) the proposed benefits of the action justify the financial impact on the family; (6) the action may be carried out by State or local government or by the family; and whether (7) the action establishes an implicit or explicit policy concerning the relationship between the behavior and personal responsibility of youth, and the norms of society. In evaluating the above factors, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment as none of the above factors are implicated. Further, this determination would not have any financial impact on families nor any impact on the autonomy or integrity of the family as an institution.

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 promulgates or is expected to lead to promulgation of a final rule, and that: (1) is a significant regulatory action under Executive Order 12866, or any successor order, and is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (2) 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 CAC/HPs adopted in this final rule incorporates testing methods contained in certain sections of the following commercial standards: AHRI 210/240–2024, AHRI 1600–2024, ANSI/ASHRAE 37–2009 ANSI/ASHRAE 16–2016 and ASHRAE 116–2010. DOE has evaluated these standards and is unable to conclude whether they fully comply with the requirements of section 32(b) of the FEAA (*i.e.,* whether they were 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 210/240–2024. This test standard is an update to AHRI 210/240–2023 (2020), an industry-accepted test procedure for measuring the performance of Unitary Air-source Air-conditioners & Heat Pump Equipment. The revised appendix M1 will be consistent with provisions in AHRI 210/240–2024.

AHRI 1600–2024. This test standard is a major update to AHRI 210/240–2023 (2020), introducing new seasonal cooling and heating efficiency metrics, namely SCORE and SHORE. The new appendix M2 will be consistent with provisions in AHRI 210/240–2024.

Copies of AHRI 210/240–2024 and AHRI 1600–2024 can be obtained from AHRI, 2311 Wilson Blvd., Suite 400, Arlington, VA 22201, (703) 524–8800, or found online at *www.ahrinet.org.*

ASHRAE 37–2009. This test standard is an industry-accepted test procedure that provides a method of test for many categories of air conditioning and heating equipment.

ANSI/ASHRAE 16. This test standard is an industry-accepted test procedure that provides a method of test for room air conditioners, packaged terminal air conditioners, and packaged terminal heat pumps.

ANSI/ASHRAE 116–2010. This test standard is an industry-accepted test procedure that provides a method of test for electrically driven, residential air-cooled air conditioners and heat pumps with cooling capacity of 65,000 Btu/hr. and less.

Copies of ASHRAE 37–2009, ANSI/ASHRAE 16 and ANSI/ASHRAE 116–2010 are available on ASHRAE's website at *www.ashrae.org.*

The following standards were previously approved for incorporation by reference in the regulatory sections where they appear, and no changes are made: AHRI 210/240–2008, AHRI 1160, and ANSI 1230–2010.

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 430

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

Signing Authority

This document of the Department of Energy was signed on December 18, 2024, by Jeffrey Marootian, Principal Deputy 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 December 19, 2024.

Treena V. Garrett,

Federal Register Liaison Officer, U.S. Department of Energy.

For the reasons stated in the preamble, DOE amends parts 429 and 430 of Chapter II of Title 10, Code of Federal Regulations as set forth below:

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

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

Authority: 42 U.S.C. 6291–6317; 28 U.S.C. 2461 note.

■ 2. Amend § 429.4 by:

■ a. Revising paragraphs (a) and (c) introductory text;

■ b. Redesignating paragraphs (c)(2) through (7) as paragraphs (c)(3) through (8); and

■ c. Adding new paragraph (c)(2) and paragraph (c)(9).

The revisions and additions read as follows:

§ 429.4 Materials incorporated by reference.

(a) Certain material is incorporated by reference into this part with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, the U.S. Department of Energy (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 the Department of Energy (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 Office, EE–5B, 1000 Independence Avenue SW, Washington, DC 20585–0121; (202) 586–9127; *Buildings@ee.doe.gov; www.energy.gov/eere/buildings/appliance-and-equipment-standards-program.* For information on the availability of this material at NARA, visit *www.archives.gov/federal-register/cfr/ibr-locations* 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, 2311 Wilson Blvd., Suite 400, Arlington, VA 22201, (703) 524–8800, or go to: *www.ahrinet.org.*

* * * * *

(2) AHRI Standard 210/240–2024 (I–P), (''AHRI 210/240–2024''), Performance Rating of Unitary Air-conditioning and Air-source Heat Pump Equipment, copyright 2024; IBR approved for § 429.134.

* * * * *

(9) AHRI Standard 1600–2024 (I–P), (''AHRI 1600–2024''), Performance Rating of Unitary Air-conditioning and Air-source Heat Pump Equipment, copyright 2024; IBR approved for § 429.134.

* * * * *

■ 3. Amend § 429.16 by revising paragraphs (a)(1) and (2), (a)(3)(i), (b)(2), (b)(3)(ii), (c)(1)(i)(B), (c)(1)(ii), (c)(3), (d)(2), and (f) to read as follows:

§ 429.16 Central air conditioners and central air conditioning heat pumps.

(a) * * *

(1) *Required represented values.* Determine the represented values (including as applicable, SEER2, EER2, HSPF2, $P_{W,OFF}$, SCORE, SHORE, EER, cooling capacity, and heating capacity) for the individual models/combinations (or ''tested combinations'') specified in the following table.

TABLE 1 TO PARAGRAPH (a)(1)

Category	Equipment subcategory	Required represented values
Single-Package Unit	Single-Package Air Conditioner (AC) (including space-constrained).	Every individual model distributed in commerce.
	Single-Package Heat Pump (HP) (including space-constrained).	Every individual model distributed in commerce.
Outdoor Unit and Indoor Unit (Distributed in Commerce by Outdoor Unit Manufacturer (OUM)).	Single-Split-System AC with Single-Stage or Two-Stage Compressor (including Space-Constrained and Small-Duct, High Velocity Systems (SDHV)).	Every individual combination distributed in commerce. Each model of outdoor unit must include a represented value for at least one coil-only individual combination that is distributed in commerce and which is representative of the least efficient combination distributed in commerce with that particular model of outdoor unit. For that particular model of outdoor unit, additional represented values for coil-only and blower-coil individual combinations are allowed, if distributed in commerce.
	Single-Split System AC with Other Than Single-Stage or Two-Stage Compressor (including Space-Constrained and SDHV).	Every individual combination distributed in commerce, including all coil-only and blower-coil combinations.
	Single-Split-System HP (including Space-Constrained and SDHV).	Every individual combination distributed in commerce.
	Multi-Split, Multi-Circuit, or Multi-Head Mini-Split Split System—non-SDHV (including Space-Constrained).	For each model of outdoor unit, at a minimum, a non-ducted ''tested combination.'' For any model of outdoor unit also sold with models of ducted indoor units, a ducted ''tested combination.'' The ducted ''tested combination'' must comprise the highest static variety of ducted indoor unit distributed in commerce (*i.e.,* conventional, mid-static, or low-static). Additional representations are allowed, as described in paragraphs (c)(3)(i) and (ii) of this section, respectively.
	Multi-Split, Multi-Circuit, or Multi-Head Mini-Split Split System—SDHV.	For each model of outdoor unit, an SDHV ''tested combination.'' Additional representations are allowed, as described in paragraph (c)(3)(iii) of this section.
Indoor Unit Only Distributed in Commerce by Independent Coil Manufacturer (ICM).	Single-Split-System Air Conditioner (including Space-Constrained and SDHV).	Every individual combination distributed in commerce.
	Single-Split-System Heat Pump (including Space-Constrained and SDHV).	

TABLE 1 TO PARAGRAPH (a)(1)—Continued

Category	Equipment subcategory	Required represented values
	Multi-Split, Multi-Circuit, or Multi-Head Mini-Split Split System—SDHV.	For a model of indoor unit within each basic model, an SDHV ''tested combination.'' Additional representations are allowed, as described in paragraph (c)(3)(iii) of this section.
Outdoor Unit with no Match		Every model of outdoor unit distributed in commerce (tested with a model of coil-only indoor unit as specified in paragraph (b)(2)(i) of this section.

(2) $P_{W,OFF}$. Represented values of $P_{W,OFF}$ are only required when determining represented values in accordance with 10 CFR part 430, subpart B, appendix M1. If individual models of single-package systems or individual combinations (or ''tested combinations'') of split systems that are otherwise identical are offered with multiple options for off-mode-related components, determine the represented value for the individual model/combination with the crankcase heater and controls that are the most consumptive. A manufacturer may also determine represented values for individual models/combinations with less consumptive off-mode options; however, all such options must be identified with different model numbers for single-package systems or for outdoor units (in the case of split systems).

(3) * * *

(i) If a model of outdoor unit (used in a single-split, multi-split, multi-circuit, multi-head mini-split, and/or outdoor unit with no match system) is distributed in commerce and approved for use with multiple refrigerants, a manufacturer must determine all represented values for that model using each refrigerant that can be used in an individual combination of the basic model (including outdoor units with no match or ''tested combinations''). This requirement may apply across the listed categories in the table 1 to paragraph (a)(1) of this section. A refrigerant is considered approved for use if it is listed on the nameplate of the outdoor unit.

* * * * *

(b) * * *

(2) *Individual model/combination selection for testing.* (i) Table 2 to this paragraph (b)(2)(i) identifies the minimum testing requirements for each basic model that includes multiple individual models/combinations; if a basic model spans multiple categories or subcategories listed in table 2, multiple testing requirements apply. For each basic model that includes only one individual model/combination, test that individual model/combination.

TABLE 2 TO PARAGRAPH (b)(2)(i)

Category	Equipment subcategory	Must test:	With:
Single-Package Unit	Single-Package AC (including Space-Constrained). Single-Package HP (including Space-Constrained).	The individual model with the lowest seasonal. energy efficiency ratio 2 (SEER2). (when testing in accordance with appendix M1. to subpart B of 10 CFR part 430). or seasonal cooling and off-mode rating. efficiency (SCORE) (when testing. in accordance with appendix M2 to subpart.. B of 10 CFR part 430)	N/A.
Outdoor Unit and Indoor Unit (Distributed in Commerce by OUM).	Single-Split-System AC with Single-Stage or Two-Stage Compressor (including Space-Constrained and Small-Duct, High Velocity Systems (SDHV)).	The model of outdoor unit	A model of coil-only indoor unit.
	Single-Split-System HP with Single-Stage or Two-Stage Compressor (including Space-Constrained and SDHV).	The model of outdoor unit	A model of indoor unit.
	Single-Split System AC or HP with Other Than Single-Stage or Two-Stage Compressor having a coil-only individual combination (including Space-Constrained and SDHV).	The model of outdoor unit	A model of coil-only indoor unit.

TABLE 2 TO PARAGRAPH (b)(2)(i)—Continued

Category	Equipment subcategory	Must test:	With:
	Single-Split System AC or HP with Other Than Single-Stage or Two-Stage Compressor without a coil-only individual combination (including Space-Constrained and SDHV).	The model of outdoor unit	A model of indoor unit.
	Multi-Split, Multi-Circuit, or Multi-Head Mini-Split Split System—non-SDHV (including Space-Constrained).	The model of outdoor unit	At a minimum, a ''tested combination'' composed entirely of non-ducted indoor units. For any models of outdoor units also sold with models of ducted indoor units, test a second ''tested combination'' composed entirely of ducted indoor units (in addition to the non-ducted combination). The ducted ''tested combination'' must comprise the highest static variety of ducted indoor unit distributed in commerce (*i.e.,* conventional, mid-static, or low-static).
	Multi-Split, Multi-Circuit, or Multi-Head Mini-Split Split System—SDHV.	The model of outdoor unit	A ''tested combination'' composed entirely of SDHV indoor units.
Indoor Unit Only (Distributed in Commerce by ICM).	Single-Split-System Air Conditioner (including Space-Constrained and SDHV).	A model of indoor unit	The least efficient model of outdoor unit with which it will be paired where the least efficient model of outdoor unit is the model of outdoor unit in the lowest SEER2 combination (when testing under appendix M1 to subpart B of 10 CFR part 430) or SCORE combination (when testing under appendix M2 to subpart B of 10 CFR part 430) as certified by the OUM. If there are multiple models of outdoor unit with the same lowest SEER2 (when testing under appendix M1 to subpart B of 10 CFR part 430) or SCORE (when testing under appendix M2 to subpart B of 10 CFR part 430) represented value, the ICM may select one for testing purposes.
	Single-Split-System Heat Pump (including Space-Constrained and SDHV).	Nothing, as long as an equivalent air conditioner basic model has been tested. If an equivalent air conditioner basic model has not been tested, must test a model of indoor unit.	
	Multi-Split, Multi-Circuit, or Multi-Head Mini-Split Split System—SDHV.	A model of indoor unit	A ''tested combination'' composed entirely of SDHV indoor units, where the outdoor unit is the least efficient model of outdoor unit with which the SDHV indoor unit will be paired. The least efficient model of outdoor unit is the model of outdoor unit in the lowest SEER2 combination (when testing under appendix M1 to subpart B of 10 CFR part 430) or SCORE combination (when testing under appendix M2 to subpart B of 10 CFR part 430) as certified by the OUM. If there are multiple models of outdoor unit with the same lowest SEER2 represented value (when testing under appendix M1 to subpart B of 10 CFR part 430) or SCORE represented value (when testing under appendix M2 to subpart B of 10 CFR part 430), the ICM may select one for testing purposes.
Outdoor Unit with No Match	.....	The model of outdoor unit	A model of coil-only indoor unit meeting the requirements of section 4 of appendix M1 (when testing under appendix M1 to subpart B of 10 CFR part 430); or meeting the requirements of section 3 of appendix M2 (when testing under appendix M2 to subpart B of 10 CFR part 430).

(ii) When testing in accordance with appendix M1 to subpart B of 10 CFR part 430, each individual model/combination (or ''tested combination'') identified in table 2 to paragraph (b)(2)(i) of this section is not required to be tested for $P_{W,OFF}$. Instead, at a minimum, among individual models/combinations with similar off-mode construction (even spanning different models of outdoor units), a manufacturer must test at least one individual model/combination for $P_{W,OFF}$.

(iii) When testing in accordance with appendix M2 to subpart B of 10 CFR part 430 and determining SCORE and SHORE, each individual model/combination (or ''tested combination'') identified in table 2 to paragraph (b)(2)(i) of this section is not required to be tested for values of P_1 (off-mode power in shoulder season) and P_2 (off-mode power in heating Season). Instead, at a minimum, among individual models/combinations with similar off-mode construction (even spanning different models of outdoor units), a manufacturer must test at least one individual model/combination, for which P_1 and P_2 are the most consumptive.

(3) * * *

(ii) *EER2, SEER2, HSPF2, SCORE, EER, and SHORE.* Any represented value of the energy efficiency or other measure of energy consumption for which consumers would favor higher values shall be less than or equal to the lower of:

(A) The mean of the sample, where:

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

and, $\bar{x}$ is the sample mean; n is the number of samples; and x_i is the ith sample; or,

(B) The lower 90 percent confidence limit (LCL) of the true mean divided by 0.95, where:

$$LCL = \bar{x} - t_{.90}\left(\frac{s}{\sqrt{n}}\right)$$

and $\bar{x}$ is the sample mean; s is the sample standard deviation; n is the number of samples; and $t_{0.90}$ is the Student's t-Distribution Value for a 90 percent one-tailed confidence interval with n-1 degrees of freedom (from appendix A to this subpart). Round represented values of EER2, SEER2, HSPF2, EER, SCORE and SHORE to the nearest 0.05.

* * * * *

(c) * * *

(1) * * *

(i) * * *

(B) The represented values of the measures of energy efficiency or energy consumption through the application of an AEDM in accordance with paragraph (d) of this section and § 429.70. An AEDM may only be used to determine represented values for individual models or combinations in a basic model (or separate approved refrigerants within an individual combination) other than the individual model or combination(s) required for mandatory testing under paragraph (b)(2) of this section.

(ii) When testing in accordance with appendix M1 to subpart B of 10 CFR part 430, for every individual model/combination within a basic model tested pursuant to paragraph (b)(2) of this section, but for which $P_{W,OFF}$ testing was not conducted, the represented value of $P_{W,OFF}$ may be assigned through, either:

(A) The testing result from an individual model/combination of similar off-mode construction; or

(B) The application of an AEDM in accordance with paragraph (d) of this section and § 429.70.

* * * * *

(3) *For multi-split systems, multi-circuit systems, and multi-head mini-split systems.* The following applies:

(i) When testing in accordance with appendix M1 to subpart B of 10 CFR part 430, or appendix M2 to subpart B of 10 CFR part 430, for basic models that include additional varieties of ducted indoor units (*i.e.,* conventional, low-static, or mid-static) other than the one for which representation is required in paragraph (a)(1) of this section, if a manufacturer chooses to make a representation, the manufacturer must conduct testing of a tested combination according to the requirements in paragraph (b)(3) of this section.

(ii) When testing in accordance with appendix M1 to subpart B of 10 CFR part 430, or appendix M2 to subpart B of 10 CFR part 430, for basic models that include mixed combinations of indoor units (any two kinds of non-ducted, low-static, mid-static, and conventional ducted indoor units), the represented value for the mixed combination is the mean of the represented values for the individual component combinations as determined in accordance with paragraph (b)(3) of this section.

(iii) When testing in accordance with appendix M1 to subpart B of 10 CFR part 430, or appendix M2 to subpart B of 10 CFR part 430, for basic models including mixed combinations of SDHV and another kind of indoor unit (any of non-ducted, low-static, mid-static, and conventional ducted), the represented value for the mixed SDHV/other combination is the mean of the represented values for the SDHV and other tested combination as determined in accordance with paragraph (b)(3) of this section.

(iv) All other individual combinations of models of indoor units for the same model of outdoor unit for which the manufacturer chooses to make representations must be rated as separate basic models, and the provisions of paragraphs (b)(1) through (3) and (c)(3)(i) through (iii) of this section apply.

(v) When testing in accordance with appendix M1 to subpart B of 10 CFR part 430, and with respect to $P_{W,OFF}$ only, for every individual combination (or ''tested combination'') within a basic model tested pursuant to paragraph (b)(2) of this section, but for which $P_{W,OFF}$ testing was not conducted, the representative values of $P_{W,OFF}$ may be assigned through either:

(A) The testing result from an individual model or combination of similar off-mode construction, or

(B) Application of an AEDM in accordance with paragraph (d) of this section and § 429.70.

(d) * * *

(2) *Energy efficiency.* Any represented value of the EER2, SEER2, HSPF2, EER, SCORE and SHORE, or other measure of energy efficiency of an individual model/combination for which consumers would favor higher values must be less than or equal to the output of the AEDM but no less than the standard.

* * * * *

(f) *Represented values for the Federal Trade Commission.* Use the following represented value determinations to meet the requirements of the Federal Trade Commission.

(1) *Annual operating cost—cooling.* Determine the represented value of estimated annual operating cost for cooling-only units or the cooling portion of the estimated annual operating cost for air-source heat pumps that provide both heating and cooling, as follows:

(i) When using appendix M1 to subpart B of 10 CFR part 430, the product of:

(A) The quotient of the represented value of cooling capacity, in Btu's per hour as determined in paragraph (b)(3)(iii) of this section, and multiplied by 0.93 for variable speed heat pumps only, divided by the represented value of SEER2, in Btu's per watt-hour, as determined in paragraph (b)(3)(ii) of this section.

(B) The representative average use cycle for cooling of 1,000 hours per year;

(C) A conversion factor of 0.001 kilowatt per watt; and

(D) The representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act.

(ii) When using appendix M2 to subpart B of 10 CFR part 430, the product of:

(A) The quotient of the represented value of cooling capacity, in Btu's per hour as determined in paragraph (b)(3)(iii) of this section, and multiplied by 0.93 for variable speed heat pumps only, divided by the represented value of SCORE, in Btu's per watt-hour, as determined in paragraph (b)(3)(ii) of this section.

(B) The representative average use cycle for cooling of 1,457 hours per year;

(C) A conversion factor of 0.001 kilowatt per watt; and

(D) The representative average unit cost of electricity in dollars per

kilowatt-hour as provided pursuant to section 323(b)(2) of the Act.

(2) *Annual operating cost—heating.* Determine the represented value of estimated annual operating cost for air-source heat pumps that provide only heating or for the heating portion of the estimated annual operating cost for air-source heat pumps that provide both heating and cooling, as follows:

(i) When using appendix M1 to subpart B of 10 CFR part 430, the product of:

(A) The quotient of the represented value of cooling capacity (for air-source heat pumps that provide both cooling and heating) in Btu's per hour, as determined in paragraph (b)(3)(iii) of this section, or the represented value of heating capacity (for air-source heat pumps that provide only heating), as determined in paragraph (b)(3)(iii) of this section, divided by the represented value of HSPF2, in Btu's per watt-hour, calculated for Region IV, as determined in paragraph (b)(3)(ii) of this section;

(B) The representative average use cycle for heating of 1,572 hours per year;

(C) The adjustment factor of 1.15 (for heat pumps that are not variable speed) or 1.07 (for heat pumps that are variable speed), which serves to adjust the calculated design heating requirement and heating load hours to the actual load experienced by a heating system;

(D) A conversion factor of 0.001 kilowatt per watt; and

(E) The representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act;

(ii) When using appendix M2 to subpart B of 10 CFR part 430, the product of:

(A) The quotient of the represented value of cooling capacity (for air-source heat pumps that provide both cooling and heating) in Btu's per hour, as determined in paragraph (b)(3)(iii) of this section, or the represented value of heating capacity (for air-source heat pumps that provide only heating), as determined in paragraph (b)(3)(iii) of this section, divided by the represented value of SHORE, in Btu's per watt-hour, as determined in paragraph (b)(3)(ii) of this section;

(B) The representative average use cycle for heating of 972 hours per year;

(C) The adjustment factor of 1.15 (for heat pumps that are not variable speed) or 1.07 (for heat pumps that are variable speed), which serves to adjust the calculated design heating requirement and heating load hours to the actual load experienced by a heating system;

(D) A conversion factor of 0.001 kilowatt per watt; and

(E) The representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act;

(3) *Annual operating cost—total.* Determine the represented value of estimated annual operating cost for air-source heat pumps that provide both heating and cooling by calculating the sum of the quantity determined in paragraph (f)(1) of this section added to the quantity determined in paragraph (f)(2) of this section.

(4) *Regional annual operating cost—cooling.* Determine the represented value of estimated regional annual operating cost for cooling-only units or the cooling portion of the estimated regional annual operating cost for air-source heat pumps that provide both heating and cooling as follows:

(i) When using appendix M1 to subpart B of 10 CFR part 430, the product of:

(A) The quotient of the represented value of cooling capacity, in Btu's per hour as determined in paragraph (b)(3)(iii) of this section, and multiplied by 0.93 for variable speed heat pumps only, divided by the represented value of SEER2, in Btu's per watt-hour, as determined in paragraph (b)(3)(ii) of this section;

(B) The estimated number of regional cooling load hours per year determined from the following table:

TABLE 4 TO PARAGRAPH (f)(4)(i)(B)

Climatic region	Regional cooling load hours
I	2,400
II	1,800
III	1,200
IV	800
V	400
VI	200

(C) A conversion factor of 0.001 kilowatts per watt; and

(D) The representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act.

(ii) When using appendix M2 to subpart B of part 430, regional annual operating cost for cooling-only units or the cooling portion of the estimated regional annual operating cost air-source heat pumps that provide both heating and cooling, does not apply.

(5) *Regional annual operating cost—heating.* Determine the represented value of estimated regional annual operating cost for air-source heat pumps that provide only heating or for the heating portion of the estimated regional annual operating cost for air-source heat pumps that provide both heating and cooling as follows:

(i) When using appendix M1 to subpart B of 10 CFR part 430, the product of:

(A) The estimated number of regional heating load hours per year determined from the following table:

TABLE 5 TO PARAGRAPH (f)(5)(i)(A)

Climatic region	Regional cooling load hours
I	493
II	857
III	1,247
IV	1,701
V	2,202
VI	1,842

(B) The quotient of the represented value of cooling capacity (for air-source heat pumps that provide both cooling and heating) in Btu's per hour, as determined in paragraph (b)(3)(iii)(C) of this section, or the represented value of heating capacity (for air-source heat pumps that provide only heating), as determined in paragraph (b)(3)(iii) of this section, divided by the represented value of HSPF2, in Btu's per watt-hour, calculated for the appropriate generalized climatic region of interest, and determined in paragraph (b)(3)(iii) of this section;

(C) The adjustment factor of 1.15 (for heat pumps that are not variable speed) or 1.07 (for heat pumps that are variable speed), which serves to adjust the calculated design heating requirement and heating load hours to the actual load experienced by a heating system;

(D) A conversion factor of 0.001 kilowatts per watt; and

(E) The representative average unit cost of electricity in dollars per kilowatt-hour as provided pursuant to section 323(b)(2) of the Act.

(ii) When using appendix M2 to subpart B of 10 CFR part 430, regional annual operating cost for air-source heat pumps that provide only heating or for the heating portion, does not apply.

(6) *Regional annual operating cost—total.* For air-source heat pumps that provide both heating and cooling, the estimated regional annual operating cost is the sum of the quantity determined in paragraph (f)(4) of this section added to the quantity determined in paragraph (f)(5) of this section.

(7) *Annual operating cost—rounding.* Round any represented values of estimated annual operating cost determined in paragraphs (f)(1) through (6) of this section to the nearest dollar per year.

■ 4. Amend § 429.70 by revising paragraphs (e)(1) and (e)(2)(i)(A) to read as follows:

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

* * * * *

(e) * * *

(1) *Criteria an AEDM must satisfy.* A manufacturer may not apply an AEDM to an individual model/combination to determine its represented values (EER2, SEER2, HSPF2, SCORE, EER, SHORE and/or $P_{W,OFF}$) pursuant to this section unless authorized pursuant to § 429.16(d) and:

(i) The AEDM is derived from a mathematical model that estimates the energy efficiency or energy consumption characteristics of the individual model or combination (EER2, SEER2, HSPF2, EER, SCORE, SHORE and/or $P_{W,OFF}$) as measured by the applicable DOE test procedure; and

(ii) The manufacturer has validated the AEDM in accordance with paragraph (e)(2) of this section.

(2) * * *

(i) * * *

(A) *Minimum testing.* The manufacturer must test each basic model as required under § 429.16(b)(2).

* * * * *

■ 5. Amend § 429.134 by revising paragraph (k) to read as follows:

§ 429.134 Product-specific enforcement provisions.

* * * * *

(k) *Central air conditioners and heat pumps.* Before July 7, 2025, the provisions in this section of this title as it appeared in the 10 CFR parts 200–499 edition revised as of January 1, 2023, are applicable. On and after July 7, 2025, the following provisions apply.

(1) *Verification of cooling capacity.* The cooling capacity of each tested unit of the individual model (for single-package systems) or individual combination (for split systems) will be measured pursuant to the test requirements of § 430.23(m) of this chapter. The mean of the measurement(s) (either the measured cooling capacity for a single unit sample or the average of the measured cooling capacities for a multiple unit sample) will be used to determine the applicable standards for purposes of compliance.

(2) *Verification of C_D value.* (i) For central air conditioners and heat pumps other than models of outdoor units with no match, if manufacturers certify that they did not conduct the optional tests to determine the C_D^c and/or C_D^h value for an individual model (for single-package systems) or individual combination (for split systems), as applicable, for each unit tested, the default C_D^c and/or C_D^h value will be used as the basis for the calculation of SEER2 or HSPF2 when testing in accordance with appendix M1 to subpart B of 10 CFR part 430, or SCORE or SHORE when testing in accordance with appendix M2 to subpart B of 10 CFR part 430. If manufacturers certify that they conducted the optional tests to determine the C_D^c and/or C_D^h value for an individual model (for single-package systems) or individual combination (for split systems), as applicable, the following provisions apply.

(A) If testing in accordance with appendix M1 to subpart B of 10 CFR part 430, the C_D^c and/or C_D^h value will be measured for each unit tested pursuant to appendix M1 to subpart B of 10 CFR part 430 and the result for each unit tested (either the tested value or the default value, as selected according to the criteria for the cyclic test in section E17 of AHRI 210/240–2024 (incorporated by reference, see § 429.4)) will be used as the basis for calculation of SEER2 or HSPF2.

(B) If testing in accordance with appendix M2 to subpart B of 10 CFR part 430, the C_D^c and/or C_D^h value will be measured for each unit tested pursuant to appendix M2 to subpart B of 10 CFR part 430 and the result for each unit tested (either the tested value or the default value, as selected according to the criteria for the cyclic test in section E17 of AHRI 1600–2024 (incorporated by reference, see § 429.4)) will be used as the basis for calculation of SCORE or SHORE.

(ii) For models of outdoor units with no match, DOE will use the default C_D^c and/or C_D^h pursuant to appendix M1 to subpart B of 10 CFR part 430 or appendix M2 to subpart B of 10 CFR part 430, as applicable.

(3) *Verification of cut-out and cut-in temperatures for central heat pumps.* (i) When testing in accordance with appendix M1 to subpart B of 10 CFR part 430, the cut-out and cut-in temperatures may be verified using the method in appendix J of AHRI 210/240–2024 (incorporated by reference, see § 429.4). If this method is conducted, the tested $T_{OFF,T}$ and $T_{ON,T}$ values determined in the test shall be used as the cut-out and cut-in temperatures, respectively, to calculate HSPF2.

(ii) When testing in accordance with appendix M2 to subpart B of 10 CFR part 430, the cut-out and cut-in temperatures may be verified using the method in appendix J of AHRI 1600–2024 (incorporated by reference, see § 429.4). If this method is conducted, the tested $T_{OFF,T}$ and $T_{ON,T}$ values determined in the test shall be used as the cut-out and cut-in temperatures, respectively, to calculate SHORE.

(4) *Verification of Variable Capacity Operation and of Fixed Settings for the Compressor and the Indoor Fan when Testing Variable Capacity Compressor Systems*—(i) *Conducting the controls verification procedure (CVP).* A CVP may be performed for any model certified as a variable capacity compressor system for the purposes of assessment or enforcement testing conducted according to appendix M1 to subpart B of 10 CFR part 430 or appendix M2 to subpart B of 10 CFR part 430 (*i.e.,* the certification tests), as applicable. For a heat pump, either a cooling mode CVP, a heating mode CVP, or both may be conducted, as elected by DOE. If a CVP is not conducted, the override instructions for the compressor and indoor fan, as specified by the manufacturer, will be used to conduct the tests per appendix M1 to subpart B of 10 CFR part 430 or, appendix M2 to subpart B of 10 CFR part 430, as applicable.

(A) *When testing in accordance with appendix M1 to subpart B of 10 CFR part 430.* The CVP will be conducted per appendix I of AHRI 210/240–2024 (incorporated by reference, see § 429.4).

(B) *When testing in accordance with appendix M2 to subpart B of 10 CFR part 430.* The CVP will be conducted per appendix I of AHRI 1600–2024 (incorporated by reference, see § 429.4).

(C) *Variable capacity certified, single capacity systems.* For systems determined to be variable capacity certified, single capacity systems as described in paragraph (k)(4)(ii)(B) of this section, the CVP cooling and heating minimum intervals may be omitted.

(ii) *Variable capacity determination.* (A) If the unit tested does meet the definition of a variable capacity compressor system based on performance of the CVP per paragraph (k)(4)(i)(A) or paragraph (k)(4)(i)(B) of this section, the efficiency metrics (SEER2, HSPF2, EER2, SCORE, SHORE, EER as applicable) shall be determined using the certification test applicable to variable capacity compressor systems.

(B) If the unit tested does not meet the definition of a variable capacity compressor system based on performance of the CVP per paragraph (k)(4)(i)(A) or (B) of this section, and the tested unit is instead determined to be a variable capacity certified, single capacity system, the efficiency metrics (SEER2, HSPF2, EER2, SCORE, SHORE, EER as applicable) shall be determined using the certification test applicable to

variable capacity certified, single capacity systems.

(C) If the unit tested does not meet the definition of a variable capacity compressor system based on performance of the CVP per paragraph (k)(4)(i)(A) or (B) of this section, and the tested unit is instead determined to be a variable capacity certified, two capacity system, the efficiency metrics (SEER2, HSPF2, EER2, SCORE, SHORE, EER as applicable) shall be determined using the certification test applicable to variable capacity certified, two capacity systems.

(D) If, for a heat pump, a CVP is conducted for just one of the operating modes (heating or cooling), the system classifications for both modes will be based on the results of the one CVP conducted.

(iii) *CVP tolerance evaluation for full and minimum load intervals.* (A) The data collected in the CVP per paragraph (k)(4)(i)(A) or (B) of this section shall be evaluated for the duration of the individual CVP full or minimum load interval excluding the preliminary 30 minutes of equilibrium data, to determine compliance with test condition tolerances and test operating tolerances listed in section I5.1 of appendix I of AHRI 210/240–2024 (if testing in accordance with appendix M1 to subpart B of 10 CFR part 430; (incorporated by reference, see § 429.4)) or of AHRI 1600–2024 (if testing in accordance with appendix M2 to subpart B of 10 CFR part 430; (incorporated by reference, see § 429.4)), with the exception that indoor entering wet bulb deviation in I5.1 and test operating tolerance in I5.1.3 is applicable only for cooling mode CVP.

(*1*) If the specified tolerances are met under system operation for 60 minutes, the average capacity and average power measured over this 60-minute test interval shall be recorded.

(*2*) If the four-hour time limit is reached by the system without maintaining the tolerances for a 60-minute period, but two successive test period sub-intervals are identified, each a minimum of 30 minutes, and comprised of a whole number of compressor cycles (either compressor on-off cycles or speed/capacity cycles) or in which minimal fluctuations of the compressor speed/capacity level are observed, where both the time averaged integrated capacity and time averaged integrated power of the two successive test period sub-intervals are observed to be within two percent of each other, a single capacity average and a single power average shall be recorded, both averaged over compressor-on periods of the two successive test period sub-intervals. These average capacity and power values shall be considered the capacity and power values recorded for the test interval.

(*3*) If the four-hour time limit is reached by the system without complying with either paragraph (k)(4)(iii)(A)(*1*) or (*2*) of this section, the time averaged integrated capacity and time averaged integrated power shall be recorded for only the compressor-on periods over the final 120 minutes of the test interval.

(B) Determine whether the measured capacity for each full load interval, as evaluated per the CVP conducted in paragraph (k)(4)(i)(A) or (B) of this section, is no more than 6% less than the corresponding certification test capacity, as follows:

$$\text{Cooling full: } \frac{\dot{q}_{A,Full} - \dot{q}_{CVP,A,Full}}{\dot{q}_{A,Full}} \times 100 \leq 6.0$$

$$\text{Heating full (17°F): } \frac{\dot{q}_{H3,Full} - \dot{q}_{CVP,H3,Full}}{\dot{q}_{H3,Full}} \times 100 \leq 6.0$$

$$\text{Heating full (5°F): } \frac{\dot{q}_{H4,Full} - \dot{q}_{CVP,H4,Full}}{\dot{q}_{H4,Full}} \times 100 \leq 6.0$$

Where:

$\dot{q}_{A,Full}$ = Certification test capacity at A_{Full} condition,

$\dot{q}_{CVP,A,Full}$ = CVP test capacity at A_{Full} condition,

$\dot{q}_{H3,Full}$ = Certification test capacity at $H3_{Full}$ condition,

$\dot{q}_{CVP,H3,Full}$ = CVP test capacity at $H3_{Full}$ condition,

$\dot{q}_{H4,Full}$ = Certification test capacity at $H4_{Full}$ condition,

$\dot{q}_{CVP,H4,Full}$= CVP test capacity at $H4_{Full}$ condition,

(C) Determine whether the measured capacity for each minimum load interval, as evaluated per the CVP conducted in paragraph (k)(4)(i)(A) or (B) of this section, is no more than 6% less than the corresponding certification test capacity, as follows:

$$\text{Cooling minimum: } \frac{\dot{q}_{CVP,F,Low} - \dot{q}_{F,Low}}{\dot{q}_{A,Full}} \times 100 \leq 6.0$$

$$\text{Heating minimum: } \frac{\dot{q}_{CVP,H1,Low} - \dot{q}_{H1,Low}}{\dot{q}_{H3,Full}} \times 100 \leq 6.0$$

Where:

$\dot{q}_{CVP,F,Low}$= CVP test capacity at F_{Low} condition,

$\dot{q}_{F,Low}$ = Certification test capacity at F_{Low} condition,

$\dot{q}_{CVP,H1,Low}$ = CVP test capacity at $H1_{Low}$ condition,

$\dot{q}_{H1,Low}$= Certification test capacity at $H1_{Low}$ condition,

(D) Determine whether the measured efficiency for the full and minimum load interval, as evaluated per the CVP conducted in paragraph (k)(4)(i)(A) or (B) of this section, is no more than 10% less than the corresponding certification test efficiency, as follows:

$$\text{Cooling full: } \frac{EER2_{A,Full} - EER2_{CVP,A,Full}}{EER2_{A,Full}} \times 100 \leq 10.0$$

$$\text{Cooling minimum: } \frac{EER2_{F,Low} - EER2_{CVP,F,Low}}{EER2_{F,Low}} \times 100 \leq 10.0$$

$$\text{Heating full (5°F): } \frac{COP2_{H4,Full} - COP2_{CVP,H4,Full}}{COP2_{H4,Full}} \times 100 \leq 10.0$$

$$\text{Heating full (17°F): } \frac{COP2_{H3,Full} - COP2_{CVP,H3,Full}}{COP2_{H3,Full}} \times 100 \leq 10.0$$

$$\text{Heating minimum: } \frac{COP2_{H1,Low} - COP2_{CVP,H1,Low}}{COP2_{H1,Low}} \times 100 \leq 10.0$$

(E) Cooling and heating efficiency requirements are shown using EER2 and COP2 to align with testing in accordance with appendix M1 to subpart B of 10 CFR part 430. When testing in accordance with appendix M2 to subpart B of 10 CFR part 430, replace EER2 with EER, and COP2 with COP.

(iv) *Evaluation of results when CVP tolerances are met.* If the tolerances for capacity and efficiency are met by the applicable full and minimum load intervals as per paragraphs (k)(4)(iii)(B) through (D) of this section, the certified override instructions for the compressor and indoor fan, as specified by the manufacturer, shall be deemed valid, and the efficiency metrics (SEER2, HSPF2, EER2, SCORE, SHORE, EER as applicable), shall be determined based on these certification tests with no adjustments determined based on the CVP results.

(v) *Evaluation of results when CVP tolerances are not met.* If the tolerances for capacity and efficiency are not met by the applicable full and minimum load intervals as per paragraphs (k)(4)(iii)(B) through (D) of this section, the unit shall be tested per instructions in paragraphs (k)(4)(v)(A) through (C) of this section, as applicable. The instructions in paragraphs (k)(4)(v)(A) through (C) shall be followed, as applicable, only for the certification tests corresponding to the out of tolerance compressor speed interval based on the evaluations of paragraphs (k)(4)(iii)(B) through (D). For all compressor speed intervals for which the capacity and EER2/COP2/EER/COP are in tolerance as per paragraphs (k)(4)(iii)(B) through (D), the corresponding certification tests shall be used without adjustments.

(A) The instructions of this paragraph shall be applied to systems for which the same control device used as per the CVP conducted in paragraph (k)(4)(i)(A) or (B) of this section is used as the means for overriding the controls, and both of the following are supported by the control device: monitoring of the compressor and indoor blower speed during native-control operation without otherwise impacting the control of the system; and monitoring and adjustment of the compressor and indoor blower speed during certification tests, where monitoring and adjustment means the control device has the ability to display and make discrete adjustments, as required, to the compressor and indoor blower speeds without additional hardware or non-publicly available software.

(*1*) The compressor and indoor blower speed shall be monitored during the CVP conducted in paragraph (k)(4)(i)(A) or (B) of this section. The average compressor and indoor blower speeds and indoor air volume rate shall be evaluated for the same time period(s) used as described in paragraph (k)(4)(iii)(A) of this section to determine average capacity and power for the CVP test. The compressor speed for the certification test shall be set at this average value observed during the corresponding CVP test interval. The indoor blower speed shall be set as described in section 6.1.5 of AHRI 210/240–2024 (if testing in accordance with appendix M1 to subpart B of 10 CFR part 430; (incorporated by reference, see § 429.4)) or of AHRI 1600–2024 (if testing in accordance with appendix M2 to subpart B of 10 CFR part 430; (incorporated by reference, see § 429.4)), except the ''specified airflow'' shall be set as the average value observed during the corresponding CVP test interval. The same adjusted compressor speed shall be used for the other certification tests that require the same speed, as applicable, as detailed in table 1 to this paragraph (k)(4)(v)(A). Specifically, for each of the CVP tests listed in the first column for which either the capacity tolerances of paragraph (k)(4)(iii)(B) or (C) of this section are not met or the efficiency tolerances of paragraph (k)(4)(iii)(D) of this section are not met, the certification tests to be conducted again using the compressor speed determined in the corresponding CVP test are listed in the last three columns of the table, depending on which of the three kinds of system the model is designated.

(*2*) If required, the adjusted $\dot{q}_{H3,Full}$ and $P_{H3,Full}$ shall be used to calculate $\dot{q}^{k=2}_{hcalc}(47)$ and $P^{k=2}_{hcalc}(47)$, respectively, to represent performance at 47 °F as described in section 11.2.2.4 of AHRI 210/240–2024 (if testing in accordance with appendix M1 to subpart B of 10 CFR part 430; (incorporated by reference, see § 429.4)) or of AHRI 1600–2024 (if testing in accordance with appendix M2 to subpart B of 10 CFR part 430; (incorporated by reference, see § 429.4)) and for use in calculating performance at 35 °F. If required, the adjusted $H1_{Low}$ and $H3_{Low}$ tests shall be used to calculate $\dot{q}_{thi,H2,Low}$ and $P_{H2,Low}$, respectively, as described in section 6.1.3.4 of AHRI 210/240–2024 (if testing in accordance with appendix M1 to subpart B of 10 CFR part 430; (incorporated by reference, see § 429.4)) or of AHRI 1600–2024 (if testing in accordance with appendix M2 to subpart B of 10 CFR part 430; (incorporated by reference, see § 429.4)). No adjustments are required for intermediate or nominal compressor speed tests or, if cyclic tests are conducted, for the degradation coefficient(s).

TABLE 1 TO PARAGRAPH (k)(4)(v)(A)

CVP test	Certification tests that use the indicated CVP test compressor speed or would have certification test results adjusted per paragraph (k)(4)(v)(B) of this section, if the CVP test is out of capacity or EER/COP tolerance per paragraph (k)(4)(iii) of this section		
	Variable capacity certified, single capacity system	Variable capacity certified, two capacity system	Variable capacity system
A_{Full}	A_{Full}, B_{Full}	A_{Full}, B_{Full}	A_{Full}, B_{Full}.
F_{Low}	N/A	B_{Low}, F_{Low}	B_{Low}, F_{Low}.
$H1_{Low}$	N/A	$H0_{Low}$, $H1_{Low}$, $H3_{Low}$	$H0_{Low}$, $H1_{Low}$.
$H3_{Full}$	$H2_{Full}$, $H3_{Full}$	$H3_{Full}$	$H3_{Full}$.
$H4_{Full}$	$H4_{Full}$	$H4_{Full}$	$H4_{Full}$.

(B) The instructions of this paragraph shall be applied to systems for which the means for overriding the compressor and indoor blower speed as discussed in paragraph (k)(4)(v)(A) of this section is not provided by the control used for conducting the CVP. For each of the CVP tests listed in the first column of table 1 to paragraph (k)(4)(v)(A) of this section for which either the capacity tolerances of paragraph (k)(4)(iii)(B) or (C) of this section are not met or the efficiency tolerances of paragraph (k)(4)(iii)(D) of this section are not met, depending on which of the three kinds of system the model is designated, the certification test results to be adjusted based on the results of the CVP test are indicated by the last three columns of the table for each CVP test listed in the first column.

(*1*) The average capacities and power(s) measured during the CVP time period(s) described in paragraph (k)(4)(iii)(A) of this section shall be used (with no adjustment for tests having a CVP interval). For the certification tests requiring adjustment with no CVP interval (any required certification test in column 2, 3, or 4 of table 1 to paragraph (k)(4)(v)(A) of this section other than A_{Full}, F_{Low}, $H1_{Low}$, $H3_{Full}$ and $H4_{Full}$ for which the column 1 CVP interval did not meet capacity or EER2/COP2/EER/COP tolerances), the capacity and power shall be adjusted. The capacity shall be adjusted by applying the ratio of the capacity measured during the CVP test interval divided by the capacity measured during the certification test (for the corresponding CVP interval). The power shall be adjusted by applying the ratio of the power measured during the CVP test interval divided by the power measured during the certification test (for the corresponding CVP interval), as follows:

Cooling full capacity:

$$\dot{q}_{B,Full} = \dot{q}_{B,Full,Certification} \times \frac{\dot{q}_{CVP,A,Full}}{\dot{q}_{A,Full,Certification}}$$

Cooling full power:

$$P_{B,Full} = P_{B,Full,Certification} \times \frac{P_{CVP,A,Full}}{P_{A,Full,Certification}}$$

Cooling minimum capacity:

$$\dot{q}_{B,Low} = \dot{q}_{B,Low,Certification} \times \frac{\dot{q}_{CVP,F,Low}}{\dot{q}_{F,Low,Certification}}$$

Cooling minimum power:

$$P_{B,Low} = P_{B,Low,Certification} \times \frac{P_{CVP,F,Low}}{P_{F,Low,Certification}}$$

Heating minimum capacity:

$$\dot{q}_{H0,Low} = \dot{q}_{H0,Low,Certification} \times \frac{\dot{q}_{CVP,H1,Low}}{\dot{q}_{H1,Low,Certification}}$$

$$\dot{q}_{H3,Low} = \frac{\dot{q}_{CVP,H1,Low}}{(1 + 30 \cdot CSF)}$$

Heating minimum power:

$$P_{H0,Low} = P_{H0,Low,Certification} \times \frac{P_{CVP,H1,Low}}{P_{H1,Low,Certification}}$$

$$P_{H3,Low} = \frac{P_{CVP,H1,Low}}{(1 + 30 \cdot PSF)}$$

Where:

CSF = 0.0204/°F, capacity slope factor for Split Systems

CSF = 0.0262/°F, capacity slope factor for Single Package Units

PSF = 0.00455/°F, power slope factor for all products

(*2*) If required, the measured $Q_{H3,Full}$ and $E_{H3,Full}$ from the CVP shall be used to calculate $\dot{q}^{k=2}{}_{hcalc}(47)$ and $P^{k=2}{}_{hcalc}(47)$, respectively, to represent performance at 47 °F as described in section 11.2.2.4 of AHRI 210/240–2024 (if testing in accordance with appendix M1 to subpart B of 10 CFR part 430; (incorporated by reference, see § 429.4)) or of AHRI 1600–2024 (if testing in accordance with appendix M2; (incorporated by reference, see § 429.4)), and for use in calculating performance at 35 °F. If required, the measured $H1_{Low}$ from the CVP and the adjusted $H3_{Low}$ tests shall be used to calculate $\dot{q}_{thi,H2,Low}$ and $P_{H2,Low}$, respectively, as described in section 6.1.3.4 of AHRI 210/240–2024 (if testing in accordance with appendix M1 to subpart B of 10 CFR part 430; (incorporated by reference, see § 429.4)) or of AHRI 1600–2024 (if testing in accordance with appendix M2 to subpart B of 10 CFR part 430; (incorporated by reference, see § 429.4)). No adjustments are required for intermediate or nominal compressor speed tests or, if cyclic tests are conducted, the degradation coefficient(s).

(C) If the test unit is determined to be variable capacity certified, single capacity system, or variable capacity certified, two capacity system and is not certified or marketed for use with only a proprietary control device, the same simulated thermostat low voltage signal that resulted in full speed compressor operation for the full load intervals shall be used for all certification full load tests. If the test unit is determined to be variable capacity certified, two capacity system and is not certified or marketed for use with only a proprietary control device the same simulated thermostat low voltage signal that resulted in low-speed compressor operation for the low load intervals shall be used for all certification low load tests.

* * * * *

PART 430—ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

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

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

■ 7. Amend § 430.2 by revising the definition of ''Central air conditioner or central air conditioning heat pump'' to read as follows.

§ 430.2 Definitions.

* * * * *

Central air conditioner or central air conditioning heat pump means a product, other than a packaged terminal air conditioner, packaged terminal heat pump, single-phase single-package vertical air conditioner with cooling capacity less than 65,000 Btu/h, single-phase single-package vertical heat pump with cooling capacity less than 65,000 Btu/h, computer room air conditioner, or unitary dedicated outdoor air system as these equipment categories are defined at § 431.92 of this chapter, which is powered by single phase electric current, air cooled, rated below 65,000 Btu per hour, not contained within the same cabinet as a furnace, the rated capacity of which is above 225,000 Btu per hour, and is a heat pump or a cooling unit only. A central air conditioner or central air conditioning heat pump may consist of: A single-package unit; an outdoor unit and one or more indoor units; an indoor unit only; or an outdoor unit with no match. In the case of an indoor unit only or an outdoor unit with no match, the unit must be tested and rated as a system (combination of both an indoor and an outdoor unit).

* * * * *

■ 8. Amend § 430.3 by:

■ a. Removing ''appendices M and M1'' and adding in its place ''appendix M'' in paragraph (b)(4) introductory text;

■ b. Revising paragraphs (c) and (g)(1) through (3);

■ c. Removing ''appendices M and M1'' and adding in its place ''appendix M'' in paragraphs (g)(4) introductory text and (g)(21);

■ d. Redesignating paragraphs (g)(22) through (24) as paragraphs (g)(23) through (25); and

■ e. Adding new paragraph (g)(22).

The revisions and addition read as follows:

§ 430.3 Materials incorporated by reference.

* * * * *

(c) *AHRI.* Air-Conditioning, Heating, and Refrigeration Institute, 2311 Wilson Blvd., Suite 400, Arlington, VA 22201, (703) 524–8800, or go to: *www.ahrinet.org.*

(1) ANSI/AHRI 210/240–2008 with Addenda 1 and 2 (''AHRI 210/240–2008''), 2008 Standard for Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment, ANSI approved October 27, 2011 (Addendum 1 dated June 2011 and Addendum 2 dated March 2012); IBR approved for appendix M to subpart B, as follows:

(i) Section 6—Rating Requirements, Section 6.1—Standard Ratings, 6.1.3—Standard Rating Tests, 6.1.3.2—Electrical Conditions;

(ii) Section 6—Rating Requirements, Section 6.1—Standard Ratings, 6.1.3—Standard Rating Tests, 6.1.3.4—Outdoor-Coil Airflow Rate;

(iii) Section 6—Rating Requirements, Section 6.1—Standard Ratings, 6.1.3—Standard Rating Tests, 6.1.3.5—Requirements for Separated Assemblies;

(iv) Figure D1—Tunnel Air Enthalpy Test Method Arrangement;

(v) Figure D2—Loop Air Enthalpy Test Method Arrangement; and

(vi) Figure D4—Room Air Enthalpy Test Method Arrangement.

(2) AHRI Standard 210/240–2024 (I–P), (''AHRI 210/240–2024''), Performance Rating of Unitary Air-conditioning and Air-source Heat Pump Equipment; IBR approved for appendix M1 to subpart B.

(3) AHRI Standard 1160–2009 (''AHRI 1160''), Performance Rating of Heat Pump Pool Heaters, 2009; IBR approved for appendix P to subpart B.

(4) ANSI/AHRI 1230–2010 with Addendum 2 (''AHRI 1230–2010''), 2010 Standard for Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-Conditioning and Heat Pump Equipment (including Addendum 1 dated March 2011), ANSI approved August 2, 2010 (Addendum 2 dated June 2014); IBR approved for appendix M to subpart B, as follows:

(i) Section 3—Definitions (except 3.8, 3.9, 3.13, 3.14, 3.15, 3.16, 3.23, 3.24, 3.26, 3.27, 3.28, 3.29, 3.30, and 3.31);

(ii) Section 5—Test Requirements, Section 5.1 (untitled), 5.1.3–5.1.4;

(iii) Section 6—Rating Requirements, Section 6.1—Standard Ratings, 6.1.5—Airflow Requirements for Systems with Capacities <65,000 Btu/h [19,000 W];

(iv) Section 6—Rating Requirements, Section 6.1—Standard Ratings, 6.1.6—Outdoor-Coil Airflow Rate (Applies to all Air-to-Air Systems);

(v) Section 6—Rating Requirements, Section 6.2—Conditions for Standard Rating Test for Air-cooled Systems <65,000 Btu/h [19,000W] (except table 8); and

(vi) Table 4—Refrigerant Line Length Correction Factors.

(5) AHRI Standard 1600–2024 (I–P) (''AHRI 1600–2024''), Performance Rating of Unitary Air-conditioning and Air-source Heat Pump Equipment; IBR approved for appendix M2 to subpart B.

* * * * *

(g) * * *

(1) ANSI/ASHRAE Standard 16–2016 (''ANSI/ASHRAE 16''), Method of Testing for Rating Room Air Conditioners, Packaged Terminal Air Conditioners, and Packaged Terminal Heat Pumps for Cooling and Heating Capacity, ANSI approved November 1, 2016; IBR approved for appendices F, M1, and M2 to subpart B.

(2) ANSI/ASHRAE 23.1–2010 (''ASHRAE 23.1–2010''), Methods of Testing for Rating the Performance of Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Temperatures of the Refrigerant, ANSI approved January 28, 2010; IBR approved for appendix M to subpart B, as follows:

(i) Section 5—Requirements;

(ii) Section 6—Instruments;

(iii) Section 7—Methods of Testing; and

(iv) Section 8—Compressor Testing.

(3) ANSI/ASHRAE Standard 37–2009, (''ASHRAE 37–2009''), Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment, ANSI approved June 25, 2009; IBR approved for appendices CC, CC1, M1, and M2 to subpart B.

* * * * *

(22) ANSI/ASHRAE Standard 116–2010, (''ANSI/ASHRAE 116–2010''), Methods of Testing for Rating Seasonal Efficiency of Unitary Air Conditioners and Heat Pumps, ANSI approved February 24, 2010, IBR approved for appendices M1 and M2 to subpart B.

* * * * *

■ 9. Amend § 430.23 by revising paragraph (m) to read as follows:

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

* * * * *

(m) *Central air conditioners and heat pumps.* See the note at the beginning of appendices M1 and M2 to this subpart to determine the appropriate test method. Determine all values discussed in this section using a single appendix.

(1) Determine cooling capacity from the steady-state wet-coil test (A or A_{full} Test), as per instructions in section 2 of appendix M1 or M2 to this subpart, and rounded off to the nearest:

(i) To the nearest 50 Btu/h if cooling capacity is less than 20,000 Btu/h;

(ii) To the nearest 100 Btu/h if cooling capacity is greater than or equal to 20,000 Btu/h but less than 38,000 Btu/h; and

(iii) To the nearest 250 Btu/h if cooling capacity is greater than or equal to 38,000 Btu/h and less than 65,000 Btu/h.

(2) Determine seasonal energy efficiency ratio 2 (SEER2) as described in sections 2 and 5 of appendix M1 to this subpart or seasonal cooling and off-mode rating efficiency (SCORE) as described in sections 2 and 4 of appendix M2 to this subpart, and round off to the nearest 0.025 Btu/W-h.

(3) Determine energy efficiency ratio 2 (EER2) as described in section 2 of appendix M1 or energy efficiency ratio (EER) as described in section 2 of appendix M2 to this subpart and round off to the nearest 0.025 Btu/W-h. EER2 (for appendix M1 to this subpart) or EER (for appendix M2 to this subpart) is the efficiency from the A or A_{full} test, whichever applies.

(4) Determine heating seasonal performance factor 2 (HSPF2) as described in sections 2 and 5 of appendix M1 to this subpart or seasonal heating and off-mode rating efficiency (SHORE) as described in sections 2 and 4 of appendix M2 to this subpart, and round off to the nearest 0.025 Btu/W-h.

(5) Determine $P_{W,OFF,}$ average off-mode power consumption, as described in section 3 of appendix M1 to this subpart, and round off to the nearest 0.5 W. Average off-mode power consumption is not required when testing in accordance with appendix M2 to this subpart.

(6) Determine all other measures of energy efficiency or consumption or other useful measures of performance using appendix M1 or M2 of this subpart.

* * * * *

■ 10. Revise appendix M1 to subpart B of part 430 to read as follows:

Appendix M1 to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Central Air Conditioners and Heat Pumps

Note: Prior to July 7, 2025, representations with respect to the energy use or efficiency of central air conditioners and heat pumps, including compliance certifications, must be based on testing conducted in accordance with:

(a) Appendix M1 to this subpart, in the 10 CFR parts 200 through 499 edition revised as of January 1, 2023; or

(b) This appendix M1.

Beginning July 7, 2025, and prior to the compliance date of amended standards for central air conditioners and heat pumps based on Seasonal Cooling and Off-mode Rating Efficiency (SCORE) and Seasonal Heating and Off-mode Rating Efficiency (SHORE), representations with respect to energy use or efficiency of central air conditioners and heat pumps, including compliance certifications, must be based on testing conducted in accordance with this appendix.

Beginning on the compliance date of amended standards for central air conditioners and heat pumps based on SCORE and SHORE, representations with respect to energy use or efficiency of central air conditioners and heat pumps, including compliance certifications, must be based on testing conducted in accordance with appendix M2 to this subpart.

Manufacturers may also certify compliance with any amended energy conservation standards for central air conditioners and heat pumps based on SCORE or SHORE prior to the applicable compliance date for those standards, and those compliance certifications must be based on testing in accordance with appendix M2 to this subpart.

1. Incorporation by Reference

In § 430.3, DOE incorporated by reference the entire standard for AHRI 210/240–2024, ANSI/ASHRAE 16, ASHRAE 37–2009 and ANSI/ASHRAE 116–2010. However, certain enumerated provisions of AHRI 210/240–2024, ANSI/ASHRAE 16, ASHRAE 37–2009 and ANSI/ASHRAE 116–2010, as set forth in sections 1.1 through 1.4 of this appendix, are inapplicable. To the extent there is a conflict between the terms or provisions of a referenced industry standard and the CFR, the CFR provisions control.

1.1. AHRI 210/240–2024

(a) Section 1 Purpose is inapplicable,
(b) Section 2 Scope is inapplicable,
(c) The following subsections of Section 3 Definitions are inapplicable: 3.2.16 (Double-duct system), 3.2.20 (Gross capacity), 3.2.46 (Oil Recovery Mode), 3.2.51 (Published Rating), 3.2.63 (Standard Filter), 3.2.78 (Unitary Air-conditioner), 3.2.79 (Unitary Heat Pump),
(d) Section 4 Classifications is inapplicable,
(e) The following subsection of Section 5 Test Requirements is inapplicable: 5.1.6.2 (Outdoor Unit with No Match (OUWNM)),
(f) The following subsections of Section 6 Rating Requirements are inapplicable: 6.1.8, 6.2, 6.3, 6.4 and 6.5
(g) Section 7 Minimum Data Requirements for Published Ratings is inapplicable,
(h) Section 8 Operating Requirements is inapplicable,
(i) Section 9 Marking and Nameplate Data is inapplicable,
(j) Section 10 Conformance Conditions is inapplicable,
(k) Appendix A References—Normative is inapplicable,
(l) Appendix B References—Informative is inapplicable,
(m) Appendix C Secondary Capacity Check Requirements—Normative is inapplicable,
(n) Appendix F Unit Configurations for Standard Efficiency Determination—Normative is inapplicable,
(o) Appendix H Verification Testing—Normative is inapplicable,
(p) Appendix I Controls Verification Procedure—Normative is inapplicable, and
(q) Appendix J Determination of Cut in and Cut out temperatures—Normative is inapplicable.

1.2. ANSI/ASHRAE 37–2009

(a) Section 1—Purpose is inapplicable,
(b) Section 2—Scope is inapplicable, and
(c) Section 4—Classification is inapplicable.

1.3. ANSI/ASHRAE 16–2016

(a) Section 1—Purpose is inapplicable,
(b) Section 2—Scope is inapplicable, and
(c) Section 4—Classification is inapplicable.

1.4. ANSI/ASHRAE 116–2010

(a) Section 1—Purpose is inapplicable,
(b) Section 2—Scope is inapplicable,
(c) Section 4—Classification is inapplicable,
(d) Section 7—Methods of Test is inapplicable,
(e) References is inapplicable,
(f) Appendix A—Example Bin Calculations is inapplicable, and
(g) Appendix B—Bibliography is inapplicable.

2. General

Determine the cooling capacity, heating capacity, and applicable energy efficiency metrics (SEER2, HSPF2, and EER2) in accordance with the specified sections of AHRI 210/240–2024 and the applicable provisions of ANSI/ASHRAE 16, ASHRAE 37–2009, and ANSI/ASHRAE 116–2010. The A_{Full} (cooling mode) and $H1_{Full}$ or $H1_{Nom}$ (heating mode, if applicable) shall have a secondary capacity check completed. For all other tests in each mode, it is permissible to not use a secondary capacity check. For cooling mode tests of variable capacity systems, the compressor shall operate at the same cooling full speed, measured by RPM of power input frequency (Hz), for both A_{Full} and B_{Full} tests. Additionally, the compressor shall operate at the same cooling minimum speed, measured by RPM or power input frequency (Hz), for the B_{Low}, F_{Low}, G_{Low}, and I_{Low} tests.

Sections 3, 4, and 5 of this appendix provide additional instructions for testing. In cases where there is a conflict, the language of this appendix takes highest precedence, followed, in order, by: AHRI 210/240–2024, ASHRAE 37–2009, ANSI/ASHRAE 16 and ANSI/ASHRAE 116–2010. Any subsequent amendment to a referenced document by the standard-setting organization will not affect the test procedure in this appendix, unless and until the test procedure is amended by DOE. Material is incorporated as it exists on the date of the approval, and a notice of any change in the incorporation will be published in the **Federal Register**.

3. Off-Mode Power

Determine off-mode power, $P_{W,\ OFF}$, in accordance with section 11.3 and appendix G of AHRI 210/240–2024.

4. Outdoor Units With No Match (OUWNM)

4.1. Definition. An Outdoor Unit that is not distributed in commerce with any indoor units, that meets any of the following criteria:

(a) Is designed for use with a refrigerant that makes the unit banned for installation when paired with a new Indoor Unit to create a new system, according to EPA regulations in 40 CFR chapter I, subchapter C,

(b) Is designed for use with a refrigerant that has a 95 °F midpoint saturation absolute pressure that is ±18 percent of the 95 °F saturation absolute pressure for R–22 and global warming potential greater than 150 per EPA regulations in 40 CFR 84.64, or

(c) Is shipped without a specified refrigerant from the point of manufacture or is shipped such that more than two pounds of refrigerant are required to meet the charge per section 5.1.8 of AHRI 210/240–2024. This shall not apply if either:

(1) The factory charge is equal to or greater than 70% of the outdoor unit internal volume times the liquid density of refrigerant at 95 °F, or

(2) An A2L refrigerant is approved for use and listed in the certification report.

4.2. Testing. An OUWNM shall be tested at a single cooling air volume rate with an indoor coil having nominal tube diameter of 0.375 in and an NGIFS of 1.0 or less (as determined in section 5.1.6.3 of AHRI 210/240–2024). Tested values of CD^c and/or CD^h are not permitted. The default value, 0.25, shall be used for both cooling and heating mode testing.

5. Test Conditions

5.1. Test Conditions for Certifying Compliance with Standards. The following conditions specified in AHRI 210/240–2024 apply when testing to certify to the SEER2 and HSPF2 energy conservation standards in § 430.32(c).

(a) For cooling mode, use the rating conditions specified in table 8 of AHRI 210/240–2024 and the fractional cooling bin hours in table 15 of AHRI 210/240–2024 to determine SEER2, and EER2 for models subject to regional standards in terms of EER2.

(b) For heat pump heating mode, use the rating conditions specified in table 8 of AHRI 210/240–2024 and the fractional heating bin hours specified for Region IV in table 16 of AHRI 210/240–2024 to determine the heating efficiency metric, HSPF2.

5.2. Optional Representations. Representations of EER2 made using the rating conditions specified in table 8 of AHRI 210/240–2024 are optional for models not subject to regional standards in terms of EER2. Representations of HSPF2 made using the rating conditions specified in table 8 of AHRI 210/240–2024 and the fractional heating hours specified for Regions other than Region IV in table 16 of AHRI 210/240–2024 are optional. Representations of COP_{peak} made using appendix K are optional.

■ 11. Add appendix M2 to subpart B of part 430 to read as follows:

Appendix M2 to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Central Air Conditioners and Heat Pumps

Note: Prior to July 7, 2025, representations with respect to the energy use or efficiency of central air conditioners and heat pumps, including compliance certifications, must be based on testing conducted in accordance with:

(a) Appendix M1 to this subpart, in the 10 CFR parts 200 through 499 edition revised as of January 1, 2023; or

(b) Appendix M1 to this subpart.

Beginning July 7, 2025, and prior to the compliance date of amended standards for central air conditioners and heat pumps based on Seasonal Cooling and Off-mode Rating Efficiency (SCORE) and Seasonal Heating and Off-mode Rating Efficiency (SHORE), representations with respect to energy use or efficiency of central air conditioners and heat pumps, including

compliance certifications, must be based on testing conducted in accordance with appendix M1 to this subpart.

Beginning on the compliance date of amended standards for central air conditioners and heat pumps based on SCORE and SHORE, representations with respect to energy use or efficiency of central air conditioners and heat pumps, including compliance certifications, must be based on testing conducted in accordance with this appendix.

Manufacturers may also certify compliance with any amended energy conservation standards for central air conditioners and heat pumps based on SCORE or SHORE prior to the applicable compliance date for those standards, and those compliance certifications must be based on testing in accordance with this appendix.

1. Incorporation by Reference

In § 430.3, DOE incorporated by reference the entire standard for AHRI 1600–2024, ANSI/ASHRAE 16, ASHRAE 37–2009, and ANSI/ASHRAE 116–2010. However, certain enumerated provisions of AHRI 1600–2024, ANSI/ASHRAE 16, ASHRAE 37–2009, and ANSI/ASHRAE 116–2010, as set forth in sections 1.1 through 1.4 of this appendix, are inapplicable. To the extent there is a conflict between the terms or provisions of a referenced industry standard and the CFR, the CFR provisions control.

1.1. AHRI 1600–2024

(a) Section 1 Purpose is inapplicable,
(b) Section 2 Scope is inapplicable,
(c) The following sections of Section 3 Definitions are inapplicable: 3.2.16 (Double-duct system), 3.2.20 (Gross capacity), 3.2.45 (Oil Recovery Mode), 3.2.50 (Published Rating), 3.2.63 (Standard Filter), 3.2.78 (Unitary Air-conditioner), 3.2.79 (Unitary Heat Pump),
(d) Section 4 Classifications is inapplicable,
(e) The following subsection of Section 5 Test Requirements is inapplicable: 5.1.6.2 (Outdoor Unit with No Match (OUWNM)),
(f) The following subsections of Section 6 Rating Requirements are inapplicable: 6.1.8, 6.2, 6.3, 6.4 and 6.5
(g) Section 7 Minimum Data Requirements for Published Ratings is inapplicable,
(h) Section 8 Operating Requirements is inapplicable,
(i) Section 9 Marking and Nameplate Data is inapplicable,
(j) Section 10 Conformance Conditions is inapplicable,
(k) Appendix A References—Normative is inapplicable,
(l) Appendix B References—Informative is inapplicable,
(m) Appendix C Secondary Capacity Check Requirements—Normative is inapplicable,
(n) Appendix F Unit Configurations for Standard Efficiency Determination—Normative is inapplicable,
(o) Appendix H Verification Testing—Normative is inapplicable,
(p) Appendix I Controls Verification Procedure—Normative is inapplicable, and
(q) Appendix J Determination of Cut in and Cut out temperatures—Normative is inapplicable.

1.2. ANSI/ASHRAE 37–2009

(a) Section 1—Purpose is inapplicable,
(b) Section 2—Scope is inapplicable, and
(c) Section 4—Classification is inapplicable.

1.3. ANSI/ASHRAE 16–2016

(a) Section 1—Purpose is inapplicable,
(b) Section 2—Scope is inapplicable, and
(c) Section 4—Classification is inapplicable.

1.4. ANSI/ASHRAE 116–2010

(a) Section 1—Purpose is inapplicable,
(b) Section 2—Scope is inapplicable,
(c) Section 4—Classification is inapplicable,
(d) Section 7—Methods of Test is inapplicable,
(e) References is inapplicable,
(f) Appendix A—Example Bin Calculations is inapplicable, and
(g) Appendix B—Bibliography is inapplicable.

2. General

Determine the applicable energy efficiency metrics (SCORE, SHORE, and EER) in accordance with the specified sections of AHRI 1600–2024 and the applicable provisions of ANSI/ASHRAE 16, ASHRAE 37–2009, and ANSI/ASHRAE 116–2010. The A_{Full} (cooling mode) and $H1_{Full}$ or $H1_{Nom}$ (heating mode, if applicable) shall have a secondary capacity check completed. For all other tests in each mode, it is permissible to not use a secondary capacity check. For cooling mode tests of variable capacity systems, the compressor shall operate at the same cooling full speed, measured by RPM of power input frequency (Hz), for both A_{Full} and B_{Full} tests. Additionally, the compressor shall operate at the same cooling minimum speed, measured by RPM or power input frequency (Hz), for the B_{Low}, F_{Low}, G_{Low}, and I_{Low} tests.

Sections 3 and 4 of this appendix provide additional instructions for testing. In cases where there is a conflict, the language of this appendix takes highest precedence, followed, in order, by: AHRI 1600–2024, ASHRAE 37–2009, ANSI/ASHRAE 16, and ANSI/ASHRAE 116–2010. Any subsequent amendment to a referenced document by the standard-setting organization will not affect the test procedure in this appendix, unless and until the test procedure is amended by DOE. Material is incorporated as it exists on the date of the approval, and a notice of any change in the incorporation will be published in the **Federal Register**.

3. Outdoor Units With No Match (OUWNM)

3.1. Definition. An Outdoor Unit that is not distributed in commerce with any indoor units, that meets any of the following criteria:

(a) Is designed for use with a refrigerant that makes the unit banned for installation when paired with a new Indoor Unit as a system, according to EPA regulations in 40 CFR chapter I, subchapter C,

(b) Is designed for use with a refrigerant that has a 95 °F midpoint saturation absolute pressure that is ±18 percent of the 95 °F saturation absolute pressure for R–22 and a global warming potential greater than 150 per EPA regulations in 40 CFR 84.64, or

(c) Is shipped without a specified refrigerant from the point of manufacture or is shipped such that more than two pounds of refrigerant are required to meet the charge per section 5.1.8 of AHRI 1600–2024. This shall not apply if either:

(1) The factory charge is equal to or greater than 70% of the outdoor unit internal volume times the liquid density of refrigerant at 95 °F or,

(2) An A2L refrigerant is approved for use and listed in the certification report

3.2. Testing. An OUWNM shall be tested at a single cooling air volume rate with an indoor coil having nominal tube diameter of 0.375 in and an NGIFS of 1.0 or less (as determined in section 5.1.6.3 of AHRI 1600–2024). Tested values of CD^c and/or CD^h are not permitted. The default value, 0.25, shall be used for both cooling and heating mode testing.

4. Test Conditions

4.1. Test Conditions for Certifying Compliance with Standards. The following conditions specified in AHRI 1600–2024 apply if testing to certify to the SCORE and SHORE energy conservation standards in § 430.32(c).

(a) For cooling mode, use the rating conditions specified in table 8 of AHRI 1600–2024 and the 'U.S. National Average' cooling conditioning hours and shoulder season hours in table 15 of AHRI 1600–2024, to determine SCORE, and EER for models subject to regional standards in terms of EER.

(b) For heat pump heating mode, use the rating conditions specified in table 8 of AHRI 1600–2024 and the 'U.S. National Average' heating conditioning hours and shoulder season hours specified in table 18 of AHRI 1600–2024 to determine the heating efficiency metric, SHORE.

4.2. Optional Representations. Representations of EER made using the rating conditions specified in table 8 of AHRI 1600–2024 are optional for models not subject to regional standards in terms of EER. Representations of SHORE made using the rating conditions specified in table 8 of AHRI 1600–2024 and the 'Cold Climate Average' heating conditioning hours and shoulder season hours in table 18 of AHRI 1600–2024 are optional. Representations of COP_{peak} made using appendix K are optional.

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