DEPARTMENT OF ENERGY

10 CFR Parts 429 and 431

[EERE–2023–BT–TP–0014]

RIN 1904–AD93

Energy Conservation Program: Test Procedures for Air-Cooled, Evaporatively-Cooled, and Water-Cooled Commercial Package Air Conditioners and Heat Pumps

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

ACTION: Notice of proposed rulemaking and request for comment.

SUMMARY: The U.S. Department of Energy (DOE) proposes to amend the Federal test procedures for air-cooled commercial package air conditioners and heat pumps with a rated cooling capacity greater than or equal to 65,000 Btu/h, evaporatively-cooled commercial package air conditioners, and water-cooled commercial package air conditioners to incorporate by reference the latest versions of the applicable industry test standards. Specifically, DOE proposes: to amend the current test procedure for this equipment for measuring the current cooling and heating metrics—integrated energy efficiency ratio (IEER) and coefficient of performance (COP), respectively; and to establish a new test procedure for this equipment that would adopt two new metrics—integrated ventilation, economizer, and cooling (IVEC) and integrated ventilation and heating efficiency (IVHE). Testing to the IVEC and IVHE 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 proposes to amend certain provisions of DOE's regulations related to representations and enforcement for the subject equipment. DOE welcomes written comments from the public on any subject within the scope of this document (including topics not raised in this proposal), as well as the submission of data and other relevant information.

DATES:

Comments: DOE will accept comments, data, and information regarding this notice of proposed rulemaking (NOPR) no later than October 16, 2023. *See* section V, ''Public Participation,'' for further details.

Meeting: DOE will hold a public meeting via webinar on Thursday, September 7, 2023, from 1:00 p.m. to 4:00 p.m. *See* section V, ''Public Participation,'' for webinar registration information, participant instructions, and information about the capabilities available to webinar participants.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov* under docket number EERE–2023–BT–TP–0014. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE–2023–BT–TP–0014 and/or RIN 1904–AD93, by any of the following methods:

Email: CUACHP2023TP0014@ee.doe.gov. Include the docket number EERE–2023–BT–TP–0014 and/or RIN 1904–AD93 in the subject line of the message.

Postal Mail: Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, Mailstop EE–5B, 1000 Independence Avenue SW, Washington, DC 20585–0121. If possible, please submit all items on a compact disc (CD), in which case it is not necessary to include printed copies.

Hand Delivery/Courier: Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza SW, 6th Floor, Washington, DC 20024. Telephone: (202) 287–1445. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

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

Docket: The docket for this activity, which includes **Federal Register** notices, public meeting webinar attendee lists and transcripts (if a public meeting is held), 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 information that is exempt from public disclosure.

The docket web page can be found at *www.regulations.gov/docket/EERE-2023-BT-TP-0014.* The docket web page contains instructions on how to access all documents, including public comments, in the docket. *See* section V (Public Participation) for information on how to submit comments through *www.regulations.gov.*

FOR FURTHER INFORMATION CONTACT: Mr. Lucas Adin, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE–5B, 1000 Independence Avenue SW, Washington, DC 20585–0121. Telephone: (202) 287–5904. Email: *ApplianceStandardsQuestions@ee.doe.gov.*

Ms. Melanie Lampton, U.S. Department of Energy, Office of the General Counsel, GC–33, 1000 Independence Avenue SW, Washington, DC 20585–0121. Telephone: (240) 571–5157. Email: *Melanie.Lampton@hq.doe.gov.*

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

SUPPLEMENTARY INFORMATION: DOE proposes to maintain a previously approved incorporation by reference and to incorporate by reference the following industry standards into parts 429 and 431:

AHRI Standard 340/360–2022 (I–P), *2022 Standard for Performance Rating of Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment,* AHRI approved January 26, 2022 (AHRI 340/360–2022).

Copies of AHRI 340/360–2022 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/standards/search-standards.*

AHRI Standard 1340(I–P)–202X Draft, *Performance Rating of Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment* (AHRI 1340–202X Draft). AHRI 1340–202X Draft is in draft form and its text was provided to DOE for the purposes of review only during the drafting of this NOPR. If this industry test standard is formally adopted, DOE intends to incorporate by reference the final published version of AHRI 1340 in DOE's subsequent test procedure final rule. If there are substantive changes between the draft and published versions for which DOE receives stakeholder comments in response to this NOPR recommending that DOE adopt provisions consistent with the published version of AHRI 1340, then DOE may consider adopting those provisions. If there are substantive changes between the draft and published versions for which stakeholder comments do not express support, DOE may adopt the substance of the AHRI 1340–202X Draft or provide additional opportunity for comment on the changes to the industry consensus standard.

A copy of the AHRI 1340–202X Draft is provided in the docket for this rulemaking for review.

ANSI/ASHRAE Standard 37–2009, *Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment,* ASHRAE approved June 24, 2009 (ANSI/ASHRAE 37–2009).

Copies of ANSI/ASHRAE 37–2009 can be obtained from the American Society of Heating, Refrigerating and Air-Conditioning Engineers, 180 Technology Parkway, Peachtree Corners, GA 30092, (404) 636–8400, or online at: *www.ashrae.org.*

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

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I. Authority and Background

Small, large, and very large commercial package air conditioning and heating equipment are included in the list of ''covered equipment'' for which DOE is authorized to establish and amend energy conservation standards and test procedures. (42 U.S.C. 6311(1)(B)–(D)) Commercial package air conditioning and heating equipment includes as equipment categories the air-cooled commercial unitary air conditioners with a rated cooling capacity greater than or equal to 65,000 Btu/h (ACUACs) and air-cooled commercial unitary heat pumps with a rated cooling capacity greater than or equal to 65,000 Btu/h (ACUHPs), evaporatively-cooled commercial unitary air conditioners (ECUACs), and water-cooled commercial unitary air conditioners (WCUACs), which are the subject of this NOPR.[1] (ECUACs,

[1] While ACUACs with rated cooling capacity less than 65,000 Btu/h are included in the broader category of CUACs, they are not addressed in this NOPR. The test procedure for ACUACs with rated cooling capacity less than 65,000 Btu/h have been addressed in a separate rulemaking: *see* Docket No. EERE–2017–BT–TP–0018–0031. All references within this NOPR to ACUACs and ACUHPs exclude

Continued

WCUACs, and ACUACs and ACUHPs including double-duct equipment are collectively referred to as CUACs and CUHPs in this document.) The current DOE test procedures for CUACs and CUHPs are codified at title 10 of the Code of Federal Regulations (CFR) part 431, subpart F, section 96, Table 1. The following sections discuss DOE's authority to establish and amend test procedures for CUACs and CUHPs, as well as relevant background information regarding DOE's proposed amendments to the test procedures for this equipment.

A. Authority

The Energy Policy and Conservation Act, Public Law 94–163 (42 U.S.C. 6291–6317, as codified), as amended (EPCA),[2] authorizes DOE to regulate the energy efficiency of a number of consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part C [3] of EPCA, added by Public Law 95–619, Title IV, section 441(a), established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve energy efficiency. This covered equipment includes small, large, and very large commercial package air conditioning and heating equipment. (42 U.S.C. 6311(1)(B)–(D)) Commercial package air conditioning and heating equipment includes CUACs and CUHPs, which are the subject of this document.

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 include definitions (42 U.S.C. 6311), energy conservation standards (42 U.S.C. 6313), test procedures (42 U.S.C. 6314), labeling provisions (42 U.S.C. 6315), and the authority to require information and reports from manufacturers (42 U.S.C. 6316; 42 U.S.C. 6296).

The Federal testing requirements consist of test procedures that manufacturers of covered equipment must use as the basis for: (1) certifying to DOE that their equipment complies with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6316(b); 42 U.S.C. 6296), and (2) making representations about the efficiency of that equipment (42 U.S.C. 6314(d)). Similarly, DOE uses these test procedures to determine whether the equipment complies with relevant standards promulgated under EPCA.

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

Under 42 U.S.C. 6314, EPCA also sets forth the general criteria and procedures DOE is required to follow when prescribing or amending test procedures for covered equipment. Specifically, EPCA requires that any test procedure prescribed or amended under this section must be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating cost of a given type of covered equipment (or class thereof) during a representative average use cycle and requires that such test procedures not be unduly burdensome to conduct. (42 U.S.C. 6314(a)(2)–(3))

As discussed, CUACs and CUHPs are classified as commercial package air conditioning and heating equipment. EPCA requires that the test procedures for commercial package air conditioning and heating equipment be those generally accepted industry testing procedures or rating procedures developed or recognized by AHRI or ASHRAE, as referenced in ASHRAE Standard 90.1, ''Energy Standard for Buildings Except Low-Rise Residential Buildings'' (ASHRAE Standard 90.1). (42 U.S.C. 6314(a)(4)(A)) Further, if such an industry test procedure is amended, DOE must update its test procedure to be consistent with the amended industry test procedure, unless DOE determines, by rule published in the **Federal Register** and supported by clear and convincing evidence, that the amended test procedure would not meet the requirements in 42 U.S.C. 6314(a)(2) and (3) related to representative use and test burden, in which case DOE may establish an amended test procedure that does satisfy those statutory provisions. (42 U.S.C. 6314(a)(4)(B) and (C))

EPCA also requires that, at least once every seven years, DOE evaluate test procedures for each type of covered equipment, including CUACs and CUHPs, to determine whether amended test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating costs during a representative average use cycle. (42 U.S.C. 6314(a)(1)–(3))

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

DOE is proposing amendments to the test procedures for CUACs and CUHPs in satisfaction of its aforementioned statutory obligations under EPCA. (42 U.S.C. 6314(a)(4)(A)) and (42 U.S.C 6314(a)(1)–(3))

B. Background

DOE's existing test procedure for CUACs and CUHPs appears at 10 CFR 431.96 (Uniform test method for the measurement of energy efficiency of commercial air conditioners and heat pumps). The test procedure for ACUACs and ACUHPs with a rated cooling capacity of greater than or equal to 65,000 Btu/h specified in 10 CFR 431.96 references appendix A to subpart F of part 431 (Uniform Test Method for the Measurement of Energy Consumption of Air-Cooled Small (≥65,000 Btu/h), Large, and Very Large Commercial Package Air Conditioning and Heating Equipment, referred to as appendix A in this document). Appendix A references certain sections of ANSI/AHRI Standard 340/360–2007, 2007 Standard for Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment, approved by ANSI on October 27, 2011 and updated by addendum 1 in December 2010 and addendum 2 in June 2011 (ANSI/AHRI 340/360–2007); ANSI/ASHRAE Standard 37–2009, Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment (ANSI/ASHRAE 37–2009); and specifies other test procedure requirements related to minimum external static pressure (ESP), optional break-in period, refrigerant charging, setting indoor airflow, condenser head pressure controls, standard airflow and air quantity, tolerance on capacity at

equipment with rated cooling capacity less than 65,000 Btu/h.

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

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

part-load test points, and condenser air inlet temperature for part-load tests.

The DOE test procedure for ECUACs and WCUACs with a rated cooling capacity of greater than or equal to 65,000 Btu/h specified in 10 CFR 431.96 incorporates by reference ANSI/AHRI 340/360–2007 (excluding section 6.3 of ANSI/AHRI 340/360–2007 and including paragraphs (c) and (e) of § 431.96.[4]) The DOE test procedure for ECUACs and WCUACs with a rated cooling capacity of less than 65,000 Btu/h incorporates by reference ANSI/AHRI Standard 210/240–2008, ''2008 Standard for Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment,'' approved by ANSI on October 27, 2011 and updated by addendum 1 in June 2011 and addendum 2 in March 2012 (ANSI/AHRI 210/240–2008).

On October 26, 2016, ASHRAE published ASHRAE Standard 90.1–2016, which included updates to the test procedure references for CUACs and CUHPs (excluding CUACs and CUHPs with a rated cooling capacity less than 65,000 Btu/h) to reference AHRI Standard 340/360–2015, 2015 Standard for Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment (AHRI 340/360–2015).[5] This action by ASHRAE triggered DOE's obligations under 42 U.S.C. 6314(a)(4)(B), as outlined previously. On July 25, 2017, DOE published a request for information (RFI) (July 2017 TP RFI) in the **Federal Register** to collect information and data to consider amendments to DOE's test procedures for certain categories of commercial package air conditioning and heating equipment including CUACs and CUHPs. 82 FR 34427. As part of the July 2017 TP RFI, DOE identified several aspects of the currently applicable Federal test procedures for CUACs and CUHPs that might warrant modifications, in particular: incorporation by reference of the most recent version of the relevant industry standard(s); efficiency metrics and calculations; and clarification of test methods. *Id.* at 82 FR 34439–34445. DOE also requested comment on any additional topics that may inform DOE's decisions in a future test procedure rulemaking, including methods to reduce regulatory burden while ensuring the procedures' accuracies. *Id.* at 82 FR 34448.

DOE received a number of comments regarding CUACs and CUHPs in response to the July 2017 TP RFI from interested parties. Table I.1 lists the commenters that provided comments relevant to CUACs and CUHPs, along with each commenter's abbreviated name used throughout this NOPR.[6] Discussion of the relevant comments, and DOE's responses, are provided in the appropriate sections of this document.

TABLE I.1—LIST OF COMMENTERS WITH WRITTEN SUBMISSIONS IN RESPONSE TO THE JULY 2017 TP RFI RELEVANT TO CUACS AND CUHPS

Name of commenter	Abbreviation used	Comment No. in the docket	Commenter type
Air-Conditioning, Heating, and Refrigeration Institute	AHRI	11	Trade Association.
Appliance Standards Awareness Project, Alliance to Save Energy, American Council for an Energy-Efficient Economy, Northwest Energy Efficiency Alliance, and Northwest Power and Conservation Council.	ASAP, ASE, *et al*	9	Efficiency Advocacy Organizations.
Carrier Corporation	Carrier	6	Manufacturer.
Goodman Global Inc	Goodman	14	Manufacturer.
Ingersoll Rand	Trane	12	Manufacturer.
Lennox International Inc	Lennox	8	Manufacturer.
National Comfort Institute	NCI	4	Trade Association.
Pacific Gas and Electric Company, Southern California Gas Company, San Diego Gas and Electric, and Southern California Edison; (collectively referred to as the ''California Investor-Owned Utilities'').	CA IOUs	7	Utilities.

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.[7] For cases in which this NOPR references comments received in response to the July 2017 TP RFI (which are contained within a different docket [8]), the full docket number (rather than just the document number) is included in the parenthetical reference.

At the time DOE published the July 2017 TP RFI, the applicable version of ASHRAE Standard 90.1 was the 2016 edition, which referenced AHRI Standard 340/360–2015, 2015 Standard for Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment as the test procedure for CUACs and CUHPs. On October 24, 2019, ASHRAE published ASHRAE Standard 90.1–2019, which updated the relevant AHRI Standard 340/360 reference to the 2019 edition, *2019 Standard for Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment* (AHRI 340/360–2019). In January 2022, AHRI published additional updates to its test procedure standard for CUACs and CUHPs, with the publication of AHRI Standard 340/360–2022, *2022 Standard for Performance Rating of Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment* (AHRI 340/360–2022), which DOE is proposing to reference in the amended test procedure in appendix A to subpart F of 10 CFR part 431 in this NOPR. These industry test standards are discussed further in section III.C of this NOPR. To the extent that comments on the July 2017 TP RFI are still relevant to AHRI 340/360–2022, DOE addresses such comments in the following sections.

[4] Paragraphs (c) and (e) of 10 CFR 431.96 address optional break-in provisions and additional provisions regarding set up, respectively.

[5] The previous version of ASHRAE Standard 90.1 (*i.e.,* ASHRAE Standard 90.1–2013) references ANSI/AHRI 340/360–2007.

[6] The parenthetical reference provides a reference for information located in a docket related to DOE's rulemaking to develop test procedures for CUACs and CUHPs. As noted, the July 2017 RFI addressed a variety of different equipment categories and is available under docket number EERE–2017–BT–TP–0018, which is maintained at *www.regulations.gov.* As this NOPR addresses only CUACs and CUHPs, it has been assigned a separate docket number (*i.e.,* EERE–2022–BT–STD–0015). The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

[7] The parenthetical reference provides a reference for information located in the relevant docket, which is maintained at *www.regulations.gov.* The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

[8] Comments submitted in response to the July 2017 TP RFI are available in Docket No. EERE–2017–BT–TP–0018.

For ECUACs and WCUACs with a rated cooling capacity less than 65,000 Btu/h, ASHRAE Standard 90.1–2016 references ANSI/AHRI 210/240–2008. After the publication of the July 2017 RFI, AHRI published AHRI Standard 210/240–2017, *2017 Standard for Performance Rating of Unitary Air-conditioning & Air-source Heat Pump Equipment* (AHRI 210/240–2017). ASHRAE Standard 90.1–2019 references AHRI 210/240–2017 as the test procedure for ECUACs and WCUACs with rated cooling capacities less than 65,000 Btu/h. After the publication of AHRI 210/240–2017, AHRI released two updates to that industry standard: (1) AHRI Standard 210/240–2017 with Addendum 1, *2017 Standard for Performance Rating of Unitary Air-conditioning & Air-source Heat Pump Equipment* (AHRI 210/240–2017 with Addendum 1), which was published in April 2019; and (2) AHRI Standard 210/240–2023, *2023 Standard for Performance Rating of Unitary Air-conditioning & Air-source Heat Pump Equipment* (AHRI 210/240–2023), which was published in May 2020.

On May 12, 2020, DOE published an RFI in the **Federal Register** regarding energy conservation standards for ACUACs, ACUHPs, and commercial warm air furnaces (May 2020 ECS RFI). 85 FR 27941. In response to the May 2020 ECS RFI, DOE received comments from various stakeholders, including ones related to the test procedure for ACUACs and ACUHPs. Table I.2 lists the stakeholders whose comments in response to the May 2020 ECS RFI were related to the ACUAC and ACUHP test procedures and have been considered in this rulemaking. For cases in which this NOPR references comments received in response to the May 2020 ECS RFI (which are contained within a different docket [9]), the full docket number (rather than just the item entry number) is included in the parenthetical reference.

TABLE I.2—LIST OF COMMENTERS WITH WRITTEN SUBMISSIONS IN RESPONSE TO THE MAY 2020 ECS RFI RELEVANT TO CUAC AND CUHP TEST PROCEDURES

Name of commenter	Abbreviation used	Comment No. in the docket	Commenter type
Appliance Standards Awareness Project, American Council for an Energy Efficient Economy, California Energy Commission, Natural Resources Defense Council, and Northeast Energy Efficiency Partnerships.	ASAP, ACEEE, *et al.*	23	Efficiency Advocacy Organizations and State Agency.
Carrier Corporation	Carrier	13	Manufacturer.
Goodman Manufacturing Company	Goodman	17	Manufacturer.
John Walsh	Walsh	18	Individual.
Kristin Heinemeier	Heinemeier	12	Individual.
Northwest Energy Efficiency Alliance	NEEA	24	Efficiency Advocacy Organization.
Pacific Gas and Electric Company, San Diego Gas and Electric, and Southern California Edison; (collectively referred to as the "California Investor-Owned Utilities").	CA IOUs	20	Utilities.
Trane Technologies	Trane	16	Manufacturer.
Verified Inc	Verified	11	Efficiency Advocacy Organization.

On May 25, 2022, DOE published an RFI in the **Federal Register** regarding test procedures and energy conservations standards for CUACs and CUHPs (May 2022 TP/ECS RFI). 87 FR 31743. In response to the May 2022 TP/ECS RFI, DOE notes that it received comments from various stakeholders related to the test procedure for CUACs and CUHPs. Table I.3 lists the stakeholders whose comments in response to the May 2022 TP/ECS RFI were related to the CUAC and CUHP test procedures and have been considered in this proposed rulemaking. For cases in which this NOPR references comments received in response to the May 2022 TP/ECS RFI (which are contained within a different docket [10]), the full docket number (rather than just the item entry number) is included in the parenthetical reference.

TABLE I.3—LIST OF COMMENTERS WITH WRITTEN SUBMISSIONS IN RESPONSE TO THE MAY 2022 TP/ECS RFI RELEVANT TO CUAC AND CUHP TEST PROCEDURES

Name of commenter	Abbreviation used	Comment No. in the docket	Commenter type
Air-Conditioning Heating and Refrigeration Institute	AHRI	8	Manufacturer.
Appliance Standards Awareness Project, American Council for an Energy-Efficient Economy.	ASAP and ACEEE	11	Efficiency Advocacy Organizations.
Carrier Corporation	Carrier	10	Manufacturer.
Lennox International Inc	Lennox	9	Manufacturer.
New York State Energy Research and Development Authority	NYSERDA	7	State Agency.
Northwest Energy Efficiency Alliance	NEEA	13	Efficiency Advocacy Organization.
Pacific Gas and Electric Company, San Diego Gas and Electric, and Southern California Edison; (collectively referred to as the "California Investor-Owned Utilities").	CA IOUs	12	Utilities.

[9] Comments submitted in response to the May 2020 ECS RFI are available in Docket No. EERE–2019–BT–STD–0042.

[10] Comments submitted in response to the May 2022 ECS/TP RFI are available in Docket No. EERE–2022–BT–STD–0015.

TABLE I.3—LIST OF COMMENTERS WITH WRITTEN SUBMISSIONS IN RESPONSE TO THE MAY 2022 TP/ECS RFI RELEVANT TO CUAC AND CUHP TEST PROCEDURES—Continued

Name of commenter	Abbreviation used	Comment No. in the docket	Commenter type
Trane Technologies	Trane	14	Manufacturer.

On July 29, 2022, DOE published in the **Federal Register** a notice of intent to establish a working group for commercial unitary air conditioners and heat pumps (Working Group) to negotiate proposed test procedures and amended energy conservation standards for this equipment (July 2022 Notice of Intent). 87 FR 45703. The Working Group was established under the Appliance Standards and Rulemaking Federal Advisory Committee (ASRAC) in accordance with the Federal Advisory Committee Act (FACA) (5 U.S.C App 2) and the Negotiated Rulemaking Act (NRA) (5 U.S.C. 561–570, Pub. L. 104–320). The purpose of the Working Group was to discuss, and if possible, reach consensus on recommended amendments to the test procedures and energy conservation standards for ACUACs and ACUHPs. The Working Group consisted of 14 voting members, including DOE. (*See* appendix A, Working Group Members, Document No. 65 in Docket No. EERE–2022–BT–STD–0015) On December 15, 2022, the Working Group signed a term sheet of recommendations regarding ACUAC and ACUHP test procedures to be submitted to ASRAC, the contents of which are referenced throughout this NOPR (referred to hereafter as the ACUAC and ACUHP Working Group TP Term Sheet). (*See Id.*) The ACUAC and ACUHP Working Group TP Term Sheet was approved by ASRAC on March 2, 2023. These recommendations are discussed further in section III.D of this NOPR.

In January 2023, ASHRAE published ASHRAE Standard 90.1–2022, which included updates to the test procedure references for CUACs and CUHPs with cooling capacities greater than or equal to 65,000 Btu/h, specifically referencing AHRI 340/360–2022. For ECUACs and WCUACs with capacities less than 65,000 Btu/h, ASHRAE Standard 90.1–2022 references AHRI 210/240–2023.

Notably, ECUACs and WCUACs with a rated cooling capacity less than 65,000 Btu/h were removed from the scope of AHRI 210/240–2023, and are instead included in the scope of AHRI 340/360–2022. DOE discusses this change in scope to the industry test procedure and comments received related to ECUACs and WCUACs with a cooling capacity less than 65,000 Btu/h in section III.G.9 of this NOPR.

Following the publication of ASHRAE Standard 90.1–2022, AHRI is currently working on an update to the AHRI standard 340/360 [11] (*i.e.,* AHRI Standard 1340(I–P)–202X Draft, *Performance Rating of Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment* (AHRI 1340–202X Draft)).

II. Synopsis of the Notice of Proposed Rulemaking

In this NOPR, DOE proposes to update its test procedures for CUACs and CUHPs by: (1) updating the reference in the Federal test procedure to the most recent version of the industry test procedure, AHRI 340/360–2022, for measuring integrated energy efficiency ratio (IEER), energy efficiency ratio (EER), and coefficient of performance (COP); and (2) establishing a new test procedure that references the most recent draft version of industry test procedure, AHRI 1340–202X Draft, and is consistent with recommendations from the ACUAC and ACUHP Working Group TP Term Sheet that DOE should include new efficiency metrics (integrated ventilation, economizer, and cooling (IVEC) and integrated ventilation and heating efficiency (IVHE)) and new testing requirements. If a finalized version of AHRI 1340–202X Draft is not published before the final rule or if there are substantive changes between the draft and published versions of AHRI 340/360, DOE may adopt the substance of the AHRI 1340–202X Draft or provide additional opportunity for comment on the final version of that industry consensus standard.

To implement the proposed changes, DOE proposes: (1) to amend appendix A to incorporate by reference AHRI 340/360–2022 for CUACs and CUHPs, while maintaining the current efficiency metrics; and (2) to add a new appendix A1 to subpart F of 10 CFR part 431. At 10 CFR part 431.96, ''Uniform test method for the measurement of energy efficiency of commercial air conditioners and heat pumps,'' DOE would list appendix A1 as the applicable test method for CUACs and CUHPs for any standards denominated in terms of IVEC and IVHE. Appendix A1 would utilize the AHRI 1340–202X Draft, including the new IVEC and IVHE efficiency metrics recommended by the ACUAC and ACUHP Working Group TP Term Sheet. Use of appendix A1 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 A1 would be required, appendix A would no longer be used as part of the Federal test procedure. DOE is also proposing more general updates to establish a definition for the terms ''commercial unitary air conditioner'' and ''commercial unitary heat pump.'' Lastly, DOE is proposing to amend certain provisions within DOE's regulations for representation and enforcement consistent with the proposed test procedure amendments.

Table I.1 summarizes the current DOE test procedure for CUACs and CUHPs, DOE's proposed changes to that test procedure, and the reason for each proposed change.

[11] DOE has provided a copy of AHRI 1340–202X Draft in the docket for this rulemaking, available at *www.regulations.gov/docket/EERE-2023-BT-TP-0014.* AHRI Standard 1340 is in draft form and its text was provided to DOE for the purposes of review only during the drafting of this NOPR. Note that the draft AHRI Standard 1340 may be further revised, edited, delayed, or withdrawn prior to publication by the AHRI Standards Technical Committee (STC).

TABLE II.1—SUMMARY OF CHANGES IN PROPOSED TEST PROCEDURE RELATIVE TO CURRENT TEST PROCEDURE

Current DOE test procedure	Proposed test procedure	Attribution
Incorporates by reference: 1. ANSI/AHRI 340/360–2007 for CUACs and CUHPs with a cooling capacity greater than or equal to 65,000 Btu/h; and 2. ANSI/AHRI 210/240–2008 for ECUACs and WCUACs with a cooling capacity less than 65,000 Btu/h.	Incorporate by reference AHRI 340/360–2022 and ANSI/ASHRAE 37–2009 in appendix A. Utilize AHRI 1340–202X Draft and incorporate by reference ANSI/ASHRAE 37–2009 in a new appendix A1.	Update to the most recent industry test procedures.
Includes provisions for determining EER, IEER, and COP.	Appendix A maintains provisions for determining EER, IEER, and COP. Appendix A1 includes provisions for determining EER2, COP2, IVEC, and IVHE.	Updates to the applicable industry test procedures.
Does not include certain CUAC and CUHP provisions regarding over-rating capacity and specific components for determination of represented values in 10 CFR 429.43.	Includes provisions in 10 CFR 429.43 specific to CUACs and CUHPs to determine represented values for units with specific components, and to prevent cooling capacity over-rating.	Improve representativeness of test procedure.
Does not include certain CUAC- and CUHP-specific enforcement provisions in 10 CFR 429.134.	Adopts product-specific enforcement provisions for CUACs and CUHPs regarding: (1) verification of cooling capacity for determining ESP requirements and (2) testing of units with specific components.	Clarify how DOE will conduct enforcement testing.

Should DOE adopt the amendments described in this proposed rule, the effective date for the amended test procedure would be 30 days after publication of the test procedure final rule in the **Federal Register**.

DOE has tentatively determined that the proposed amendments to the CUAC and CUHP test procedures would not be unduly burdensome. Furthermore, DOE has tentatively determined that the proposed amendments to appendix A, if made final, would not alter the measured efficiency of CUACs and CUHPs or require retesting or recertification solely as a result of DOE's adoption of the proposed amendments to the test procedure. Additionally, DOE has tentatively determined that the proposed amendments to appendix A, if made final, would not increase the cost of testing. If finalized, representations of energy use or energy efficiency would be required to be based on testing in accordance with the amended test procedure in appendix A beginning 360 days after the date of publication of the test procedure final rule in the **Federal Register**.

DOE has tentatively determined, however, that the newly proposed test procedure at appendix A1 would alter the measured efficiency of CUACs and CUHPs, in part because the amended test procedure would adopt different energy efficiency metrics than in the current test procedure. DOE has tentatively determined that the proposed amendments to appendix A1, if made final, would increase the cost of testing relative to the current test procedure. Tentative cost estimates are discussed in section III.M of this document. As discussed, use of appendix A1 would not be required until the compliance date of any amended energy conservation standard denominated in terms of the new metrics in appendix A1, should DOE adopt such standards.

The proposed amendments to representation requirements in 10 CFR 429.43 would not be required until 360 days after publication in the **Federal Register** of a test procedure final rule.

Discussion of DOE's proposed actions are addressed in detail in section III of this NOPR.

III. Discussion

In the following sections, DOE proposes certain amendments to its test procedures for CUACs and CUHPs. For each proposed amendment, DOE provides relevant background information, explains why the amendment merits consideration, discusses relevant public comments, and proposes a potential approach.

A. Scope of Applicability

This rulemaking applies to ACUACs and ACUHPs with a rated cooling capacity greater than or equal to 65,000 Btu/h, including double-duct air conditioners and heat pumps, as well as ECUACs and WCUACs of all capacities. Definitions that apply to CUACs and CUHPs are discussed in section III.B of this NOPR.

DOE's regulations for CUACs and CUHPs cover both single-package units and split systems. See the definition of ''commercial package air-conditioning and heating equipment'' at 10 CFR 431.92. A split system consists of a condensing unit—which includes a condenser coil, condenser fan and motor, and compressor—that is paired with a separate component that includes an evaporator coil to form a complete refrigeration circuit for space conditioning. One application for condensing units is to be paired with an air handler (which includes an evaporator coil), such that the combined system (*i.e.,* the condensing unit with air handler) meets the definition of a split system CUAC or CUHP. It should be pointed out that AHRI has a certification program for unitary large equipment that includes certification of CUACs, CUHPs, and condensing units. DOE notes that as part of the AHRI certification program for unitary large equipment, manufacturers who sell air-cooled condensing units with a rated cooling capacity greater than or equal to 65,000 Btu/h and less than 135,000 Btu/h must certify condensing units as a complete system (*i.e.,* paired with an air handler) according to the AHRI 340/360 test procedure.[12] However, for condensing units with a rated cooling capacity greater than or equal to 135,000 Btu/h and less than 250,000 Btu/h, the AHRI certification program allows manufacturers to certify condensing units as a complete system according to AHRI 340/360 or optionally certify as a condensing unit only according to AHRI Standard 365, ''Standard for Performance Rating of Commercial and Industrial Unitary Air-Conditioning Condensing Units'' (AHRI 365). DOE emphasizes that these AHRI testing and certification requirements differ from the Federal test procedure at 10 CFR 431.96, which requires testing to ANSI/AHRI 340/360–2007 and does not permit certifying to DOE as a condensing unit only according to AHRI 365. Additionally, the AHRI

[12] *See* appendix A of the AHRI Unitary Large Equipment Certification Program Operations Manual (January 2021). This can be found at *https://www.ahrinet.org/sites/default/files/2022-08/ULE_OM.pdf.*

certification program does not include unitary split systems or condensing units with cooling capacities above 250,000 Btu/h, whereas the Federal test procedure and standards (codified at 10 CFR 431.96 and 10 CFR 431.97, respectively) cover all CUACs and CUHPs with cooling capacities up to 760,000 Btu/h. Once again, DOE emphasizes that condensing unit models distributed in commerce with air handlers with cooling capacities up to 760,000 Btu/h are covered as commercial package air-conditioning and heating equipment (*see* definition at 10 CFR 431.92) and as such are subject to the Federal regulations specified for CUACs and CUHPs regarding test procedures (10 CFR 431.96), energy conservation standards (10 CFR 431.97), and certification and representation requirements (10 CFR 429.43).

B. Definitions

1. CUAC and CUHP Definition

In the May 2020 ECS RFI, DOE requested comment on whether the definitions that apply to CUACs and CUHPs (including the definitions for small, large, and very large commercial package air conditioning and heating equipment) require any revisions—and if so, how those definitions should be revised. 85 FR 27941, 27945 (May 12, 2020). DOE also requested comment on whether additional equipment definitions are necessary to close any potential gaps in coverage between equipment types. *Id.*

Trane commented that the overall definition for commercial package air conditioning and heating equipment is very broad and covers equipment that is used in specific industrial applications (*e.g.,* computer room air conditioners (CRACs), dedicated outdoor air systems (DOASes), and indoor agricultural systems) for which the CUAC/CUHP test procedure and IEER metric should not apply.[13] Trane recommended that DOE should separately regulate these categories of equipment with specific definitions, test procedures, and energy conservation standards. (Trane, EERE–2019–BT–STD–0042–0016, pp. 2–3)

Goodman commented that ambiguity exists regarding DOASes used for dry-climate applications, as these systems could be rated and tested in accordance with AHRI Standard 340/360, as well as AHRI Standard 920, and that updating definitions to address these specific system types based on mixed-air or 100-percent air applications would provide some clarity in the marketplace. (Goodman, EERE–2019–BT–STD–0042–0017, p. 2)

Regarding DOASes, in a final rule published in the **Federal Register** on July 27, 2022, DOE defined a direct expansion-dedicated outdoor air system (DX–DOAS) as a unitary dedicated outdoor air system that is capable of dehumidifying air to a 55 °F dew point—when operating under Standard Rating Condition A as specified in Table 4 or Table 5 of AHRI 920–2020 (incorporated by reference, 10 CFR 431.95) with a barometric pressure of 29.92 in Hg—for any part of the range of airflow rates advertised in manufacturer materials, and has a moisture removal capacity of less than 324 lb/h. 87 FR 45164, 45170, 45198. DOE has tentatively concluded that this definition provides the requisite specificity sought by Goodman's comment.

More broadly, as in this NOPR, DOE has previously used the colloquial terms ''commercial unitary air conditioners'' and ''commercial unitary heat pump'' (*i.e.,* CUACs and CUHPs), to refer to certain commercial package air conditioning and heating equipment, recognizing that CUAC is not a statutory term and is not currently used in the CFR. *See* 79 FR 58948, 58950 (Sept. 30, 2014); 80 FR 52676, 52676 (Sept. 1, 2015). As codified in regulation, the classes for which EPCA prescribed standards have been grouped under the headings ''commercial air conditioners and heat pumps'' (10 CFR 431.96, Table 1) and ''air conditioning and heating equipment'' (10 CFR 431.97, Table 1), although these are not defined terms. These classes have also been identified by the broader equipment type with which they are associated (*i.e.,* small, large, or very large commercial package air conditioning and heating equipment). *Id.* DOE agrees with the commenters that a more tailored definition regarding the equipment categories covered by these umbrella terms may provide additional benefits in terms of clarity.

Consequently, in this NOPR, DOE proposes to establish a definition for ''commercial unitary air conditioner and commercial unitary heat pump'' to assist in distinguishing between the regulated categories of commercial package air conditioning and heating equipment. The proposed definition is structured to indicate categories of commercial package air conditioning and heating equipment that are excluded from the definition, rather than stipulating features or characteristics of CUACs and CUHPs. Specifically, the proposed definition would exclude single package vertical air conditioners and heat pumps (SPVUs), variable refrigerant flow multi-split air conditioners and heat pumps, and water-source heat pumps. To the extent that a unit could be considered either a CUAC or a CRAC, such unit would be excluded from the CUAC definition if marketed solely for applications specific to the CRAC equipment category. To the extent that a unit could be either a CUAC or a DX–DOAS, such unit would be excluded from the CUAC definition if it is only capable of providing ventilation and conditioning of 100-percent outdoor air or it is marketed in all materials as only having such capability. DOE notes that, when gathering information for potential enforcement of CRAC, CUAC or a DX–DOAS standards, DOE may consider marketing materials claiming that a unit is a CRAC, CUAC or DX–DOAS by any party. Any marketing, by any party, could signal that a unit is not only a CRAC, CUAC, or a DX–DOAS. DOE notes that to the extent that a basic model is covered under more than one equipment category (*e.g.,* CRAC and CUAC) it would be subject to the regulations applicable to each equipment class that covers that basic model.

DOE proposes the following definition: *Commercial unitary air conditioner and commercial unitary heat pump* means any small, large, or very large air-cooled, water-cooled, or evaporatively-cooled commercial package air conditioning and heating equipment that consists of one or more factory-made assemblies that provide space conditioning; but does not include:

(1) single package vertical air conditioners and heat pumps,

(2) variable refrigerant flow multi-split air conditioners and heat pumps,

(3) water-source heat pumps;

(4) equipment marketed only for use in computer rooms, data processing rooms, or other information technology cooling applications, and

(5) equipment only capable of providing ventilation and conditioning of 100-percent outdoor air marketed only for ventilation and conditioning of 100-percent outdoor air.

DOE recognizes that there may be models on the market that would be covered by DOE regulations for multiple equipment categories. As discussed in a previous notice addressing CRACs, such models would have to be tested and rated according to the requirements for each applicable equipment class of

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[13] The IEER metric represents a weighted average of full-load and part-load efficiencies, weighted according to the average amount of time operating at each load point. Additionally, IEER incorporates reduced condenser temperatures (*i.e.,* reduced outdoor ambient temperatures) for part-load operation.

standards (*e.g.,* CRAC and CUAC). *See* 77 FR 16769, 16773 (March 22, 2012).

Issue 1: DOE seeks comment on its proposed definition for CUACs and CUHPs.

2. Basic Model Definition

The current definition for ''basic model'' in DOE's regulations includes a provision applicable for ''small, large, and very large air-cooled or water-cooled commercial package air conditioning and heating equipment (excluding air-cooled, three-phase, small commercial package air conditioning and heating equipment with a cooling capacity of less than 65,000 Btu/h).'' 10 CFR 431.92. Consistent with DOE's proposed definition for ''commercial unitary air conditioner and commercial unitary heat pump,'' DOE proposes to similarly update the definition of ''basic model'' so that this provision instead applies to the proposed term ''commercial unitary air conditioner and commercial unitary heat pump.'' DOE notes that the term in the current ''basic model'' definition includes ACUACs, ACUHPs, and WCUACs, but does not explicitly include ECUACs, (DOE notes that the definition of ''commercial package air-conditioning and heating equipment'' at 10 CFR 431.92 makes clear that that term includes evaporatively-cooled equipment. Consequently, ECUACs are clearly part of the relevant basic model definition, so the omission of the term ''evaporatively-cooled'' from the heading should not impact the proper functioning and use of the test procedure. However, DOE is proposing to update the relevant heading to dispel any confusion in that regard.) This proposal thereby includes ECUACs in this provision of the ''basic model'' definition—*i.e.,* because ECUACs are included within the proposed term ''commercial unitary air conditioner and commercial unitary heat pump,'' as discussed in section III.B.1 of this NOPR. It would further clarify that this provision of the ''basic model'' definition refers only to CUACs and CUHPs, and not to any other category of equipment that is ''small, large, and very large commercial package air conditioning and heating equipment''.

DOE also proposes editorial changes more generally to the definition of ''basic model'' specified in 10 CFR 431.92. The current definition begins with ''*Basic model* includes'' and each equipment category-specific provision of the definition begins with the equipment category name, followed by the word ''means,'' followed by the basic model definition for that category (*e.g.,* ''*Computer room air conditioners* means all units . . .''). However, this wording could be misinterpreted to read as a definition of each equipment category, rather than as the definition of what constitutes a basic model for each equipment category. Therefore, DOE proposes to revise the definition to instead begin with ''Basic model means'' and then revise each equipment category specific provision to begin with ''For'' and replace the word ''means'' with a colon (*e.g.,* ''For *Computer room air conditioners:* all units . . .''). These proposed changes to the basic model definition are editorial and would not change the current understanding of what constitutes a basic model for each equipment category.

3. Double-Duct Definition

DOE established a definition for ''double-duct air conditioner or heat pump'' at 10 CFR 431.92 (referred to as ''double-duct air conditioners and heat pumps'' or ''double-duct systems'') in an energy conservation standards direct final rule published in the **Federal Register** on January 15, 2016 (January 2016 Direct Final Rule). 81 FR 2420, 2529. This definition was included in a term sheet by the ASRAC working group for commercial package air conditioners (Commercial Package Air Conditioners Working Group) as part of the rulemaking that culminated with the January 2016 Direct Final Rule. (*See* Document No. 93 in Docket No. EERE–2013–BT–STD–0007, pp. 4–5) DOE defines double-duct systems as air-cooled commercial package air conditioning and heating equipment that: (1) Is either a horizontal single package or split-system unit; or a vertical unit that consists of two components that may be shipped or installed either connected or split; (2) Is intended for indoor installation with ducting of outdoor air from the building exterior to and from the unit, as evidenced by the unit and/or all of its components being non-weatherized, including the absence of any marking (or listing) indicating compliance with UL 1995,[14] ''Heating and Cooling Equipment,'' or any other equivalent requirements for outdoor use; (3) If it is a horizontal unit, a complete unit has a maximum height of 35 inches; if it is a vertical unit, a complete unit has a maximum depth of 35 inches; and (4) Has a rated cooling capacity greater than or equal to 65,000 Btu/h and up to 300,000 Btu/h. 10 CFR 431.92.

In the May 2020 ECS RFI, DOE requested comment on whether the definitions that apply to ACUACs and ACUHPs, including double-duct systems, require any revisions—and if so, how those definitions should be revised. 85 FR 27941, 27945. (May 12, 2020).

In response to the May 2020 ECS RFI, Carrier recommended that DOE review the current definitions for double-duct systems, as well as the definition for SPVUs, asserting that the current definitions for double-duct systems and SPVUs do not clearly delineate the two equipment categories. Carrier stated that while double-duct systems and SPVUs are extraordinarily similar in application, double-duct systems have longer ductwork to bring air from outside the building to the condensing section of the unit, whereas SPVUs must remain in close proximately to an exterior wall. (Carrier, EERE–2019–BT–STD–0042–0013 at p. 2)

In response, DOE notes that section 3.7 of AHRI 340/360–2022 and section 3.12 of the AHRI 1340–202X Draft specify the following definition for double-duct systems: an air conditioner or heat pump that complies with all of the following: (1) Is either a horizontal single package or split-system unit; or a vertical unit that consists of two components that can be shipped or installed either connected or split; or a vertical single packaged unit that is not intended for exterior mounting on, adjacent interior to, or through an outside wall; (2) Is intended for indoor installation with ducting of outdoor air from the building exterior to and from the unit, where the unit and/or all of its components are non-weatherized; (3) If it is a horizontal unit, the complete unit shall have a maximum height of 35 in. or the unit shall have components that do not exceed a maximum height of 35 in. If it is a vertical unit, the complete (split, connected, or assembled) unit shall have components that do not exceed maximum depth of 35 in.; (4) Has a rated cooling capacity greater than and equal to 65,000 Btu/h and less than or equal to 300,000 Btu/h.

In comparison to DOE's definition, DOE notes the following regarding the definition for double-duct system in section 3.7 of AHRI 340/360–2022 and section 3.12 of the AHRI 1340–202X Draft: (1) vertical single packaged units not intended for exterior mounting on, adjacent interior to, or through an outside wall can be classified as double-duct systems; (2) the maximum dimensions apply to each component of a split system; and (3) the AHRI 340/360–2022 and AHRI 1340–202X Draft definition does not include compliance with UL 1995 as a criterion for determining whether a model is non-

[14] Underwriters Laboratory (UL) 1995, *UL Standard for Safety for Heating and Cooling Equipment* (UL 1995).

weatherized. For the reasons discussed in the following paragraphs, DOE has tentatively concluded that the definition for double-duct system in section 3.7 of AHRI 340/360–2022 and section 3.12 of the AHRI 1340–202X Draft more appropriately classifies double-duct systems and differentiates this equipment from other categories of commercial package air conditioning and heating equipment.

Regarding vertical single package units, the DOE definitions for SPVUs at 10 CFR 431.92 include models that are intended for exterior mounting on, adjacent interior to, or through an outside wall. In the January 2016 Direct Final Rule, DOE agreed with the exclusion of vertical single package units from the definition for ''double-duct system'' because SPVUs are separately regulated.[15] 81 FR 2420, 2446 (Jan. 15, 2016). However, the exclusion of all vertical single package units from the definition for ''double-duct system'' adopted in the January 2016 Direct Final Rule means that vertical single package models that do not meet the SPVU definition (*i.e.,* are not intended for exterior mounting on, adjacent interior to, or through an outside wall) are not explicitly covered by the definitions for SPVUs or double-duct systems. Because the reasoning provided in the January 2016 Direct Final Rule was to exclude SPVUs from the double-duct definition, DOE has tentatively concluded that vertical single package units that do not meet the SPVU definition were inadvertently excluded from the DOE double-duct definition. Therefore, DOE has tentatively determined that the clarification in the AHRI 340/360–2022 definition for ''double-duct systems'' (*i.e.,* inclusion of vertical single package units not intended for exterior mounting on, adjacent interior to, or through an outside wall) is appropriate and consistent with the intent of the Commercial Package Air Conditioners Working Group that initially drafted the current ''double-duct system'' definition. *See* 81 FR 2420, 2446. (Jan. 15, 2016). This clarification also addresses Carrier's concern that the current definitions do not clearly differentiate double-duct systems from SPVUs.

[15] Specifically, DOE stated in the January 2016 Direct Final Rule that single package vertical units are already covered under separate standards (10 CFR 431.97(d)). As a result, to ensure that SPVUs are not covered under the definition of double-duct equipment, DOE agrees with the ASRAC Term Sheet recommendations that for vertical double-duct units, only those with split configurations (that may be installed with the two components attached together) should be included as part of this separate equipment class.

Regarding maximum height and depth dimensions, the revised definition in section 3.7 of AHRI 340/360–2022 and section 3.12 of the AHRI 1340–202X draft specifies that for systems with multiple components, the maximum dimensions apply to each component of the unit. Because split systems are installed separately from each other, DOE has tentatively concluded that it is appropriate for the maximum dimensions for split systems to apply to each component, rather than the combined system.

Regarding determination of whether a model is non-weatherized, the AHRI 340/360–2022 and AHRI 1340–202X Draft definition does not include the criterion regarding the absence of any marking (or listing) indicating compliance with UL 1995 as an indication that the unit is intended for indoor installation. Upon examination of UL 1995, DOE recognizes that the scope of the standard is not limited to models intended for outdoor installation, and therefore, that compliance with UL 1995 does not necessarily indicate that a model is intended for outdoor installation and/or is weatherized. Therefore, DOE tentatively agrees with removing the reference to UL 1995 in the double-duct definition, and instead specifying that double-duct systems are intended for indoor installation (*e.g.,* the unit and/or all of its components are non-weatherized).

Based on the preceding discussion, DOE has tentatively determined that the definition for ''double-duct system'' in AHRI 340/360–2022 and the AHRI 1340–202X Draft better implements the intent of DOE and the Commercial Package Air Conditioners Working Group to create a separate equipment class of ACUACs and ACUHPs that are designed for indoor installation and that would require ducting of outdoor air from the building exterior. 81 FR 2420, 2446 (Jan. 15, 2016). Thus, DOE is proposing to revise the definition of double-duct air conditioners and heat pumps in 10 CFR 431.92 to reflect the updated definition for double-duct systems in section 3.7 of AHRI 340/360–2022 and section 3.12 of the AHRI 1340–202X Draft.

4. Metric Definitions

As mentioned in section II and discussed in further detail in sections III.F.4 and III.F.5 of this NOPR, DOE is proposing to adopt new cooling and heating metrics in appendix A1 (*i.e.,* IVEC and IVHE). Additionally, DOE is proposing three metrics for optional representations in appendix A1, as discussed further in section III.F.3 of this NOPR: energy efficiency ratio 2 (EER2), coefficient of performance 2 (COP2), and IVHE for colder climates ($IVHE_C$). Consistent with this approach, DOE is proposing to add new definitions for the terms ''IVEC,'' ''IVHE,'' ''EER2,'' and ''COP2'' to 10 CFR 431.92. The proposed definitions describe what each metric represents, the test procedure used to determine each metric, and specific designations applicable to each metric (*e.g.,* $IVHE_C$).

C. Updates to Industry Test Standards

The following sections discuss the changes included in the most recent updates to AHRI 340/360 and ASHRAE 37, which are incorporated by reference in the current DOE test procedure for ACUACs and ACUHPs with a rated cooling capacity greater than or equal to 65,000 Btu/h at 10 CFR 431.96 and 10 CFR part 431, subpart F, appendix A. AHRI 340/360 is also incorporated by reference in the current DOE test procedure for ECUACs and WCUACs with a rated cooling capacity greater than or equal to 65,000 Btu/h at 10 CFR 431.96.

1. AHRI 340/360

As noted previously, DOE's current test procedures for ACUACs, ACUHPs, and ECUACs and WCUACs with a rated cooling capacity greater than or equal to 65,000 Btu/h incorporates by reference ANSI/AHRI 340/360–2007. DOE's current test procedure for ECUACs and WCUACs with a rated cooling capacity less than 65,000 Btu/h incorporates by reference ANSI/AHRI 210/240–2008.

The most recent version of ASHRAE Standard 90.1, (*i.e.,* ASHRAE Standard 90.1–2022), references AHRI 340/360–2022 as the test procedure for ACUACs, ACUHPs, and ECUACs and WCUACs with a rated cooling capacity greater than or equal to 65,000 Btu/h. ASHRAE Standard 90.1–2022 included updates to the test procedure references for ECUACs and WCUACs with capacities less than 65,000 Btu/h to reference AHRI 210/240–2023. However, ECUACs and WCUACs with capacities less than 65,000 Btu/h are outside of the scope of AHRI 210/240–2023 and are instead included in AHRI 340/360–2022. Given these changes to the relevant industry test standards, DOE believes that such reference was an oversight.

The following list includes substantive additions in AHRI 340/360–2022 as compared to ANSI/AHRI 340/360–2007, which is edition referenced in the current Federal test procedure and applies to CUACs and CUHPs:

1. A method for testing double-duct systems at non-zero ESP (see section

6.1.3.7 and appendix I of AHRI 340/360–2022);

2. A method for comparing relative efficiency of indoor integrated fan and motor combinations (IFMs) that allows CUACs and CUHPs with non-standard (*i.e.,* higher ESP) IFMs to be rated in the same basic model as otherwise identical models with standards IFMs (see section D4.2 of Appendix D of AHRI 340/360–2022);

3. Requirements for indoor and outdoor air condition measurement (see appendix C of AHRI 340/360–2022);

4. Detailed provisions for setting indoor airflow and ESP (see sections 6.1.3.4–6.1.3.6 of AHRI 340/360–2022) and refrigerant charging instructions to be used in cases in which manufacturer's instructions conflict or are incomplete (see section 5.8 of AHRI 340/360–2022); and

5. ECUACs and WCUACs with cooling capacities less than 65,000 Btu/h are included within the scope of the standard.

As discussed, DOE is proposing to amend its test procedure for CUACs and CUHPs by incorporating by reference AHRI 340/360–2022 in appendix A.

2. AHRI 1340

The recommendations of the ACUAC and ACUHP Working Group TP Term Sheet are being incorporated into an updated version of AHRI 340/360 currently being drafted (*i.e.,* AHRI 1340–202X Draft) that will supersede AHRI 340/360–2022.

The AHRI 1340–202X Draft includes recommendations from the ACUAC and ACUHP Working Group TP Term Sheet described in section III.D of this NOPR (including the IVEC and IVHE metrics). The AHRI 1340–202X Draft also includes the following revisions and additions to the IVEC and IVHE metrics not included in the ACUAC and ACUHP Working Group TP Term Sheet, which are discussed in detail in sections III.F.5.a, III.F.6, and III.F.7.a of this NOPR:

1. Detailed test instructions for splitting ESP between the return and supply ductwork, consistent with ESP requirements recommended in the ACUAC and ACUHP Working Group TP Term Sheet;

2. Corrections to the hour-based IVEC weighting factors included in the ACUAC and ACUHP Working Group TP Term Sheet;

3. Correction of the equation in the ACUAC and ACUHP Working Group TP Term Sheet for calculating adjusted ESP for any cooling or heating tests conducted with an airflow rate that differs from the full-load cooling airflow;

4. Addition of separate hour-based weighting factors and bin temperatures to calculate a separate version of IVHE that is representative of colder climates, designated IVHEC

5. Changes to the default fan power and maximum pressure drop used for testing coil-only systems;

6. Additional instruction for component power measurement during testing;

7. Corrections to equations used for calculating IVHE;

8. Provisions for testing with non-standard low-static indoor fan motors; and

9. Revision to the power adder for WCUACs that reflects power that would be consumed by field-installed heat rejection components.

In this NOPR, DOE proposes to incorporate by reference the AHRI 1340–202X Draft in its appendix A1 test procedure. AHRI Standard 1340 is in draft form and its text was provided to DOE for the purposes of review for this NOPR. Note that the draft AHRI Standard 1340 may be further revised, edited, delayed, or withdrawn prior to publication by the AHRI Standards Technical Committee. If AHRI has published a final version, DOE intends to update its incorporation by reference to the final published version of AHRI 1340, unless there are substantive changes between the draft and published versions, in which case DOE may adopt the substance of the AHRI 1340–202X Draft or provide additional opportunity for comment on the changes to the industry consensus standard.

3. ASHRAE 37

ANSI/ASHRAE 37–2009, which provides a method of test for many categories of air conditioning and heating equipment, is referenced for testing CUACs and CUHPs by both AHRI 340/360–2022 and the AHRI 1340–202X Draft. More specifically, sections 5 and 6 and appendices C, D, and E of AHRI 340/360–2022 and sections 5 and 6 and appendices C, D, and E of the AHRI 1340–202X Draft reference methods of test in ANSI/ASHRAE 37–2009. DOE currently incorporates by reference ANSI/ASHRAE 37–2009 in 10 CFR 431.95, and the current incorporation by reference applies to the current Federal test procedure for ACUACs and ACUHPs specified at appendix A. The current Federal test procedures at 10 CFR 431.96 for ECUACs and WCUACs do not explicitly reference ANSI/ASHRAE 37–2009. Given that DOE is proposing to expand the scope of appendix A to include testing of ECUACs and WCUACs as well as the fact that AHRI 340/360–2022 references ANSI/ASHRAE 37–2009 for several test instructions, DOE has tentatively concluded that it is appropriate for the existing incorporation by reference of ANSI/ASHRAE 37–2009 in appendix A to apply to testing ECUACs and WCUACs. Given that the AHRI 1340–202X Draft references ANSI/ASHRAE 37–2009 for several test instructions, DOE is proposing to additionally incorporate by reference ANSI/ASHRAE 37–2009 for use with appendix A1.

D. Consideration of the ACUAC and ACUHP Working Group TP Term Sheet

In response to the May 2022 TP/ECS RFI, DOE received comments from several stakeholders indicating support for the formation of an ASRAC working group to convene and discuss representative test conditions for CUACs and CUHPs. (AHRI, EERE–2022–BT–STD–0015–0008, at pp. 1–2; CA IOUs, EERE–2022–BT–STD–0015–0012, at pp. 1–2; Lennox, EERE–2022–BT–STD–0015–0009, at pp. 1–2; NEEA, EERE–2022–BT–STD–0015–0013, at pp. 6–7; Trane, EERE–2022–BT–STD–0015–0014, at p. 2)

As a result, DOE published in the **Federal Register** the July 2022 Notice of Intent. 87 FR 45703 (July 29, 2022). DOE then established the Working Group in accordance with FACA and NRA. The Working Group consisted of 14 members and met six times, while the Working Group's subcommittee met an additional seven times. The Working Group meetings were held between September 20, 2022, and December 15, 2022, after which the Working Group successfully reached consensus on an amended test procedure. The Working Group signed a term sheet of recommendations on December 15, 2022. (*See* EERE–2022–BT–STD–0015–0065) The Working Group addressed the following aspects of the test procedure for ACUACs and ACUHPs:

1. Mathematical representation of cooling efficiency: The current cooling metric specified by AHRI 340/360–2022 (*i.e.,* IEER) represents a weighted average of the measured energy efficiency ratios (EER) measured at four distinct test conditions, whereas the proposed IVEC metric is calculated as the total annual cooling capacity divided by the total annual energy use, as discussed further in section III.F.4 of this document. The Working Group agreed that this calculation approach provides a more mathematically accurate way of representing the cooling efficiency of ACUACs and ACUHPs compared to the current approach used for IEER. As part of this equation format, the IVEC metric also uses hour-based weighting factors to represent the time spent per year in each operating mode.

2. Integrated heating metric: The current heating metric for ACUHPs (*i.e.,* COP) represents the ratio of heating capacity to the power input, calculated at a single test condition of 47 °F. COP does not account for the performance at part-load or over the range of temperatures seen during an average heating season, and it does not include energy use in heating season ventilation mode. IVHE accounts for both full-load and part-load operation at a range of typical ambient temperatures seen during the heating season, and it includes energy use in heating season ventilation mode. Analogous to IVEC, the proposed IVHE metric is calculated as the total annual heating load divided by the total annual energy use, as discussed further in section III.F.5 of this document, and the metric also uses hour-based weighting factors to represent the time spent per year in each operating mode.

3. Operating modes other than mechanical cooling: The IEER metric currently does not include the energy use of operating modes other than mechanical cooling, such as economizer-only cooling and cooling season ventilation. The newly established IVEC metric includes the energy use of these other modes.

4. ESP: The IVEC and IVHE metrics require increased ESPs—in comparison to the ESPs required for determining IEER and COP—to more accurately represent ESPs and corresponding indoor fan power that would be experienced in real-world installations.

5. Crankcase heater operation: The current IEER metric includes crankcase heater power consumption only when operating at part-load compressor stages (*i.e.,* for part-load cooling operation, crankcase heater power is included only for higher-stage compressors that are staged off, and it is not included for lower-stage compressors when all compressors are cycled off). The COP metric does not include any crankcase heater power consumption. In contrast, the IVEC and IVHE metrics include all annual crankcase heater operation, including when all compressors are cycled off in part-load cooling or heating, ventilation mode, unoccupied no-load hours, and in heating season (for ACUACs only).

6. Oversizing: The current IEER and COP metrics do not consider that ACUACs and ACUHPs are typically oversized in field installations. In contrast, the proposed IVEC and IVHE metrics include an oversizing factor of 15 percent (*i.e.,* it is assumed that the unit's measured full-load cooling capacity is 15 percent higher than the peak building cooling load and peak building heating load). Accounting for oversizing is more representative of the load fractions seen in field applications and better enables the test procedure to differentiate efficiency improvements from the use of modulating/staged components.

Based on discussions related to these six topics, the Working Group developed the ACUAC and ACUHP Working Group TP Term Sheet, which includes the following recommendations:

1. A recommendation to adopt the latest version of AHRI 340/360–2022 with IEER and COP metrics required for compliance beginning 360 days from the date a test procedure final rule publishes (See Recommendation #0);

2. The IVEC efficiency metric, to be required on the date of amended energy conservation standards for ACUACs and ACUHPs (See Recommendation #1);

3. Hour-based weighting factors for the IVEC metric (See Recommendation #2);

4. Details on determination of IVEC, including provisions for determining IVEC in appendix B of the ACUAC and ACUHP Working Group TP Term Sheet (See Recommendation #3);

5. Target load fractions and temperature test conditions for IVEC, which account for oversizing (See Recommendation #4);

6. A requirement that representations of full-load EER be made in accordance with the full-load ''A'' test (See Recommendation #5); [16]

7. A requirement to provide representations of airflow used for the full load ''A'' test and the part load ''D'' test (*i.e.,* the airflow used in the lowest-stage test for the D point), and a provision for determining the minimum airflow that can be used for testing (See Recommendation #6);

8. The IVHE efficiency metric (See Recommendation #7);

9. Hour-based weighting factors, load bins, and outdoor air temperatures for each bin (*i.e.,* temperatures used for the building heating load line, not test temperature conditions) for the IVHE metric (See Recommendation #8);

10. The test conditions and list of required and optional tests and representations for the IVHE metric (See Recommendation #9);

11. Provisions for manufacturers to certify cut-in and cut-out temperatures for heat pumps to DOE and provisions for a DOE verification test of those temperatures (See Recommendation #10);

12. Commitment of the Working Group to analyze ventilation and fan-only operation included in the IVEC and IVHE metrics to validate that these metrics adequately capture fan energy use during the energy conservation standards portion of the negotiated rulemaking. If the IVEC and IVHE levels do not adequately drive more efficient air moving systems that are technologically feasible and economically justified, the Working Group committed to developing a metric addressing furnace fan energy use (See Recommendation #11);

13. ESP requirements for the IVEC and IVHE metrics, requirements for splitting the ESP requirements between the return and supply ducts, and a requirement that certified airflow for full load and D bin be made public in the DOE Compliance Certification Database (See Recommendation #12);

14. Provisions requiring manufacturers to certify crankcase heater wattages and tolerances for certification (See Recommendation #13); and

15. Provisions that the contents of the ACUAC and ACUHP Working Group TP Term Sheet be implemented in a test procedure NOPR and final rule, with the final rule issuing no later than any energy conservation standards direct final rule. (See Recommendation #14)

E. DOE Proposed Test Procedures

As discussed, EPCA requires that test procedures for covered equipment, including CUACs and CUHPs, be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating costs of a type of industrial equipment (or class thereof) during a representative average use cycle (as determined by the Secretary), and shall not be unduly burdensome to conduct. (42 U.S.C. 6314(a)(2)) DOE has tentatively determined that the recommendations specified in the ACUAC and ACUHP Working Group TP Term Sheet are consistent with this EPCA requirement and is proposing amendments to the existing test procedure in appendix A and a new test procedure in appendix A1 in accordance with the Term Sheet.

In this NOPR, DOE is proposing to maintain the current efficiency metrics of IEER, EER, and COP in appendix A, and is proposing to reference AHRI 340/360–2022 in appendix A for measuring the existing metrics. Thus, the proposed

[16] Similar to the current test procedure for determining IEER, the test procedure recommended in the ACUAC and ACUHP Working Group TP Term Sheet includes four cooling tests designated with letters ''A'', ''B'', ''C'', and ''D.'' The ''A'' test is a full-load cooling test, while the ''B,'' ''C,'' and ''D'' tests are part-load cooling tests.

amendments to appendix A would not affect the measured efficiency of CUACs and CUHPs or require retesting solely as a result of DOE's adoption of the proposed amendments to the appendix A test procedure, if made final. Additionally, DOE is proposing to establish a new test procedure at appendix A1 that would adopt the AHRI 1340–202X Draft, including the newly proposed IVEC and IVHE metrics, ideally through incorporation by reference of a finalized version of that industry test standard. (If a finalized version of the AHRI 1340–202X Draft is not published before the test procedure final rule, or if there are substantive changes between the draft and published versions of the standard that are not supported by stakeholder comments in response to this NOPR, DOE may adopt the substance of the AHRI 1340–202X Draft or provide additional opportunity for comment on the final version of that industry consensus standard.) Use of appendix A1 would not be required until the compliance date of any amended standards denominated in terms of the new metrics in appendix A1, should such standards be adopted.

Specifically, in appendix A, DOE is proposing to adopt the following sections of AHRI 340/360–2022: sections 3 (with certain exclusions [17]), 4, 5, and 6, and appendices A, C, D (excluding sections D1 through D3 [18]), and E.

As previously mentioned in section I.B of this NOPR, DOE's test procedure for ACUACs and ACUHPs currently specifies additional test procedure requirements in sections 3 through 10 of the current appendix A that are not included in ANSI/AHRI 340/360–2007 and that are related to minimum ESP, optional break-in period, refrigerant charging, setting indoor airflow, condenser head pressure controls, tolerance on capacity at part-load test points, and condenser air inlet temperature for part-load tests. Similarly, DOE's test procedure for ECUACs and WCUACs currently specifies additional test procedure requirements in paragraphs (c) and (e) of 10 CFR 431.96 regarding optional break-in period and additional provisions for equipment setup. DOE has tentatively determined that these DOE test procedure requirements that are specified in appendix A and paragraphs (c) and (e) of 10 CFR 431.96 no longer need to be separately specified due to the addition of equivalent provisions in AHRI 340/360–2022 and the AHRI 1340–202X Draft. Therefore, DOE is proposing to remove these provisions from appendix A and to revise Table 1 to 10 CFR 431.96 such that paragraphs (c) and (e) are no longer listed as requirements for ECUACs and WCUACs, instead utilizing the relevant provisions in AHRI 340/360–2022.

Further, in both appendix A and appendix A1, DOE is proposing to incorporate by reference ANSI/ASHRAE 37–2009 and to utilize all sections of that industry test method except sections 1 (Purpose), 2 (Scope), and 4 (Classifications).

Specifically for appendix A1, DOE is proposing to adopt sections of AHRI 1340–202X Draft for measuring the IVEC and IVHE metrics, which are generally consistent with the recommendations from the ACUAC and ACUHP Working Group TP Term Sheet. In the proposed appendix A1, DOE is proposing to adopt the following sections of the AHRI 1340–202X Draft: sections 3 (with certain exclusions) 4, 5, and 6.1 through 6.3, and appendices A, C, D (excluding D1 through D3), and E. Sections III.F.3, III.F.4, III.F.5, and III.F.6 of this NOPR include further discussion on the IVEC and IVHE metrics, as well as additions and revisions to the IVEC and IVHE metrics that are included in the AHRI 1340–202X Draft but not in the ACUAC and ACUHP Working Group TP Term Sheet. Sections III.F.7 and III.F.6.d of this NOPR include further discussion on the IVEC and IVHE metrics specified in the AHRI 1340–202X Draft that DOE is proposing to adopt in appendix A1 for ECUACs, WCUACs, and double-duct systems.

The ACUAC and ACUHP Working Group TP Term Sheet applies only to the test procedures for ACUACs and ACUHPs excluding double-duct systems. However, AHRI 1340–202X Draft includes additional provisions for determining IVEC and IVHE for double-duct systems, ECUACs, and WCUACs—indicating industry consensus that these metrics are appropriate for these categories of CUACs and CUHPs. DOE has tentatively determined that the test procedures for CUACs and CUHPs as proposed would improve the representativeness of the current Federal test procedure for CUACs and CUHPs and would not be unduly burdensome to conduct. Specifically, DOE has tentatively concluded that testing CUACs and CUHPs (including double-duct systems, ECUACs, and WCUACs) in accordance with the test provisions in the most recent draft of the applicable consensus industry test procedure AHRI 1340–202X Draft (which incorporates recommendations of the ACUAC and ACUHP Working Group TP Term Sheet, including adopting the new IVEC and IVHE metrics) would provide more representative results and more fully comply with the requirements of 42 U.S.C. 6314(a)(2) than testing strictly in accordance with AHRI 340/360–2022. Therefore, DOE is proposing to amend the test procedure for CUACs and CUHPs to adopt in the proposed new appendix A1 the test provisions in AHRI 1340–202X Draft and ASHRAE 37–2009.

Issue 2: DOE requests feedback on its proposal to adopt the IVEC and IVHE metrics as determined under AHRI 1340–202X Draft in appendix A1 of the Federal test procedure for ACUACs and ACUHPs (including double-duct systems), ECUACs, and WCUACs.

F. Efficiency Metrics and Test Conditions

In response to the July 2017 TP RFI, May 2020 ECS RFI, and May 2022 TP/ECS RFI, DOE received comment on a number of topics related to changing the metrics and/or test conditions used for determining CUAC and CUHP efficiency. The following sections: (1) summarize comments received on these topics; (2) discuss the current test conditions and metrics in appendix A; (3) discuss the test conditions and metrics proposed to be included in appendix A1; (4) discuss the newly proposed IVEC metric; (5) discuss the newly proposed IVHE metric; (6) discuss additions and revisions to the IVEC and IVHE metrics that are included in the AHRI 1340–202X Draft but not the ACUAC and ACUHP Working Group TP Term Sheet; and (7) discuss metrics specific to double-duct systems.

1. Comments Received on Metrics

In response to the July 2017 TP RFI, May 2020 ECS RFI, and May 2022 TP/ECS RFI, DOE received comments regarding a number of test procedure topics. In the following subsections, DOE briefly summarizes these topics,

[17] DOE is not proposing to reference the following provisions in section 3 of AHRI 340/360–2022 because the terms are either defined at 10 CFR 431.92 or are not needed for the proposed DOE test procedure: 3.2 (Basic Model), 3.4 (Commercial and Industrial Unitary Air-conditioning Equipment), 3.5 (Commercial and Industrial Unitary Heat Pump), 3.7 (Double-duct System), 3.8 (Energy Efficiency Ratio), 3.12 (Heating Coefficient of Performance), 3.14 (Integrated Energy Efficiency Ratio), 3.23 (Published Rating), 3.26 (Single Package Air-Conditioners), 3.27 (Single Package Heat Pumps), 3.29 (Split System Air-conditioners), 3.30 (Split System Heat Pump), 3.36 (Year Round Single Package Air-conditioners).

[18] For reasons discussed in section III.I of this NOPR, DOE is proposing provisions regarding configuration of unit under test at 10 CFR 429.43(a)(3)(v)(A), appendix A, and appendix A1 that are distinct from the provisions in sections D1 through D3 of AHRI 340/360–2022.

including the corresponding comments received and DOE's responses.

DOE notes that many of the issues raised by commenters had not yet been addressed through an industry consensus test procedure at the time the comments were submitted to DOE. Many of these issues were raised subsequently during the Working Group, and the newly proposed IVEC and IVHE metrics would largely address the major concerns previously expressed by commenters.

a. IEER Test Conditions and Weighting Factors

In the July 2017 TP RFI, DOE welcomed comment on any aspect of the existing test procedures for CUACs and CUHPs not specifically addressed by the RFI, particularly with regard to information that would improve the representativeness of the test procedures. 82 FR 34427, 34448. (July 25, 2017).

With respect to the IEER test conditions and weighting factors, the CA IOUs suggested raising the highest ambient dry-bulb temperature test point used for determining IEER, stating that the 95 °F condition specified in the test procedure does not reflect the conditions experienced in the western climate and on many rooftops throughout the country. (CA IOUs, EERE–2017–BT–TP–0018–0007 at p. 3)

Additionally, in response to the May 2020 ECS RFI, DOE received comments and test data from Verified recommending changes to the IEER weighting factors and indoor and outdoor air temperature test conditions in AHRI 340/360, particularly to account for the use of economizers (discussed further in section III.F.1.d) and changes in climate due to global climate change. (Verified, EERE–2019–BT–STD–0042–0011 at pp. 3–7) DOE also received comments from two individuals supporting the statements made by Verified. (Heinemeier, EERE–2019–BT–STD–0042–0012 at p. 1; Walsh, EERE–2019–BT–STD–0042–0018 at p. 1)

In response to the May 2022 TP/ECS RFI, DOE received several comments regarding the weighting factors used in the IEER metric, specifically relating to the building types considered in the current test procedure. ASAP and ACEEE asserted that the current IEER weighting factors should be adjusted to account for additional building types that were not considered when initially developing IEER. (ASAP and ACEEE, EERE–2022–BT–STD–0015–0011, at p. 2)

Carrier noted that IEER was developed using three building types (specifically, office, retail, and school buildings) and asserted that for an updated analysis, the 16 building types currently in ASHRAE 90.1 should be considered where applicable to ACUACs and ACUHPs. (Carrier, EERE–2022–BT–STD–0015–0010, at pp. 14–15) Carrier also noted that it had developed a model that outputs load profiles for the 16 ASHRAE 90.1 building types for each of the 19 global climate zones in ASHRAE 169–2013 and was using its model to evaluate the effects of ventilation, ASHRAE 90.1 requirements for economizer free cooling and energy recovery, updated heating metrics, different climate zones and building load profiles, and updated ESPs. (Carrier, EERE–2022–BT–STD–0015–0010, at pp. 1–6)

Additionally, Carrier noted that the weighting factors developed during the 2005 process to create IEER were based on ton-hours and not purely on hours, noting that high-capacity hours have more weight than the lower capacity hours in terms of energy use. (Carrier, EERE–2022–BT–STD–0015–0010, at pp. 12–13). Carrier also explained that the weighting for the A test condition was based on the 97-percent to 100-percent capacity range because it would not have been appropriate to use a larger bin with the rating condition at the extreme upper limit of the bin. *Id.* Carrier recommended that if DOE were to update the cooling metric, DOE should consider the following: (1) oversizing, (2) re-evaluating test points and weighting factors if ventilation and economizing are included, (3) test uncertainty at very low loads, and (4) varying return air temperatures. *Id.*

AHRI stated that energy use during cooling varies based on climate zone, building type, construction, and use, and that ASHRAE SSPC 90.1 has developed reference cities for all 19 climate zones and defined 16 reference buildings that represent 83 percent of the market. (AHRI, EERE–2022–BT–STD–0015–0008, at p. 5)

As presented in the September 20–21, 2022, Working Group meetings, the Working Group evaluated the weighting factors and test conditions specified in conjunction with the newly proposed IVEC metric using the models developed by Carrier, which include several ASHRAE 90.1 building types and climate zones for which ACUACs and ACUHPs are installed. (*See* EERE–2022–BT–STD–0015–0019, pp. 9–22) The weighting factors and their development are further discussed in section III.F.4 of this NOPR. DOE believes that these provisions address the issues raised by commenters as summarized previously in this section, and proposes to adopt in appendix A1 the adjusted IVEC weighting factors that are specified in AHRI 1340–202X Draft and discussed in section III.F.6.a of this NOPR.

b. Energy Efficiency Metrics for ECUACs and WCUACs

For ECUACs and WCUACs of all regulated cooling capacities, DOE currently prescribes standards in terms of the EER metric for cooling-mode operation. 10 CFR 431.97(b); *see* Table 1 to 10 CFR 431.97. This differs from ACUACs and ACUHPs with cooling capacities greater than or equal to 65,000 Btu/h (excluding double-duct systems), for which DOE currently prescribes energy conservation standards in terms of the IEER metric for cooling-mode operation and in terms of COP for heating-mode operation. 10 CFR 431.97(b); *see* Table 3 and Table 4 to 10 CFR 431.97. Unlike EER, which represents the efficiency of the equipment operating only at full load, IEER represents the efficiency of operating at part-load conditions of 75 percent, 50 percent, and 25 percent of capacity in addition to the efficiency at full load. The IEER metric provides a more representative measure of energy consumption in actual operation of CUACs and CUHPs by weighting the full-load and part-load efficiencies with the average amount of time the equipment spends operating at each load point. AHRI 340/360–2022 includes both the EER and IEER metrics for ECUACs and WCUACs. ASHRAE 90.1–2019 and ASHRAE 90.1–2022 specify minimum efficiency levels for ECUACs and WCUACs in terms of both EER and IEER.

As discussed in the July 2017 RFI, ANSI/AHRI 340/360–2007 includes a method for testing and calculating IEER for ECUACs and WCUACs. DOE requested comment and data on whether the IEER part-load conditions and IEER weighting factors are representative of the operation of field-installed ECUACs and WCUACs, and on the typical cycling losses of field-installed ECUACs and WCUACs. 82 FR 34427, 34440 (July 25, 2017).

On this topic, AHRI, Carrier, and Goodman commented that the weighting factors are based on building load profiles and should not depend on equipment category. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 22; Carrier, EERE–2017–BT–TP–0018–0006 at p. 8; Goodman, EERE–2017–BT–TP–0018–0014 at p. 3) ASAP, ASE, *et al.* encouraged DOE to adopt IEER as the efficiency metric for ECUACs and WCUACs, stating that ECUACs and WCUACs spend most of their operating time in part load, and that using IEER for these equipment types would provide consistency in ratings with ACUACs and ACUHPs and better represent performance in the field. (ASAP, ASE, *et al.,* EERE–2017–BT–TP–0018–0009 at pp. 4–5) In contrast, Goodman stated that the WCUAC market is so small that there would be no value in changing the regulated metric to IEER for such equipment. (Goodman, EERE–2017–BT–TP–0018–0014 at p. 3)

DOE responds to these commenters as follows. In the proposed appendix A, for ECUACs and WCUACs, DOE proposes to include both the required EER metric and the optional IEER metric, as well as the test procedure specified in AHRI 340/360–2022, in the DOE test procedure so as to allow for required representations using the EER metric and optional representations using the IEER metric. In a final determination published in the **Federal Register** on July 14, 2021, DOE discussed the potential for amended energy conservation standards for ECUACs and WCUACs denominated in terms of IEER, but the Department concluded that such a metric change was not warranted and ultimately maintained the current standards denominated in terms of EER. 86 FR 37001, 37004–37005. As part of this rulemaking, DOE is proposing the IEER provisions as an optional test procedure to allow for consistent and comparable representations in terms of IEER when testing to appendix A, should a manufacturer choose to make such representations.

As discussed, DOE is proposing to adopt the IVEC metric for ECUACs and WCUACs in the proposed appendix A1, as determined in the AHRI 1340–202X Draft. DOE has tentatively concluded that the inclusion of the IVEC metric for ECUACs and WCUACs in AHRI 1340–202X Draft represents industry consensus that the metric provides a representative measure of efficiency for ECUACs and WCUACs. Section III.F.6.d of this NOPR includes further discussion of the IVEC metric for ECUACs and WCUACs.

c. Cyclic Degradation Factor for Cooling

In section 6.2.3.2 of AHRI 340/360–2022, units that are unable to reduce their capacity to meet one of the IEER part load rating points (*i.e.,* 75 percent, 50 percent, or 25 percent) are tested under steady-state conditions at the minimum stage of compression that the unit is able to achieve. In real-world installations, these same units would typically operate under non-steady-state conditions because the compressor would cycle to reduce the unit's capacity to meet the desired cooling load. AHRI 340/360–2022 require units unable to reduce their capacity below one of the part load rating points have the EER for that rating point calculated using a cyclic degradation coefficient. This degradation coefficient, which is calculated based on the load fraction and ranges from 1 to 1.13, is included in the denominator of the EER calculation for that rating point and is multiplied by the sum of the compressor and condenser fan power in order to simulate the efficiency degradation of compressor and condenser fan cycling.

With respect to cyclic degradation, DOE received a comment in response to the July 2017 TP RFI from the CA IOUs recommending that DOE investigate the cyclic degradation factor in AHRI 340/360–2015 to verify that the degradation coefficient will never exceed 1.13. (CA IOUs, EERE–2017–BT–TP–0018–0007 at p. 2)

DOE also received a comment in response to the May 2020 ECS RFI from Verified questioning the validity of the cyclic degradation factor in AHRI 340/360–2019, stating that its laboratory tests found that relative cycling losses of a 7.5-ton system were more than double the losses for a 3-ton system. (Verified, EERE–2019–BT–STD–0042–0011 at p. 10)

While the Working Group discussed calculation methods for IVEC during the ACUAC and ACUHP Working Group meetings, the Working Group did not discuss any alternatives to the cyclic degradation approach specified in AHRI 340/360–2022. Additionally, the ACUAC and ACUHP Working Group TP Term Sheet includes the cyclic degradation calculation method specified in AHRI 340/360–2022 as part of the IVEC metric calculation method. At this time, DOE lacks clear and convincing evidence to deviate from the cyclic degradation approach in AHRI 340/360–2022 that is recommended in the ACUAC and ACUHP Working Group TP Term Sheet and included in AHRI 1340–202X Draft. Therefore, DOE is not proposing to adopt a cyclic degradation approach that differs from the approach specified in these documents.

d. Economizing and Ventilation

In 2015, DOE initiated a rulemaking effort for the ASRAC Commercial and Industrial Fans and Blowers Working Group (CIFB Working Group) to negotiate the scope, test procedure, and standards for commercial and industrial fans and blowers. 80 FR 17359. The CIFB Working Group issued a term sheet with recommendations regarding the energy conservation standards, test procedures, and efficiency metrics for commercial and industrial fans and blowers (CIFB Term Sheet). (*See* Document No. 179 in Docket No. EERE–2013–BT–STD–0006.) Recommendation #3 of the CIFB Term Sheet identifies a need for DOE's test procedures and related efficiency metrics for CUACs and CUHPs to more fully account for the energy consumption of fans embedded in regulated commercial air-conditioning equipment. (*Id.* at pp. 3–4) In addition, the CIFB Working Group recommended that in the next round of test procedure rulemakings, DOE should consider revising efficiency metrics that include energy use of supply and condenser fans to include the energy consumption during all relevant operating modes (*e.g.,* auxiliary heating mode, ventilation mode, and part-load operation). (*Id.*)

The Commercial Package Air Conditioners Working Group also developed recommendations regarding fan energy use in a term sheet. (See Document No. 93 in Docket No. EERE–2013–BT–STD–0007) The Commercial Package Air Conditioners Working Group recommended that DOE initiate a rulemaking with a primary focus of better representing total fan energy use in real-world installations, including consideration of fan operation for operating modes other than mechanical cooling and heating.[19] (*Id.* at p. 2)

As part of the July 2017 TP RFI, DOE requested comment and data on the operation of CUAC and CUHP supply fans when there is no demand for heating and cooling, as well as the impact of ancillary functions (*e.g.,* primary heating, auxiliary heating, and economizers[20]) on the use and operation of the supply fan. 82 FR 34427, 34440.

In response to the July 2017 TP RFI, Carrier and AHRI commented that fan operation in ventilation hours cannot properly be accounted for without including economizer operation in testing. (Carrier, EERE–2017–BT–TP–0018–0006 at p. 9; AHRI, EERE–2017–BT–TP–0018–0011 at p. 23)

AHRI and Goodman commented that manufacturers and third-party laboratories do not currently have test

[19] Mechanical cooling and heating refer to a ACUAC and ACUHP using the refrigeration cycle to cool and heat the indoor space, and does not refer to other forms of unit operation (*e.g.,* economizing, ventilation, or supplemental heating).

[20] An economizer is a system that enables an ACUAC or ACUHP to supply outdoor air instead of return air from the conditioned space in order to reduce or eliminate mechanical cooling operation in mild or cold weather conditions. In economizer-only cooling, the indoor fan runs to supply outdoor air to meet cooling load, but there is no mechanical cooling operation—*i.e.,* compressor(s) and condenser fans do not operate.

facilities that can accommodate testing of ACUACs and ACUHPs with economizers operating because such testing requires air to be pulled from the outdoor room into the indoor room. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 22; Goodman, EERE–2017–BT–TP–0018–0014 at p. 3) AHRI further stated that because of the lack of test facilities to accommodate this type of testing, incorporation of ventilation into an efficiency metric is still not practical. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 23)

In the May 2022 TP/ECS RFI, DOE acknowledged a need to further investigate the prevalence and operating hours of economizers and ventilation. DOE requested comment and data on several issues including the number of units installed with economizers per climate zone, the operating hours of economizers by climate zone, and the methodology used to determine operating hours in each cooling mode, especially those that might contribute to the creation of a new metric.

In response to the May 2022 TP/ECS RFI, the CA IOUs, NYSERDA, and ASAP and ACEEE commented that the current test procedure does not account for the fan energy use outside of mechanical cooling and heating modes. (CA IOUs, EERE–2022–BT–STD–0015–0012, at p. 2; ASAP and ACEEE, EERE–2022–BT–STD–0015–0011, at pp. 1–2, NYSERDA, EERE–2022–BT–STD–0015–0007, at p. 3)

Specifically, the CA IOUs recommended that DOE consider the California 2022 Title 24 codes and standards enhancement effort for potential solutions. (CA IOUs, EERE–2022–BT–STD–0015–0012, at p. 2)

NYSERDA recommended that DOE consider factoring in fan energy using temperature rise provisions, further detailed in comments submitted by NYSERDA in response to the commercial warm air furnace test procedure NOPR published February 5, 2022 (*see* 87 FR 10726). (NYSERDA, EERE–2022–BT–STD–0015–0007, at p. 3)

Regarding the distribution of installed economizers, AHRI stated that although many economizers are field-installed, AHRI is considering collecting data on factory-installed economizers, particularly by state or climate zone. (AHRI, EERE–2022–BT–STD–0015–0008, at p. 5) AHRI did not provide any such data in its comment.

ASAP and ACEEE cited AHRI data indicating that economizers are typically installed in CUACs. ASAP and ACEEE noted that ASHRAE 90.1–2019 requires economizers in all but one climate zone, suggesting the importance of incorporating fan energy use during economizer only cooling mode. (ASAP and ACEEE, EERE–2022–BT–STD–0015–0011, at pp. 1–2)

Lennox commented that its information indicates that the percentage of CUACs and CUHPs shipped with factory installed economizers ranges from around 30 percent to 80 percent by state, averaging around 55 percent in the U.S. (Lennox, EERE–2022–BT–STD–0015–0009, at p. 5) Lennox noted that the total percentage is likely far higher than this level when field-installed economizers are taken into account. *Id.* Lennox also stated that its information indicates that a higher fraction of equipment in northern climates contain economizers than in warmer southern climates. Lennox recommended that DOE review the standard and code requirements for where economizers are required in order to assess the fraction of products installed with economizers in each climate zone. *Id.*

Carrier commented that, based on the market distribution data used for the ASHRAE 90.1 determination, economizers are required on approximately 96 percent of the 16 reference buildings' weighted sales. (Carrier, EERE–2022–BT–STD–0015–0010, at pp. 9–10)

Regarding economizer hours and methodology for determination of hours in each bin load, AHRI stated that DOE should use the heating and cooling load modeling used to develop IEER to understand the heating, cooling, and economizing hours for CUACs and CUHPs. (AHRI, EERE–2022–BT–STD–0015–0008, at p. 3)

Carrier provided data showing the hours CUACs and CUHPs spend in economizer only, integrated economizer, and mechanical only cooling developed as part of ASHRAE 90.1 economizer studies it has conducted. (Carrier, EERE–2022–BT–STD–0015–0010, at p. 12) Carrier stated that the 2005 analysis performed to determine the IEER metric was based on the mechanical cooling operation, including hours where integrated economizers are used, but that it did not account for the benefits of the economizer capacity. (Carrier, EERE–2022–BT–STD–0015–0010, at pp. 12–13)

In addition to distribution and operating information, DOE received multiple recommendations in response to the May 2022 TP/ECS RFI relating to the inclusion of economizer or ventilation data in a new efficiency metric.

The CA IOUs stated that economizer performance is highly dependent on the use of climate-zone appropriate controls, and that economizers are often shipped with conservative default control settings appropriate for warm and moist areas. (CA IOUs, EERE–2022–BT–STD–0015–0012, at pp. 3–4) The CA IOUs asserted that including economizers in the CUAC and CUHP energy efficiency metric would not be beneficial because it would preempt climate-zone-dependent economizer requirements in building codes. *Id.* The CA IOUs explained that economizers and their installed controls are often sold by third parties, and that original equipment manufacturers (OEMs) usually do not determine the method of economizer control or quality of construction. *Id.* The CA IOUs stated that DOE may need to determine if independently manufactured economizers fall within its statutory authority and if it is feasible to regulate them. *Id.* Furthermore, the CA IOUs asserted that designing a test procedure that measures a significant difference between models may be challenging unless the test includes operation as an integrated economizer, in which case the difference in performance would be driven by the unit's capacity control and turndown capability. *Id.*

Carrier asserted that the downside of including the ventilation cooling hours in a new cooling metric is that it would decrease the focus on the mechanical cooling, and that evaluation of mechanical cooling performance was the intent of the current IEER metric. (Carrier, EERE–2022–BT–STD–0015–0010, at pp. 9–10) Carrier requested that if the IEER metric and test procedure are modified to include ventilation fan power, the benefits of the economizer and also energy recovery be included to account for the actual capabilities of such a large application base. *Id.*

Based on comments received in response to the July 2017 TP RFI and the May 2020 ECS RFI, DOE recognized in the May 2022 TP/ECS RFI a need to further investigate fan operation during ventilation or air circulation/filtration and economizing. Specifically, while comments received previously had indicated the prevalence of multi-speed fans that reduce fan speed in these operating modes, the commenters had not indicated how the fan speed in these operating modes typically compares to fan speed when operating at the lowest stage of compressor cooling. Thus, in the May 2022 TP/ECS RFI, DOE sought feedback on the supply airflow and fan power at the lowest stage of compression for variable air volume and staged air volume fans in relation to ventilation, air circulation, and economizer-only cooling. 87 FR 31743, 31750–31751.

In response to the May 2022 TP/ECS RFI, AHRI and Lennox recommended that DOE review ASHRAE 62.1 ''Ventilation for Acceptable Indoor Air Quality,'' which specifies minimum ventilation rates and other measures to achieve proper indoor air quality control in commercial buildings. (AHRI, EERE–2022–BT–STD–0015–0008, at pp. 4–5; Lennox, EERE–2022–BT–STD–0015–0009, at pp. 4–5) AHRI noted that ventilation rates specified by ASHRAE 62.1 vary from 18 percent to 60 percent based on building type. (AHRI, EERE–2022–BT–STD–0015–0008, at p. 4) AHRI also noted that ASHRAE 90.1–2019 provides minimum requirements for the CUACs and CUHPs, including the requirement to have two-speed fans. *Id.* AHRI stated that airflow, including during ventilation, will be different for CUACs and CUHPs if the product is multi-zone variable air volume (MZVAV), single-zone variable air volume (SZVAV), or constant volume, and that the relationship between fan power, airflow, and code requirements must be considered when developing a metric change that incorporates ventilation. (AHRI, EERE–2022–BT–STD–0015–0008, at pp. 4–5) AHRI also stated that ventilation occurs only during occupied mode. (AHRI, EERE–2022–BT–STD–0015–0008, at p. 5)

Lennox stated that CUAC and CUHP systems are generally designed to meet minimum ventilation requirements in all operating modes. (Lennox, EERE–2022–BT–STD–0015–0009, at p. 5) Lennox recommended that for the test procedure, the airflow in ventilation-only mode be set at the same as the airflow used at the minimum stage of capacity. *Id.* Lennox stated that for economizer-only cooling, the systems are generally designed to meet a supply air temperature setpoint, and that the supply airflow volume is influenced by outside air temperature and/or the cooling demand of the conditioned space to attain this setpoint. *Id.* Lennox stated that the economizer-only supply airflow might not be the same as the lowest stage of compression and can be less than the airflow at the lowest stage of compression. *Id.*

Carrier stated that for ventilation-only operation, the airflow may or may not be the same as the minimum stage of capacity, and that the airflow depends on the controls and application, as well as the required ventilation rate. (Carrier, EERE–2022–BT–STD–0015–0010, at p. 9) Carrier also stated that fan speeds can be higher during economizer cooling operation. *Id.* Carrier noted that ASHRAE 90.1 requires economizers to be capable of 100-percent airflow and that the maximum economizer capacity be used before turning on the mechanical cooling of the integrated economizer option. *Id.*

NEEA noted that CUAC and CUHP standard rating conditions do not consider operating modes where ventilation air (either mixed or not mixed with return air) is actively heated or cooled. NEEA stated that it recognizes that the impact of certain features—including economizers and ventilation systems—will vary depending on the amount of ventilation air introduced by the CUAC/CUHP. NEEA described, for example, that in 30-percent and 100-percent outside air systems, energy recovery represents a significant opportunity for energy savings, whereas in 0-percent outside systems, enclosure improvements or reducing damper leakage may present the greatest opportunity for energy savings. NEEA asserted that by only accounting for 0-percent outside air cooling and heating modes, the current efficiency metrics give misleading signals to manufacturers and consumers about what models will decrease energy consumption. NEEA recommended that DOE consider how the market categorizes CUAC and CUHP equipment and ensure that DOE product definitions align with the market and not just what is simplest for regulation. (NEEA, EERE–2022–BT–STD–0015–0013 at p. 6)

During negotiations for the Working Group, the Working Group agreed not to include testing with economizers operating due to test burden and repeatability concerns. (*See* EERE–2022–BT–STD–0015–0048 at pp. 55–57) However, the Working Group agreed to include operating hours and fan energy use associated with economizer operation (reflecting both factory-installed and field-installed economizers). (*See* EERE–2022–BT–STD–0015–0053 at pp. 9, 32) DOE and other participating stakeholders then assessed market data of economizer distribution. Due to the wide distribution of economizers identified through this analysis, all caucuses agreed to include the economizer benefit and energy use in the new integrated cooling metric—IVEC. To ensure representative consideration of economizers in the cooling metric, the calculation for the IVEC metric incorporates both the cooling benefit and energy use associated with the hours of cooling contribution provided in integrated economizing and economizer-only cooling modes. The IVEC metric also includes the energy use associated with cooling season ventilation operation. To determine the breakdown of hours among economizer-only cooling, integrated economizer, mechanical cooling-only, and cooling season ventilation operation for the IVEC metric, the Working Group utilized the previously discussed building modeling of several ASHRAE 90.1 building types and climate zones in which CUACs and CUHPs are installed. DOE has tentatively determined that the proposed inclusion of fan energy for economizing and ventilation operating modes in the IVEC cooling metric—in conjunction with other proposed test condition changes—addresses the concerns previously raised regarding fan energy representation in the efficiency metric, and proposes to adopt the IVEC metric as specified in the AHRI 1340–202X Draft.

e. External Static Pressure Requirements

In the testing of air conditioners and heat pumps, ESP requirements simulate the resistance that the indoor fan must overcome from the air distribution system when installed in real-world installations. Both AHRI 210/240 (*i.e.,* the 2008, 2017, and 2023 versions) and AHRI 340/360 (*i.e.,* the 2007, 2015, 2019, and 2022 versions) specify minimum ESPs for testing based on the unit's rated capacity. Minimum ESPs are specified in Table 7 of AHRI 340/360–2022 and range from 0.10–0.20 inches of water column (in. H_2O) for ACUACs and ACUHPs with a rated cooling capacity less than 65,000 Btu/h, and range from 0.2–0.75 in. H_2O for all CUACs with cooling capacity greater than or equal to 65,000 Btu/h. These values align with the ESP requirements specified in the current DOE test procedure.

In 2015, the Commercial Package Air Conditioners Working Group recommended that the energy use analysis conducted for the January 2016 Direct Final Rule should use higher ESPs than those specified in the DOE test procedure to help better simulate real-world applications. 81 FR 2420, 2470 (Jan. 15, 2016). Specifically, the Commercial Package Air Conditioners Working Group recommended ESPs of 0.75 and 1.25 in. H_2O, which corresponded to the ESPs used in modified building simulations of the cooling load. *Id.* The ESP values recommended by the Commercial Package Air Conditioners Working Group did not vary with capacity. Recommendation #2 of the term sheet developed by the Commercial Package Air Conditioners Working Group suggested that DOE should amend the test procedure for CUACs and CUHPs to better represent the total fan energy use by considering alternative ESPs. (*See* Document No. 93 in Docket No. EERE–2013–BT–STD–0007 at p. 2) Higher ESPs at the same airflow would result in higher fan power measured during testing and would, therefore, result in fan energy use comprising a larger fraction of total energy use measured during the test.

In the May 2022 TP/ECS RFI, DOE sought data and comment on representative ESPs in the field of all CUACs and CUHPs. 87 FR 31743, 31749 (May 25, 2022). NEEA provided a comment, recommending generally that DOE establish a more representative ESP value for testing all CUACs and CUHPs based on the previous recommendation from the Commercial Package Air Conditioners Working Group. (NEEA, EERE–2022–BT–STD–0015–0013 at pp. 7–8) NEEA noted that the ESP levels used by DOE for the energy use analysis during the last energy conservation standards rulemaking for ACUACs and ACUHPs are two to three times higher than the required ESPs in the existing test procedure. *Id.* NEEA stated that these values were more representative of units in the field due to the ESP used in this test procedure not including the return ductwork pressure loss, which NEEA described as significant because many units do not include return fans. *Id.*

The CA IOUs supported updates to the CUAC and CUHP test procedure to improve the representation of fan energy use, particularly by updating the required ESPs in the test procedure. (CA IOUs, EERE–2022–BT–STD–0015–0012 at p. 2) Specifically regarding ESPs, the CA IOUs encouraged DOE to explore California's 2022 Title 24 codes and standards-enhancement effort for air distribution enhancements. *Id.* The CA IOUs, as well as NYSERDA and ASAP and ACEE, recommended that DOE consider alternative ESP values more representative of units in real-world installations. (CA IOUs, EERE–2022–BT–STD–0015–0012, at p. 2; ASAP and ACEEE, EERE–2022–BT–STD–0015–0011, at pp. 1–2; NYSERDA, EERE–2022–BT–STD–0015–0007, at p. 3)

AHRI and Lennox stated that CUACs and CUHPs are designed to cover a range of ESPs, noting that big box retail stores could have an ESP of 0.5 in. H_2O and that multi-story offices could exceed ESPs of 2.0 in. H_2O. (AHRI, EERE–2022–BT–STD–0015–0008 at pp. 2–3; Lennox, EERE–2022–BT–STD–0015–0009 at p. 2) AHRI noted that the Commercial Package Air Conditioners Working Group agreed to use 0.75 and 1.25 in. H_2O for the energy conservation standards energy use analysis. *Id.* AHRI stated that its members were unable to form a consensus position on the issue of representative ESPs for CUACs and CUHPs before the comment period ended; however, AHRI may submit supplementary comments to DOE or a working group if one were to be formed. (AHRI, EERE–2022–BT–STD–0015–0008 at p. 3)

Lennox stated that while its review of data was ongoing regarding a representative ESP recommendation, it found the ESP levels used by the Commercial Package Air Conditioners Working Group to be reasonable. Lennox recommended that the ESPs used for testing increase according to the capacity breaks specified in AHRI 340/360 because ESPs generally increase with product capacity. (Lennox, EERE–2022–BT–STD–0015–0009 at pp. 2–3) Lennox also commented the applied static pressure from ECUACs and WCUACs did not vary from similar air source products and recommended similar values be used for product performance comparison. (*Id.* at p. 3)

Carrier stated that it agreed some adjustments to the ESPs might be appropriate, but that several things need to be reviewed before the ESPs are revised. Carrier also stated that ESPs can vary significantly depending on the application. Specifically, Carrier stated that some applications can use concentric ductwork, where ESPs are likely higher than the current ESPs in AHRI 340/360–2022; and other applications use variable air volume (VAV) systems, which have more extensive ductwork and added pressure drop from terminals. Carrier stated that for larger equipment, the applications are more complex because the equipment is larger and ductwork design can vary based on the building design. Carrier mentioned a general trend that static pressure and ductwork length increase with equipment size, but also mentioned that this depends on the building design, configuration, and system type. Carrier stated that it is in the process of reviewing job design data and applications and will have that data for further discussions once it is received. Additionally, Carrier stated that performing an analysis of the ASHRAE Standard 90.1 fan power budget addendum BO may also provide additional insight to proper static pressure levels. (Carrier, EERE–2022–BT–STD–0015–0010 at p. 7)

In the May 2022 RFI, DOE also sought specific data on ESPs for ECUACs and WCUACs with cooling capacities less than 65,000 Btu/h, as well as feedback on whether a representative ESP value for testing would be 0.5 in H_2O (as referenced for air-cooled CUACs <65,000 Btu/h in AHRI 210/240–2023), the range of 0.10 to 0.20 in H_2O (from AHRI 340/360–2022), or alternative values. For WCUACs with a cooling capacity of less than 65,000 Btu/h, DOE's preliminary analysis showed that these units may typically be installed above dropped ceilings in commercial buildings. For ECUACs with a cooling capacity of less than 65,000 Btu/h, DOE's preliminary analysis shows that these units are primarily marketed for residential applications, which suggests that it may be appropriate to align the ESP requirements for ECUACs with a cooling capacity of less than 65,000 Btu/h with those specified for CAC/HPs in 10 CFR part 430, subpart B, appendix M1 (appendix M1) (*i.e.,* 0.5 in H_2O for conventional units). Therefore, DOE considered whether it was appropriate for the same ESP requirements to be applied for both ECUACs and WCUACs with a cooling capacity of less than 65,000 Btu/h. 87 FR 31743, 31750 (May 25, 2022).

Carrier stated that the ESPs for ECUACs and WCUACs less than 65,000 Btu/h in the field would not be much different than the average values used for the AHRI 210/240–2023 analysis.[21] Carrier asserted that ESP values in the field might be lower than those ESPs, because some ECUACs and WCUACs with a capacity less than 65,000 Btu/h are applied with short supply ducts and no return ducts or can also be used with concentric ducts. (Carrier, EERE–2022–BT–STD–0015–0010 at pp. 7–8) Lennox recommended the ESP value of 0.5 in H_2O from AHRI 210/240–2023 be used for ECUACs and WCUACs with cooling capacity less than 65,000 Btu/h. (Lennox, EERE–2022–BT–STD–0015–0009 at p. 3)

The majority of comments received in response to both the July 2017 TP RFI and May 2022 TP/ECS RFI indicate that higher ESP requirements for testing would be more representative of all CUACs and CUHPs in the field. The ESP requirements included in the ACUAC and ACUHP Working Group TP Term Sheet reflect consensus among Working Group members regarding higher ESP requirements for testing. The AHRI 1340–202X Draft specifies provisions for determining the IVEC and IVHE metrics for double-duct systems, ECUACs, and WCUACs, including higher ESP requirements for testing consistent with

[21] In its comment, Carrier mentioned the ''AHRI 210/240–2003 analysis.'' Because there is no 2003 version of AHRI 210/240 and the ESP requirements for air-cooled central air conditioners and heat pumps with cooling capacity less than 65,000 Btu/h were updated in AHRI 210/240–2023, DOE interprets the intent of Carrier's comment as referring to AHRI 210/240–2023.

the ACUAC and ACUHP Working Group TP Term Sheet. Because the ACUAC and ACUHP Working Group TP Term Sheet does not include provisions for testing ECUACs and WCUACs, the term sheet does not include ESP requirements for testing equipment with cooling capacity less than 65,000 Btu/h. The AHRI 1340–202X Draft includes an ESP requirement of 0.5 in H_2O for testing ECUACs and WCUACs with cooling capacity less than 65,000 Btu/h, which is consistent with the ESP requirement specified in AHRI 210/240–2023 for comparable air-cooled equipment. DOE has tentatively concluded that the ESP requirements specified in AHRI 1340–202X Draft represent industry consensus for testing CUACs and CUHPs and provide a more representative measure of energy efficiency. Therefore, as discussed in sections III.F.4 and III.F.5 of this NOPR, DOE is proposing to adopt the ESP requirements specified in AHRI 1340–202X Draft as part of the IVEC and IVHE metrics.

f. Damper Leakage, Energy Recovery Systems, and Crankcase Heaters

In response to the May 2022 TP/ECS RFI, DOE received several comments recommending that damper leakage, energy recovery systems, and crankcase heaters be addressed in the test procedure for ACUACs and ACUHPs.

NEEA recommended that DOE create a test procedure that accounts for energy losses and gains from auxiliary components, considers energy saved from increased enclosure insulation, and considers variation alongside potentially incorporating CSA P.8, *Thermal efficiencies of industrial and commercial gas-fired packaged furnaces.* (NEEA, EERE–2022–BT–STD–0015–0013, at pp. 2–6) NEEA highlighted the significant energy savings potential of heat recovery ventilation (HRV) and energy recovery ventilation (ERV) systems. NEEA stated that its research indicates such systems can reduce energy use by 24 percent in commercial warm air furnaces in Northwest climate zones. Accordingly, NEEA recommended that energy recovery be incorporated into the test procedure and performance metric for CUACs and CUHPs. *Id.* With regard to insulation, NEEA stated that while building codes such as ASHRAE 90.1 stipulate maximum damper leakage, the requirements do not apply to the resale market, causing a significant number of units available today to have significantly higher leakage rates than code requirements. *Id.* NEEA recommended that DOE investigate the savings potential of increased insulation and account for its benefit across all operating modes in test procedure and efficiency metrics, as non-conditioning operating periods are not currently accounted for. *Id.* NEEA stated that its research indicates that increased enclosure insulation can improve heating season energy savings, and that NEEA expects there would be cooling season savings as well that are not currently accounted for. *Id.* NEEA provided examples of subcomponent performance characteristics that could be used as part of a whole box metric approach, including AHRI 1060 for energy recovery, ANSI/AMCA Standard 500–D–18 for damper leakage, and AHRI 1350 for evaluation of enclosure insulation material and thickness for casing loss. *Id.* NEEA recommended that DOE consider the approach implemented in CSA P.8 to account for different outdoor air configurations, which could be emulated to account for different percentages of ventilation air without adding additional test burden. *Id.*

The CA IOUs expressed concern that energy use of equipment components, such as crankcase heaters, is significant and not represented in the IEER metric. (CA IOUs, EERE–2022–BT–STD–0015–0012, at p. 6) The CA IOUs therefore recommended that off-mode and standby energy consumption be accounted for when updating the CUAC/HP test procedure and metric. *Id.*

As discussed, the Working Group assessed the impact of energy from additional operating modes, as well as crankcase heaters and controls power, and the metrics recommended in the ACUAC and ACUHP Working Group TP Term Sheet include: (1) in the IVEC metric—economizer-only cooling, cooling season ventilation mode, crankcase heat operation, and controls power in unoccupied no-load cooling season hours; and (2) in the IVHE metric—heating season ventilation mode, crankcase heat operation, and controls power in unoccupied no-load heating season hours. (*See* EERE–2022–BT–STD–0015–0065) Additionally, damper leakage was discussed during the Working Group meetings, and the Working Group ultimately voted not to address this issue in the IVEC and IVHE metrics. (*See* EERE–2022–BT–STD–0015–0055, pp. 7–9) While cabinet insulation and the effects of ERVs and HRVs were discussed during the Working Group discussions, no proposals were made to include them in the new metrics. All members of the Working Group voted to recommend inclusion of the IVEC and IVHE metrics in the DOE test procedure for ACUACs and ACUHPs. DOE has tentatively determined that the issues regarding additional operating modes raised by commenters are adequately addressed by provisions in the ACUAC and ACUHP Working Group TP Term Sheet, and these provisions are also included in the AHRI 1340–202X Draft. Further, at this time DOE lacks clear and convincing evidence to justify proposing any deviations from the IVEC and IVHE metrics specified in AHRI 1340–202X Draft to address damper leakage, cabinet insulation, or ERVs and HRVs. Therefore, DOE proposes to adopt the IVEC and IVHE metrics specified in AHRI 1340–202X Draft in appendix A1.

g. Controls Verification Procedure

In response to the May 2022 TP/ECS RFI, DOE also received several comments regarding recommendations for a controls verification procedure. The CA IOUs, ASAP and ACEEE, and NEEA suggested that DOE consider a controls verification procedure (CVP) in the DOE test procedure. (CA IOUs, EERE–2022–BT–STD–0015–0012, at p. 5; ASAP and ACEEE, EERE–2022–BT–STD–0015–0011, at pp. 2–3; NEEA, EERE–2022–BT–STD–0015–0013, at p. 5) Specifically, the CA IOUs recommended that DOE consider a CVP similar to the one developed for variable refrigerant flow multi-split systems (VRF multi-split systems) to validate that the controls used within CUACs and CUHPs with variable speed compressors are used effectively. (CA IOUs, EERE–2022–BT–STD–0015–0012, at p. 5) ASAP and ACEEE stated that the CVP should include requirements for testing under native controls to better reflect performance of equipment in the field. (ASAP and ACEEE, EERE–2022–BT–STD–0015–0011, at pp. 2–3) ASAP and ACEEE stated that this would mirror the CVP included in the December 2021 test procedure NOPR for VRF multi-split systems (*See* 86 FR 70644) and the native control requirement in the residential cold climate heat pump challenge in the September 2021 specifications. *Id.* NEEA recommended that DOE consider a verification procedure to test that economizer controls operate as intended. (NEEA, EERE–2022–BT–STD–0015–0013, at p. 5) Due to what NEEA asserted is a significant energy savings opportunity of economizer cooling if the controls are verified, NEEA recommended that economizers be incorporated into the efficiency metric through a calculation-based approach. *Id.*

DOE notes that members from NEEA, ASAP, and the CA IOUs were involved during the Working Group negotiations and provided input on the included test procedure requirements. The resulting ACUAC and ACUHP Working Group TP Term Sheet does not contain any provisions for a CVP and was agreed upon by all members of the Working Group. As such, DOE believes that the issues raised by these stakeholders are resolved on this matter. Further, commenters did not provide sufficient information that would justify or inform development of a CVP for CUACs and CUHPs, and at this time, DOE lacks clear and convincing evidence to propose any test procedure amendments that deviate from the AHRI 1340–202X Draft to address controls verification.

h. Heating Efficiency Metric

In the May 2022 TP/ECS RFI, DOE stated that it was considering whether incorporating heating performance at temperatures lower than 47 °F would improve the representativeness of the DOE test procedure for ACUHPs, and how such performance would differ between CUHPs with different types of supplementary heat (*e.g.,* electric resistance heat and furnaces) and the climate regions in which CUHPs are typically installed. As such, in the May 2022 TP/ECS RFI, DOE requested comment on data relating to CUHP shipments and typical regions they are shipped to, distribution of heating types shipped with CUHPs, and the lowest outdoor temperatures CUHPs are expected to operate at alongside cut in and cut out temperature data. 87 FR 31743, 31750–31753.

Carrier provided data showing the shipment-weighted market share by building type for CUACs and CUHPs; however, Carrier noted that the actual shipment data by building type would be best obtained from AHRI for the whole U.S. industry. (Carrier, EERE–2022–BT–STD–0015–0010, at p. 13)

In response to the request for comment regarding shipment data of CUHPs, Lennox and the CA IOUs commented that the market for CUHPs is growing alongside electrification efforts, but still represents a small fraction of the overall CUAC and CUHP market. (Lennox, EERE–2022–BT–STD–0015–0009, at pp. 3–4; CA IOUs, EERE–2022–BT–STD–0015–0012, at pp. 4–5) Additionally, Lennox stated that the CUHP market is primarily concentrated in the south and southwestern regions of the country, with the majority located in California and Arizona. *Id.* Lennox acknowledged the importance of CUHP market growth and test procedure improvements but recommended that DOE fully evaluate industry capability and incremental burden associated with test procedure amendments to prevent undue burden. *Id.*

NYSERDA noted that in an effort to decarbonize, the Climate Action Council of New York set a 2030 goal that heat pumps should provide space heating and cooling for 10 percent to 20 percent of commercial space statewide, and that heat pumps should become the majority of new purchases for space and water heating by the late 2020s. (NYSERDA, EERE–2022–BT–STD–0015–0007, at pp. 1–2)

Carrier stated that the commercial heat pump market is generally limited to models under 20 tons because the demand for large heat pumps in commercial buildings is currently very small. (Carrier, EERE–2022–BT–STD–0015–0010, at p. 8) Carrier noted that commercial load profiles are significantly different than residential buildings, that commercial buildings have much higher cooling loads than residential buildings, and that commercial buildings tend to operate during the day and are often unoccupied during the evening when temperatures are lower. *Id.*

In response to the request for comment regarding the distribution of supplementary heating types shipped with CUHPs, Carrier stated that currently, it only provides CUHPs with electric heat as backup, mostly because the different load profiles in commercial buildings are more cooling intensive. (Carrier, EERE–2022–BT–STD–0015–0010, at p. 8) Carrier also stated that with the growing interest in use of heat pumps in colder climates, it is evaluating the use of backup gas heat. *Id.* Lennox stated that it does not offer CUHP products with factory-installed supplementary electric heat and described the difficulty in tracking field-installed electric heat accessories. (Lennox, EERE–2022–BT–STD–0015–0009, at p. 4) Lennox noted that dual-fuel CUHP products with factory-installed gas furnaces comprise less than 1 percent of the CUHP and CUAC markets but could expand as CUHPs are implemented in climates with heating capacity requirements exceeding current CUHP abilities. *Id.*

In response to the request for data on the operating temperatures for CUHPs, AHRI stated that the lowest outdoor temperatures at which CUHPs typically operate in mechanical heating mode would be between 5 °F and 15 °F, and that the cut-out temperature is not dependent on supplementary heat. (AHRI, EERE–2022–BT–STD–0015–0008, at p. 4) AHRI stated that the purpose of supplementary heat is to provide comfort conditions to buildings, and that a compressor cut-out temperature is required to protect equipment. *Id.* Carrier stated that currently, its CUHPs are rated to operate down to −10 °F with a few limited to −5 °F and 0 °F, and that at these very low temperatures, auxiliary electric heat is required. (Carrier, EERE–2022–BT–STD–0015–0010, at p. 8) Carrier also stated that currently, there is no set temperature for mechanical heating lockout. *Id.* Lennox stated that industry compressor cut-out temperatures range from over 15 °F to −15 °F depending on unit design. (Lennox, EERE–2022–BT–STD–0015–0009, at p. 4) Lennox commented that with electric heating, cut-out temperatures are typically set to the lowest available setting, while compressor cut-out temperature is normally more flexible and typically set to a higher temperature with furnace supplementary heating. *Id.*

In addition to the data and information provided regarding specific heat pump issues, DOE received recommendations from multiple stakeholders regarding potential new heating efficiency metrics. The CA IOUs encouraged DOE to adopt an updated heating metric to match the expected increase in market share and recommended using a metric that is representative of an average use cycle. (CA IOUs, EERE–2022–BT–STD–0015–0012, at pp. 4–5) Additionally, the CA IOUs expressed support for a seasonal heating metric, similar to HSPF2 for consumer heat pumps, which could account for performance at different ambient conditions, defrost operation, and standby modes. *Id.* The CA IOUs also noted that separate product categories could also be considered, such as for cold-climate CUHPs. *Id.*

NYSERDA stated that a heating efficiency metric could utilize heating-specific weighting factors similar to those used in the approach for IEER calculations and could take into account heating mode tests at all three conditions, alongside proposing two new required test conditions. (NYSERDA, EERE–2022–BT–STD–0015–0007, at pp. 1–2) NYSERDA also recommended the new metric utilize fractional heating bin hours for a representative region, and account for the typical load profiles for the 16 DOE commercial prototype buildings. *Id.*

Lennox asserted that reasonably designed test procedure amendments could encourage CUHP product improvements in low temperature performance and accelerate market expansion. (Lennox, EERE–2022–BT–STD–0015–0009, at p. 4)

Specifically, NYSERDA, the CA IOUs, and ASAP and ACEEE supported an update to the CUHP heating metric to account for performance under 17 °F and 5 °F ambient conditions. (NYSERDA, EERE–2022–BT–STD–0015–0007, at pp. 1–2; CA IOUs, EERE–2022–BT–STD–0015–0012, at p. 4; ASAP and ACEEE, EERE–2022–BT–STD–0015–0011, at p. 1) All three groups recommended that DOE incorporate a test at 5 °F as an optional test condition. *Id.* The CA IOUs also recommended accounting for defrost performance, and that DOE track the development of ASHRAE RP–1831 ''Validation of a Test Method for Applying a Standardized Frost Load on a Test Evaporator in a Test Chamber with an Operating Conditioning System'' to consider whether it can help the development of a test procedure that incorporates defrost performance. (CA IOUs, EERE–2022–BT–STD–0015–0012, at p. 4)

Carrier stated that it is not aware of how many test laboratories in the United States have the capabilities of testing on ACUHPs at low ambient conditions. (Carrier, EERE–2022–BT–STD–0015–0010, at p. 9) Carrier asserted that if DOE were to require testing at lower ambient conditions for ACUHPs, manufacturers and third-party labs may be required to invest substantial capital in psychrometric room upgrades. *Id.*

During the Working Group ASRAC negotiations, extensive discussions were held and analyses were conducted on improving the representativeness of the heating metric for ACUHPs by creating a seasonal metric. As a result of these discussions and analyses, Working Group members reached consensus on the IVHE metric to better represent ACUHP energy use across a range of operation conditions, and specified test conditions and procedures for determining IVHE in the ACUAC and ACUHP Working Group TP Term Sheet. The tests for determining IVHE include required and optional tests at varying load levels (*i.e.,* full-load, part-load, and for variable-speed equipment, boost compressor speed) and outdoor air dry-bulb temperatures (specifically 47 °F, 17 °F, and 5 °F). The IVHE metric also accounts for defrost operation by including a defrost degradation coefficient for low-temperature operation (less than 40 °F). DOE has tentatively determined that the IVHE metric included in the ACUAC and ACUHP Working Group TP Term Sheet and the AHRI 1340–202X Draft addresses concerns raised by commenters, and as discussed further in section III.F.5 of this NOPR, DOE is proposing to adopt the IVHE metric as specified in the AHRI 1340–202X Draft in appendix A1.

2. Test Conditions Used for Current Metrics in Appendix A

As discussed, DOE proposes to update the current test procedure for CUACs and CUHPs (which DOE proposes to specify for ACUACs and ACUHPs, ECUACs, and WCUACs in appendix A) to reference the updated industry test standard AHRI 340/360–2022 and retain the current metrics for CUACs and CUHPs. AHRI 340/360–2022 designates certain test conditions for test procedures characterized as ''standard rating tests'' and certain other test conditions for test procedures characterized as ''performance operating tests.'' The ''standard rating tests'' are used for determining representations of cooling capacity, heating capacity, and cooling and heating efficiencies. The ''performance operating tests'' evaluate other operating conditions, such as ''maximum operating conditions'' (*see* section 8 of AHRI 340/360–2022), which DOE is not proposing to include in the DOE test procedure. Specifically, Table 6 of AHRI 340/360–2022 specifies test conditions for standard rating and performance operating tests for CUACs and CUHPs. The relevant conditions for EER and IEER cooling tests are those referred to as ''standard rating conditions'' in AHRI 340/360–2022. To clarify this distinction, DOE proposes to specify explicitly in section 3 of appendix A that the cooling test conditions used for representations as required under the DOE regulations are: (1) for equipment subject to standards in terms of EER, the ''Standard Rating Conditions, Cooling'' conditions specified in Table 6 of AHRI 340/360–2022; and (2) for equipment subject to standards in terms of IEER, the ''Standard Rating Conditions, Cooling'' and ''Standard Rating Part-Load Conditions (IEER)'' conditions specified in Table 6 of AHRI 340/360–2022.

For heating mode tests of CUHPs, Table 6 of AHRI 340/360–2022 includes ''Standard Rating Conditions'' for both a ''High Temperature Steady-state Test for Heating'' and a ''Low Temperature Steady-state Test for Heating'' (conducted at 47 °F and 17 °F outdoor air dry-bulb temperatures, respectively). To clarify which conditions are applicable for representations as required under the DOE regulations, DOE proposes to specify explicitly in section 3 of appendix A that the heating test conditions used for compliance are the ''Standard Rating Conditions (High Temperature Steady-state Heating)'' conditions specified in Table 6 of AHRI 340/360–2022. Further, DOE proposes to also include the low-temperature (*i.e.,* 17 °F) heating test condition specified in Table 6 of AHRI 340/360–2022 (referred to as ''Low Temperature Steady-state Heating'') in the proposed test procedure and specify in section 3 of appendix A that representations of COP at this low-temperature heating condition are optional.

3. Test Conditions Used for New Metrics in Proposed Appendix A1

As discussed, DOE is proposing to include the new test procedure recommended in the ACUAC and ACUHP Working Group TP Term Sheet and included in the AHRI 1340–202X Draft in a new appendix A1. This proposal includes adopting the new IVEC and IVHE metrics discussed in sections III.F.4 and III.F.5 of this NOPR.

The AHRI 1340–202X Draft designates certain test conditions for test procedures characterized as ''standard rating tests'' and certain other test conditions for test procedures characterized as ''performance operating tests.'' The ''standard rating tests'' are used for determining representations of cooling capacity, heating capacity, and cooling and heating efficiencies. The ''performance operating tests'' evaluate other operating conditions, such as ''maximum operating conditions'' (*see* section 8 of AHRI 1340–202X Draft), which DOE is not proposing to include in the DOE test procedure at appendix A1. Specifically, Table 7 of AHRI 1340–202X Draft specifies test conditions for standard rating and performance operating tests for CUACs and CUHPs. The relevant test conditions for IVEC tests, as well as EER2 representations, are those referred to as ''standard rating conditions'' in the AHRI 1340–202X Draft. To clarify this distinction, DOE proposes to specify explicitly in section 3 of appendix A1 that the cooling conditions used for representations as required under the DOE regulations are the ''Standard Rating Conditions, Cooling'' and ''Standard Rating Part-Load Conditions (IVEC)'' specified in Table 7 of AHRI 1340–202X Draft. Additionally, DOE proposes to include provisions for optional representations of EER2.

For heating mode tests of ACUHPs, Table 7 of the AHRI 1340–202X Draft includes ''Standard Rating Conditions, Heating'' for three outdoor temperature conditions at 47 °F, 17 °F, and 5 °F. Additionally, the table includes ''Standard Rating Part-Load Conditions (IVHE),'' which includes optional part load conditions for rating units with the IVHE metric. The required test conditions for IVHE representations are the ''Standard Rating Conditions Heating'' at 47 °F and 17 °F. The optional test conditions for IVHE representations are the ''Standard Rating Conditions Heating'' at 5 °F and ''Standard Rating Part-Load Conditions (IVHE)''. To clarify this, DOE proposes to specify explicitly in section 3 of appendix A1 that the heating conditions used for representations as required under the DOE regulations are the ''Standard Rating Conditions Heating'' at 47 and 17 °F specified in Table 7 of AHRI 1340–202X Draft. Further, DOE proposes to also include the 5 °F heating test condition as well as the part load test conditions specified in Table 7 of AHRI 1340–202X Draft (referred to as ''Standard Rating Conditions Heating (5 °F ambient)'' and ''Standard Rating Part-Load Conditions (IVHE)'' respectively) in the proposed test procedure and specify in section 3 of appendix A1 that testing to the low-temperature heating conditions and the part load conditions are optional for representations of IVHE. Additionally, DOE proposes to include provisions for optional representations of $COP2_{47}$, $COP2_{17}$, and $COP2_5$ at the 47, 17, and 5 °F heating test conditions previously discussed.

4. IVEC

The following section provides a summary of the development and final recommendations regarding the IVEC cooling metric proposals in the ACUAC and ACUHP Working Group TP Term Sheet and DOE's corresponding proposals for inclusion in the appendix A1 test procedure.

As discussed, for the newly proposed cooling metric, the Working Group determined to modify the climate zones and building types accounted for in the test procedure compared to those included in the current DOE test procedure. To do so, the Working Group utilized hour-based weighting factors. To develop these weighting factors, members of the Working Group used building modeling developed by Carrier that was based on 10 ASHRAE 90.1 building prototypes across all U.S. climate zones. (*See* EERE–2022–BT–STD–0015–0019) This resulted in hour-based weighting factors, which are provided in Recommendation #2 of the ACUAC and ACUHP Working Group TP Term Sheet.

The ACUAC and ACUHP Working Group concluded that including economizer-only cooling and cooling season ventilation operating modes in a seasonal cooling metric would improve the representativeness for ACUACs and ACUHPs. Appendix B of the ACUAC and ACUHP Working Group TP Term Sheet provides the recommended calculation method for the IVEC method and includes sections specifying the methods for including ventilation and economizer-only cooling operation in the calculation of IVEC.

As discussed in section III.F.1.e of this NOPR, the Working Group also considered ESP requirements for the newly proposed IVEC and IVHE metrics. Stakeholders indicated the need for higher ESP requirements to improve representativeness of field performance. Additionally, stakeholders discussed the importance of maintaining uniformity in testing of units at higher ESP conditions. (*See* EERE–2022–BT–STD–0015–0062 at p. 11) The ESP requirements agreed to by the Working Group are provided in Recommendation #12 of the ACUAC and ACUHP Working Group TP Term Sheet and include the following:

1. Higher ESP requirements for testing: As discussed previously, the minimum ESP conditions recommended by the Working Group are provided in Table III.1.

TABLE III.1—MINIMUM ESP REQUIREMENTS FOR IVEC AND IVHE RECOMMENDED BY THE ACUAC AND ACUHP WORKING GROUP

Rated cooling capacity	ESP (in H_2O)
≥65 and <135 kBtu/h	0.75
≥135 and <240 kBtu/h	1.0
≥240 and <280 kBtu/h	1.0
≥280 and <760 kBtu/h	1.5

2. Economizer pressure drop: ASHRAE 90.1–2022 requires the use of economizers for comfort cooling applications for almost all U.S. climate zones. The analysis conducted by Carrier in support of the Working Group indicates that over 96 percent of buildings require the use of economizers. Economizers installed in CUACs and CUHPs add internal static pressure that the indoor fan has to overcome, even when the economizer dampers are closed. The current DOE test procedure does not require the installation of an economizer on a tested unit, and DOE is aware that manufacturers generally do not test CUACs and CUHPs with economizers installed. The ESP requirements specified by the current DOE test procedure are the same regardless of whether a unit is tested with or without an economizer. As such, testing a unit without an economizer does not reflect the total static pressure that would be experienced in the field for installations that require the use of an economizer. In order to better represent the fan power of ACUACs and ACUHPs that are typically installed with economizers, the Working Group recommended that for all units tested without an economizer installed, 0.10 in. H_2O shall be added to the full load ESP values specified in Table III.1.

3. Return and supply static split requirements: Test procedures for CUACs and CUHPs include ESP requirements that reflect the total ESP applied within the return and supply ductwork of the test setup. The current Federal test procedure does not specify requirements for how ESP is distributed during testing (*i.e.,* the relative contribution from return ductwork versus supply ductwork). Given the recommendation to increase the required ESP levels for testing (as discussed in section III.F.1.e of this document), the Working Group concluded that the higher ESP conditions could cause variability in test results if the distribution of ESP between return ductwork and supply ductwork were not specified in the revised test procedure. To ensure repeatable and reproducible testing conditions for CUAC and CUHP units, the Working Group recommended specifying that ESP requirements be split with 25 percent applied in the return ductwork and the remaining 75 percent applied in the supply ductwork. The Working Group further recommended that the fraction of ESP applied in the return ductwork shall have a −5/+0 percent tolerance (*i.e.,* the return static must be within 20 to 25 percent of the total ESP) for the full-load cooling test. In a case where there is no additional restriction on the return duct and more than 25 percent of the ESP is already applied in the return ductwork without a restriction, then greater than 25 percent ESP in the return ductwork would be allowed. Once set for the full-load cooling test, these restriction settings shall remain unchanged for the other cooling and heating tests conducted.

To incorporate the various changes involved in testing requirements and weighting factors already discussed, the Working Group created the IVEC metric provided in Recommendation #1 with further specifications in appendix B of the ACUAC and ACUHP Working Group TP Term Sheet. The IVEC metric is essentially a summation formula analogous to the seasonal energy efficiency ratio 2 (SEER2) metric designated for residential central air conditioner (CAC) equipment. (*See* appendix M1 to subpart B of part 430 ''Uniform Test Method for Measuring the Energy Consumption of Central Air Conditioners and Heat Pumps'') Specifically, the IVEC metric is calculated by dividing the total annual cooling capacity by the total annual energy use. Key aspects encompassed in the proposed IVEC metric include the following:

1. Accounting for energy consumed in different modes: The IVEC metric includes energy use during mechanical cooling, integrated mechanical and economizer cooling, economizer-only cooling, cooling season ventilation, unoccupied no-load hours, and heating season operation of crankcase heat (for CUACs only). Appendix B of the ACUAC and ACUHP Working Group TP Term Sheet specifies instructions for determining energy consumption during each mode.

2. Testing parameters: The ACUAC and ACUHP Working Group TP Term Sheet further specifies instructions in appendix B for the mechanical cooling tests at each target mechanical load. These methodologies and tolerances mirror those specified in AHRI 340/360–2022, including a 3-percent tolerance on the target mechanical load for part-load tests, and in cases when the target mechanical load cannot be met within tolerance, instructions for using interpolation and cyclic degradation to determine the performance at the target test point.

3. Target load percentages: Recommendation #4 of the ACUAC and ACUHP Working Group TP Term Sheet includes target conditions for testing, including load percentages for testing units at part-load conditions. For each bin, the specified target load percent (% Loadi) reflects the average load as a percentage of the full-load capacity for that bin met by using all modes of cooling, and is used for determining total annual cooling provided in the numerator of the IVEC equation. The target mechanical load percent (% Loadi, mech) is the average load for each bin met only through mechanical cooling (*i.e.,* mechanical-only cooling and the mechanical portion of integrated mechanical and economizer cooling) and is the target load fraction used for the part-load cooling test for each bin.

As mentioned, the IVEC metric includes the annual operation of crankcase heaters for CUACs and CUHPs. Appendix B of the ACUAC and ACUHP Working Group TP Term Sheet further specifies the accounting of crankcase heater energy consumption in each operating mode. Recommendation #2 of the ACUAC and ACUHP Working Group TP Term Sheet specifies hour-based weighting factors to account for crankcase heat operation in unoccupied no-load cooling season hours for CUACs and CUHPs as well as heating season hours for CUACs. Appendix B of the ACUAC and ACUHP Working Group TP Term Sheet also specifies that for part-load cooling tests, crankcase heat is accounted for in power measurements of higher stage compressors that are staged off during testing, while crankcase heat operation of lower-stage compressors when cycled off as well as crankcase heat operation in other operating modes is calculated using the certified crankcase heater power.

The IVEC metric also accounts for a 15-percent oversizing factor. Accordingly, the target load percentages specified in Recommendation #4 include this 15 percent oversizing factor. Additionally, the A test condition is excluded from the IVEC calculation; however, the A test is still a required test point for determining full load capacity.

IVEC includes outdoor and return air dry-bulb and wet-bulb test temperatures that differ from those used in the current test procedure for determining IEER, as shown in Table III.2.

TABLE III.2—IEER AND IVEC TEST TEMPERATURES

Test point	IEER test conditions		IVEC test conditions	
	Outdoor air dry bulb temperature (°F)	Return air temperature (dry bulb/wet bulb) (°F)	Outdoor air dry bulb temperature (°F)	Return air temperature (dry bulb/wet bulb) (°F)
A	95	80/67	95	80/67
B	81.5	80/67	85	77/64
C	68	80/67	75	77/64
D	65	80/67	65	77/64

The IVEC metric also limits the minimum airflow that can be used for testing. This minimum airflow limit calculation method is based on the average ventilation rate determined in building modeling performed to develop IVEC and is a function of the full-load cooling capacity. Unlike AHRI 340/360–2022 (*see* section 6.1.3.4.5), the provisions for determining IVEC do not specify separate test provisions for setting airflow during part-load tests of MZVAV units. Rather, the part-load airflow used for testing all CUACs and CUHPs would be based on the certified part-load cooling airflow.

Based on the discussions in the Working Group, DOE understands that the changes recommended for the IVEC metric are intended to result in an efficiency metric that is more representative of CUAC and CUHP operation. Therefore, DOE tentatively agrees with the approach recommended by the Working Group and is proposing to adopt the IVEC metric in appendix A1 as specified in the AHRI 1340–202X Draft (including the provisions discussed in section III.F.6 of this NOPR that were not included in the ACUAC and ACUHP Working Group TP Term Sheet).

5. IVHE

The following section provides a summary of the development and final recommendations regarding the IVHE heating metric specified in the ACUAC and ACUHP Working Group TP Term Sheet.

The IVHE metric specified in the ACUAC and ACUHP Working Group TP Term Sheet differs from the COP heating efficiency metric specified in the current DOE test procedure through the inclusion of heating season operating modes not currently accounted for, a combined seasonal performance metric rather than individual ratings at specific temperature conditions, and additional optional test conditions. In alignment with the development of the IVEC metric described in section III.F.4 of this NOPR, the Working Group determined to utilize hour-based weighting factors to account for heating loads across more building types and climate zones than are included in the current DOE test procedure. The building heating load lines and hours developed for the IVHE metric rely on a similar ASHRAE 90.1 building and climate zone analysis as the one conducted for the IVEC metric development. Additionally, in developing the heating load line that the hour-based weighting factors rely on, the Working Group utilized the previously discussed 15-percent oversizing factor and assumed a heat to cool ratio of 1 as outlined in Recommendation #8 (*i.e.,* assumed the peak building cooling load equals the peak building heating load).

The heating rating requirements recommended in the ACUAC and ACUHP Working Group TP Term Sheet include several distinct provisions regarding testing requirements from the existing DOE test procedure. In the current DOE test procedure, CUHPs are required to be tested only at a 47 °F full-load condition to generate a COP rating. Recommendation #9 of the ACUAC and ACUHP Working Group TP Term Sheet, however, introduces several provisions with significant differences from the existing DOE test procedure. First, the recommendation includes required testing at 47 °F and 17 °F full load conditions, aligning with those previously specified in AHRI 340/360–2022. Additionally, the recommendation introduces optional part load test conditions at both 47 °F and 17 °F temperature conditions as well as test conditions for optional testing at a 5 °F full load condition. Finally, the recommendation includes test requirements for optional boost tests at the 17 °F and 5 °F test conditions for variable speed units. Additionally, the IVHE metric incorporates two operating modes previously excluded from the DOE test procedure: heating season ventilation mode and supplemental electric resistance heat operation. Lastly, the IVHE test conditions rely on the same ESP requirements per capacity bin as those specified for IVEC, as detailed in Recommendation #12. The airflow provisions pertaining to IVEC mentioned in section III.F.4 of this NOPR (*i.e.,* a limit on minimum airflow used for testing and no separate test provisions for MZVAV units) apply to the test provisions for the IVHE metric as well.

The results from optional and required testing as well as the newly included operating modes are included in the calculation of the IVHE metric utilizing the weighting factors outlined in Recommendation #8 and calculation methods from appendix C of the ACUAC and ACUHP Working Group TP Term Sheet. The calculation methods for IVHE that implement these changes are further detailed in the paragraphs that follow.

The IVHE metric includes contributions from both mechanical and resistance heating to meet building heating load. Similar to the IVEC calculation approach, the IVHE metric is calculated by dividing the total annual building heating load by the total annual energy use.

Recommendations #8, #9 and #10, as well as appendices B and C of the ACUAC and ACUHP Working Group TP Term Sheet, provide the calculation methods for the IVHE metric. The proposed hour-based weighting factors and bin temperatures for IVHE are included in Recommendation #8 of the ACUAC and ACUHP Working Group TP Term Sheet, which specifies 10 distinct load-based bins alongside weighting factors for heating season ventilation and operation of crankcase heat in unoccupied no-load heating season hours. The calculation methods outlined for the IVHE metric in the ACUAC and ACUHP Working Group TP Term Sheet are specified as the following:

1. Building load calculation: Recommendation #8 includes the calculation method for the building load in each load bin based on the measured full-load cooling capacity.

2. Interpolation between temperatures: Appendix C of the ACUAC and ACUHP Working Group TP Term Sheet specifies interpolation instructions for the various test temperatures specified in Recommendation #8. Interpolation instructions are specified for bins with temperatures between 17 °F and 47 °F. Appendix C also includes the following instructions for bins with temperatures less than 17 °F: (1) interpolation instructions to be used if the optional 5 °F test is conducted, and (2) extrapolation instructions utilizing the 47 °F and 17 °F test data to be used if the 5 °F test is not conducted.

3. Determination of heating stage, auxiliary heat, and cyclic degradation: For load bins in which the calculated building load exceeds the highest-stage mechanical heating capacity determined for the bin temperature, appendix C of the ACUAC and ACUHP Working Group TP Term Sheet includes calculation methods for determining the power required by auxiliary resistance heat and is included in the overall IVHE calculation. For load bins in which the calculated building load is lower than the lowest-stage mechanical heating capacity determined for the bin temperature, appendix C of the ACUAC and ACUHP Working Group TP Term Sheet includes calculation methodology for calculating power and incorporating cyclic degradation with a cyclic degradation factor of 0.25. This cyclic degradation methodology is consistent with the methodology specified in appendix M1 to subpart B of 10 CFR part 430 for residential central heat pumps. For load bins in which the calculated building load is in between the lowest-stage and highest-stage mechanical heating capacities determined for the bin temperature, appendix C of the ACUAC and ACUHP Working Group TP Term Sheet includes calculations for determining power based on interpolation between performance of mechanical heating stages.

4. Defrost degradation: The capacity calculations for all load bins with temperatures less than 40 °F include a defrost degradation coefficient, with calculations specified in appendix C of the ACUAC and ACUHP Working Group TP Term Sheet.

5. Cut-out factor: Recommendation #10 of the ACUAC and ACUHP Working Group TP Term Sheet specifies that manufacturers will certify cut-in and cut-out temperatures, or the lack thereof, to DOE to ensure resistance-only operation is included at temperatures below which mechanical heating would not operate. This restriction is implemented in calculations through a cut-out factor included in appendix C. DOE is not proposing to amend the certification or reporting requirements for ACUHPs in this NOPR to require reporting cut-in and cut-out temperatures. Instead, DOE may consider proposals to amend the certification and reporting requirements for this equipment under a separate rulemaking regarding appliance and equipment certification.

6. Crankcase heater power contribution: In alignment with the inclusion of crankcase heater power contribution in IVEC, appendix C of the ACUAC and ACUHP Working Group TP Term Sheet specifies a method for incorporating crankcase heat power for all heating season operating modes for ACUHPs. Specifically, for part-load heating tests, crankcase heat is accounted for in power measurements of higher stage compressors that are staged off during testing, while crankcase heat operation of lower-stage compressors when cycled off as well as crankcase heat operation in other operating modes is calculated using the certified crankcase heater power.

Based on participation in the Working Group, DOE understands that the changes recommended for the IVHE metric are intended to result in an efficiency metric that is more representative of CUHP operation. As discussed, DOE tentatively agrees with the approach recommended by the Working Group and is proposing to adopt the IVHE metric in appendix A1, as specified in the AHRI 1340–202X Draft (including the provisions discussed in section III.F.6 of this NOPR that were not included in the ACUAC and ACUHP Working Group TP Term Sheet).

a. IVHE for Colder Climates

While stakeholder comments received (as discussed in section III.F.1.h) indicate that the majority of current CUHP shipments are concentrated in the south and southwestern regions of the country, it is likely that in the future manufacturers will develop CUHPs that are designed for operation in colder climates, and correspondingly that the market for CUHPs in colder climates is expected to grow. Because the IVHE metric is based on the US national average climate across all US climate zones, the lowest bin temperature for calculating IVHE is 15.9 °F, and a small fraction of heating hours are at colder temperatures (*i.e.,* 19 percent of heating hours are in a load bin with a temperature colder than 32 °F, and less than 1 percent of heating hours are in a load bin with a temperature colder than 17 °F).

As a result, the AHRI 1340–202X Draft includes provisions, including weighting factors and temperature bins, for calculating a colder climate-specific IVHE metric, designated as $IVHE_C$, which are distinct from the provisions used for IVHE. Specifically, $IVHE_C$ was developed using the same building heating analysis that was used to develop IVHE (as discussed in section III.F.5 of this NOPR), but the $IVHE_C$ weighting factors and load bins were developed using the results for climates zones 5 and above (*i.e.,* climate zone 5 as well as all climate zones colder than climate zone 5), weighted by the share of the US population in each of those climate zones. The use of only climate zones 5 and colder for $IVHE_C$ results in the following, compared to IVHE: lower outdoor dry-bulb temperature for each load bin, more heating season hours in all load bins, and a higher heating season building load. Specifically, for $IVHE_C$, 56 percent of heating hours are in a load bin with a temperature colder than 32 °F, and 12 percent of heating hours are in a load bin with a temperature colder than 17 °F. Further, because the defrost degradation coefficients specified in appendix C of the ACUAC and ACUHP Working Group TP Term Sheet depend on the outdoor temperature for each load bin (and $IVHE_C$ has colder bin temperatures than IVHE), the AHRI 1340–202X Draft also specifies separate defrost degradation coefficients for calculating $IVHE_C$. The temperatures and hours for each load bin for calculating IVHE and $IVHE_C$ can be found in section 6.3.2 of the AHRI 1340–202X Draft.

Given the potential for the development of CUHPs designed for operation in colder climates and the expected increased number of shipments of CUHPs into colder climates, DOE recognizes the utility in having CUHP ratings for a separate IVHE metric that is specific to colder climates. Correspondingly, DOE has tentatively concluded that the $IVHE_C$ metric as specified in the AHRI 1340–202X Draft is more representative of field conditions for CUHPs installed in colder US climates. Therefore, DOE is proposing to adopt provisions for determining the $IVHE_C$ metric in appendix A1 via reference to the AHRI 1340–202X Draft, and to allow for optional representations of $IVHE_C$ for CUHPs. Specifically, DOE is proposing that IVHE would be the regulated metric when testing to appendix A1; therefore, should DOE adopt amended standards for CUHPs in terms of IVEC and IVHE, all CUHPs would be required to certify compliance with IVHE standards, and additional representations of $IVHE_C$ would be optional.

6. Additions and Revisions to the IVEC and IVHE Metrics Not Included in the Term Sheet

AHRI 1340–202X Draft includes several provisions regarding the new IVEC and IVHE metrics that are not included in the ACUAC and ACUHP Working Group TP Term Sheet. DOE notes that the ACUAC and ACUHP Working Group TP Term Sheet includes provisions to allow changes to the proposals in the term sheet if mistakes in the original recommendations are identified through further analysis or discussion between stakeholders. (*See* EERE–2022–BT–STD–0015–0065, Recommendations #2, #8, #11) Further, the AHRI 1340–202X Draft includes a number of additional test provisions that DOE has tentatively concluded are consistent with the intent of the ACUAC and ACUHP Working Group TP Term Sheet, but provide additional guidance for determining IVEC and IVHE. As discussed, DOE is proposing to adopt AHRI 1340–202X Draft for determining IVEC and IVHE in appendix A1, including these additional provisions not specified in the ACUAC and ACUHP Working Group TP Term Sheet. The following sections discuss these provisions in further detail.

a. Cooling Weighting Factors Adjustment

Subsequent to the development of the ACUAC and ACUHP Working Group TP Term Sheet, additional analysis of the building models used to develop the weighting factors for the IVEC metric indicated that the proposed weighting hours included in the ACUAC and ACUHP Working Group TP Term Sheet are incorrect. Specifically, the weighting hour factors in the ACUAC and ACUHP Working Group TP Term Sheet over-represent mechanical-only cooling hours and underrepresent economizer-only and integrated-economizer hours for all IVEC load bins. DOE presented corrected weighting factors during the ACUAC and ACUHP standards negotiations and no concerns were raised. (*See* EERE–2022–BT–STD–0015–0078 at p. 8) These corrected IVEC weighting factors are included in AHRI 1340–202X Draft. DOE is proposing to adopt AHRI 1340–202X Draft for determining IVEC and IVHE in appendix A1, including these updated IVEC weighting factors.

b. ESP Testing Target Calculation

Recommendation #12 of the ACUAC and ACUHP Working Group TP Term Sheet includes an equation for determining adjusted ESP for cooling or heating tests that use an airflow that differs from the full-load cooling airflow. However, the equation specified in Recommendation #12 is missing a term for the full-load ESP. This equation is corrected in AHRI 1340–202X Draft. DOE is proposing to adopt these provisions of AHRI 1340–202X Draft for determining IVEC and IVHE in appendix A1, including this corrected equation for determining adjusted ESP.

c. Test Instructions for Splitting ESP Between Return and Supply Ductwork

As discussed previously, Recommendation #12 of the ACUAC and ACUHP Working Group TP Term Sheet specifies that ESP shall be split between return and supply ducts during testing, such that 25 percent of the ESP is applied in the return ductwork. However, the ACUAC and ACUHP Working Group TP Term Sheet does not contain explicit test setup instructions specifying how to achieve the split in ESP between return and supply ductwork. Section E11 of the AHRI 1340–202X Draft includes more detailed instructions regarding the duct and pressure measurement setup, the measurement and adjustment of the return static pressure, and the restriction devices that can be used in the return ductwork to achieve the required split of between 20 and 25 percent of the total ESP applied to the return ductwork. The AHRI 1340–202X Draft also includes test instructions for cases in which the ESP split is not achieved in the first test as well as any exceptions to the specified tolerance requirement. DOE has tentatively concluded that these additional instructions will provide a more consistent measurement of ESP and are aligned with the intent of Recommendation #12 of the ACUAC and ACUHP Working Group TP Term Sheet. Therefore, DOE is proposing to adopt these provisions of the AHRI 1340–202X Draft for determining IVEC and IVHE.

d. Default Fan Power and Maximum Pressure Drop for Coil-Only Systems

DOE's current test procedure for CUACs and CUHPs references ANSI/AHRI 340/360–2007, and section 6.1 of that test standard specifies default fan power and corresponding capacity adjustment for ACUACs, ACUHPs, ECUACs, and WCUACs with a coil-only configuration (*i.e.,* without an integral indoor fan). Specifically, ANSI/AHRI 340/360–2007 requires that an indoor fan power of 365 Watts (W) per 1,000 standard cubic feet per minute (scfm) be added to power input for coil-only units and that the corresponding heat addition (*i.e.,* 1,250 Btu/h per 1,000 scfm) be subtracted from measured cooling capacity (and added to measured heating capacity), regardless of capacity of the unit under test and regardless of full or part-load test conditions. In the July 2017 TP RFI, DOE requested comment on the prevalence of ACUACs, ACUHPs, ECUACs, and WCUACs that are sold in coil-only configurations and requested data on the typical efficiency or typical power use and airflow of fans used with coil-only ACUACs, ACUHPs, WCUACs, and ECUACs in field installations. 82 FR 34427, 34440 (July 25, 2017).

In response, Lennox and AHRI stated that the market for coil-only ACUACs and ACUHPs is very small and that less than 1 percent of the approximately 9,000 models listed in the AHRI directory are coil-only models. In addition, Lennox and AHRI stated their expectation that the coil-only configuration will become even less common or disappear from the market by 2023 when new energy conservation standards become effective. (Lennox, EERE–2017–BT–TP–0018–0008 at p. 3; AHRI, EERE–2017–BT–TP–0018–0011 at pp. 23–24) Lennox recommended maintaining the current default fan power because the market for these configurations is very small and stated that the effect of any change in default fan power associated with the difference in typical energy use would be *de minimis.* (Lennox, EERE–2017–BT–TP–0018–0008 at p. 3)

Section 6.1.1.6 of AHRI 340/360–2022 has the same requirement as ANSI/AHRI 340/360–2007 regarding default fan power and capacity adjustment of coil-only systems. Additionally, both section 6.1.3.2(d) of ANSI/AHRI 340/360–2007 and section 6.1.3.3.4 of AHRI 340/360–2022 specify that for coil-only systems, the pressure drop across the indoor assembly shall not exceed 0.30 in H_2O for the full-load cooling test. If the measured pressure drop exceeds that value, then the industry test standards specify that the indoor airflow rate be reduced such that the measured pressure drop does not exceed the specified maximum pressure drop.

The AHRI 1340–202X Draft includes different requirements for testing coil-only units as compared to ANSI/AHRI 340/360–2007 and AHRI 340/360–2022. First, section 5.17.4 of the AHRI 1340–202X Draft includes a higher maximum pressure drop across the indoor assembly of 1.0 in H_2O when testing coil-only units, as compared to the maximum pressure drop of 0.3 in H_2O specified in ANSI/AHRI 340/360–2007 and AHRI 340/360–2022. Second, section 6.2.4.2 of the AHRI 1340–202X Draft includes higher default fan power values than specified in ANSI/AHRI 340/360–2007 and AHRI 340/360–2022; these values were updated to reflect the higher ESP requirements used for IVEC and IVHE. Because the ACUAC and ACUHP Working Group TP Term Sheet and AHRI 1340–202X Draft specify ESP requirements that vary by capacity bin, section 6.2.4.2 of the AHRI 1340–202X Draft specifies different default fan power adders and capacity adjustments for each capacity bin, developed based on fan power needed to overcome the ESP requirement for each bin.

Lastly, while ANSI/AHRI 340/360–2007 and AHRI 340/360–2022 specify a single default fan power adder (and corresponding capacity adjustment) to be used for all tests, the AHRI 1340–202X Draft includes separate default fan power adders and capacity adjustments for full-load tests and part-load tests (*i.e.,* tests conducted at an airflow lower than the full-load cooling airflow) to reflect that fan power does not decrease linearly with airflow (*i.e.,* reducing airflow in part-load operation would reduce fan power in field operation by more than would be calculated using a single power adder that is normalized by airflow). These part-load fan power adders and capacity adjustments were developed assuming a part-load airflow that is 67 percent of the full-load airflow. The AHRI 1340–202X Draft does not specify what values to use if the part-load airflow is higher than 67 percent of the full-load airflow. In a test procedure final rule for CAC/HPs published October 25, 2022, DOE adopted a part-load fan power adder and capacity adjustment for coil-only systems based on 75 percent of the full-load airflow, and specified that linear interpolation be used to determine the default fan power coefficient between the part-load and full-load default fan power coefficients when the specified part-load airflow is between 75 and 100 percent of the full-load airflow. 87 FR 64550, 64558. DOE has tentatively concluded that similar linear interpolation provisions would be appropriate for coil-only CUACs and CUHPs in the case where the airflow specified by a manufacturer for a test is between 67 and 100 percent of the full-load airflow. Therefore, DOE is proposing to include similar provisions in appendix A1 that specify how to calculate the default fan power coefficient and capacity adjustment in such cases.

Consistent with the basis of part-load values in the AHRI 1340–202X Draft on 67 percent of full-load cooling airflow, DOE is also proposing to clarify that for tests in which the manufacturer-specified airflow is less than the full-load cooling airflow, the target airflow for the test must be the higher of: (1) the manufacturer-specified airflow for the test; or (2) 67 percent of the airflow measured for the full-load cooling test.

DOE tentatively concludes the changes to the coil-only test procedure in the AHRI 1340–202X Draft represent industry consensus on the most appropriate and representative way to test and determine IVEC and IVHE of coil-only systems. Additionally, DOE has tentatively concluded that provisions to address manufacturer-specified airflows between 67 and 100 percent of full-load cooling airflow (via interpolation between the specified full-load and part-load fan power adders and capacity adjustments) would provide a representative means to develop ratings for coil-only CUACs and CUHPs, consistent with the CAC/HP test procedure at appendix M1. Lastly, these do not conflict with any recommendations in the ACUAC and ACUHP Working Group TP Term Sheet. DOE has tentatively concluded that these provisions provide a representative method to test coil-only units that better aligns with the test requirements for CUACs and CUHPs with integral fans specified in the ACUAC and ACUHP Working Group TP Term Sheet and the AHRI 1340–202X Draft. Therefore, DOE is proposing to reference the provisions for testing coil-only units specified in sections 5.17.4 and 6.2.4.2 of the AHRI 1340–202X Draft with additional instruction to use linear interpolation for determining the fan power adder and capacity adjustment for instances when manufacturers specify an airflow between 67 and 100 percent of full-load cooling airflow, and clarifying that airflow for coil-only systems must not be lower than 67 percent of full-load cooling airflow.

e. Component Power Measurement

Section E10 of AHRI 1340–202X Draft includes additional instruction regarding how the total unit, indoor fan, controls, compressor, condenser section, and crankcase heat power should be measured and accounted for during a test. This includes details that were not included in the ACUAC and ACUHP Working Group TP Term Sheet, as well as updates to address issues such as unique model designs and power meter precision that were identified after the term sheet was completed. For example, although the ACUAC and ACUHP Working Group TP Term Sheet specified that controls power be determined by subtracting all other power measurements from the total unit power, sections E10.1 and E10.2 of AHRI 1340–202X Draft require that controls power be measured. This is because controls power is a much smaller value than power consumed by other components of a CUAC or CUHP and thus is more accurately determined by measuring directly with a power meter of sufficient precision. Section E10.2 of AHRI 1340–202X Draft also allows for determination of compressor and condenser section power by measurement together or by subtraction from total power (*i.e.,* separate power measurement of power consumed by the compressor and condenser section is not required). These provisions address cases in which unique wiring of certain models may make separate measurement of compressor and condenser section power very difficult or impossible, in addition to cases in which the laboratory does not have enough power meters to measure all components separately. Section E10.3 also provides an equation for calculating default value(s) for crankcase heater power to address the case in which a manufacturer does not specify crankcase heater wattage.[22] DOE has tentatively concluded that these provisions will provide more repeatable and representative test results and is proposing to adopt them through reference to section E10 of the AHRI 1340–202X Draft.

f. IVHE Equations

Section 6.3 of the AHRI 1340–202X Draft includes the following changes regarding the heating metric equations that differ from the provisions in appendix C of the ACUAC and ACUHP Working Group TP Term Sheet.

1. *Removal of the cut-out factor from certain equations:* As discussed in section III.F.5 of this NOPR, appendix C of the ACUAC and ACUHP Working Group TP Term Sheet includes a cut-out factor in IVHE calculations to reflect the dependence of unit performance on whether compressors are cut-out at a given bin temperature. However, the cut-out factor was inadvertently included in certain equations in appendix C of the ACUAC and ACUHP Working Group TP Term Sheet where it should not apply (*i.e.,* equations to determine unit performance that should not be impacted by the fraction of time in which compressors are cut out). Therefore, in the AHRI 1340–202X Draft, the cut-out factor was removed from those equations where it was incorrectly applied in the ACUAC and ACUHP Working Group TP Term Sheet. DOE notes that these changes would only affect IVHE calculation for models with a cut-out or cut-in temperature higher than the temperature of the lowest load bin.

2. *Accounting for auxiliary heat when compressors are cut out:* When compressors are cut-out, auxiliary heat would operate to meet the building load. This auxiliary heat operation is addressed in section b of appendix C of the ACUAC and ACUHP Working Group TP Term Sheet (*i.e.,* when building load exceeds the highest stage unit heating capacity at a given bin temperature), but was inadvertently excluded in sections c and d of appendix C of the ACUAC and ACUHP Working Group TP Term Sheet (*i.e.,* when building load is between capacities of a unit tested with multiple heating stages, or when building load is less than the capacity for the lowest tested compressor stage). Therefore, the AHRI 1340–202X Draft includes corrections in these cases so that auxiliary heat demand is applied to meet building load in all cases in which compressors are cut out.

3. *Fan power applied in auxiliary heat-only mode:* In appendix C of the Term Sheet, the equations do not subtract the heat gain in the indoor airstream from the indoor fan (*i.e.,* ''fan heat'') from the auxiliary heat demand. The AHRI 1340–202X Draft addresses this issue by subtracting fan heat from auxiliary heat demand. Additionally, sections c and d of appendix C of the ACUAC and ACUHP Working Group TP Term Sheet assume that the fan would be either cycling between airflows when cycling between stages of compression or operating at the lowest measured indoor airflow for any cooling or heating test when cycling on and off at the lowest stage of compression; however, the indoor fan would likely be operating at the airflow corresponding to the full-load heating test when operating in auxiliary heat mode. The AHRI 1340–202X Draft addresses this by applying fan power from the full-load heating test for auxiliary heat-only mode. However, DOE notes that because both fan heat and auxiliary heat apply heat to the indoor airstream with the same efficiency (*i.e.,* COP of 1), the airflow assumed for auxiliary heat-only mode does not impact results, as the fan heat resulting from an increase in fan power reduces the auxiliary heat needed to meet the building load by the same amount, resulting in no net change to calculated IVHE.

4. *Interpolation for variable-speed compressor systems:* When building load is between capacities of a unit tested with multiple heating stages, section c of appendix C of the term sheet includes a separate method for interpolating between stages for variable-speed compressor systems (*i.e.,* a method that interpolates capacity divided by power) from the method for all other units (*i.e.,* a method that linearly interpolates power). As part of development of the AHRI 1340–202X Draft, it was determined that there were insufficient data to support a separate interpolation method for variable-speed compressor systems, and therefore the AHRI 1340–202X Draft applies the same linear interpolation method based on power for all units.

5. *Compressor operating levels for heating tests:* Recommendation #9 of the Term Sheet includes details on the required and optional tests based on configuration of the system (*i.e.,* single-stage, two or more stages, and variable-capacity). Required tests include a test at ''high'' operating level at 17 and 47 °F; optional tests include tests at low and intermediate operating levels at 17 and 47 °F as well as high and ''boost'' operating levels at 5 °F. For variable-capacity systems, the Term Sheet specifies that the high speed and low speed at each temperature should be the normal maximum and minimum for each ambient temperature. The AHRI 1340–202X Draft includes additional explanation of which compressor speeds correspond to the low, medium,

[22] As discussed, Recommendation # 13 of the ACUAC and ACUHP Working Group TP Term Sheet requires that manufacturers certify crankcase heater wattage for each heater. DOE is not proposing amendments to certification requirements in this rulemaking, and will instead address certification requirements in a separate rulemaking for certification, compliance, and enforcement.

high, and boost designations at each test temperature.

DOE has tentatively concluded that these updated IVHE equations as described in the preceding paragraphs would provide for a more accurate calculation of IVHE. Further, Recommendation #9 of the ACUAC and ACUHP Working Group TP Term Sheet states that the equations in appendix C of the term sheet are subject to quality control checking (''QC'') for errors with the intent remaining the same as voted on. DOE has tentatively concluded that the discussed deviations in the AHRI 1340–202X Draft hold the same intent of the recommendations set forth in the ACUAC and ACUHP Working Group TP Term Sheet. Therefore, DOE is proposing to adopt the provisions of AHRI 1340–202X Draft for determining IVHE in appendix A1, including the updated equations discussed in this section.

DOE notes that appendix C of the Term Sheet includes a provision that ''additional provisions, still TBD would apply for variable-speed compressors for which pairs of full-speed or minimum-speed tests are not run at the same speed.'' The AHRI 1340–202X Draft does not include any provisions allowing for determination of capacity for a bin by interpolating between tests conducted at different compressor operating levels. DOE has tentatively concluded that this approach is appropriate and that calculating IVHE with results from multiple tests at each compressor operating level will provide representative ratings for manufacturers that choose to include performance at operating levels beyond the required high operating level tests at 47 and 17 °F in their representations of IVHE. Therefore, DOE is not proposing to deviate from the approach in the AHRI 1340–202X Draft.

g. Non-Standard Low-Static Indoor Fan Motors

As discussed in section III.F.4, DOE is proposing to include higher ESPs recommended by the Working Group and included in the AHRI 1340–202X Draft in the Federal test procedure for CUACs and CUHPs. However, individual models of CUACs and CUHPs with indoor fan motors intended for installation in applications with a low ESP may not be able to operate at the proposed full-load ESP requirements at the full-load indoor rated airflow. To address this situation, section 3.25 of AHRI 1340–202X Draft defines ''non-standard low-static indoor fan motors'' as motors which cannot maintain ESP as high as specified in the test procedure when operating at the full-load rated indoor airflow and that are distributed in commerce as part of an individual model within the same basic model that is distributed in commerce with a different motor specified for testing that can maintain the required ESP. Section 5.19.3.3 of AHRI 1340–202X Draft includes test provisions for CUACs and CUHPs with non-standard low-static indoor fan motors that cannot reach the ESP within tolerance during testing, which require using the maximum available fan speed that does not overload the motor or motor drive, adjusting the airflow-measuring apparatus to maintain airflow within tolerance, and operating with an ESP as close as possible to the minimum ESP requirements for testing. This approach is consistent with the industry test standard referenced by the DOE test procedure for DX–DOASes (AHRI 920–2020).

As discussed in section III.I.3.b, DOE is proposing to clarify that representations for a CUAC or CUHP basic model must be based on the least efficient individual model(s) distributed in commerce within the basic model (with the exception specified in 10 CFR 429.43(a)(3)(v)(A) for certain individual models with the components listed in Table 6 to 10 CFR 429.43(a)(3)). DOE has tentatively concluded that the combination of (1) the provisions in the AHRI 1340–202X Draft for testing models with ''non-standard low-static indoor fan motors'' with (2) the requirement that basic models be rated based on the least efficient individual model (with certain exceptions, as discussed) provides an appropriate approach for handling CUAC and CUHP models with these motors—if an individual model with a non-standard low-static indoor fan motor is tested, the test would be conducted at an indoor airflow representative for that model. But because testing at the rated airflow for such an individual model would result in testing at an ESP lower than the requirement and thus a lower indoor fan power, the representations for that basic model would be required to be based on an individual model with an indoor fan motor that can achieve the ESP requirements at the rated airflow. Consistent with the proposed adoption of the AHRI 340/360–202X Draft in appendix A1, DOE is not proposing any deviations from the provisions for testing models with non-standard low-static indoor fan motors.

7. Efficiency Metrics for ECUACs and WCUACs

The current DOE test procedure for WCUACs and ECUACs is specified at 10 CFR 431.96 and includes the EER metric. The ACUAC and ACUHP Working Group TP Term Sheet does not include provisions for ECUACs and WCUACs. However, AHRI 1340–202X Draft includes provisions for determining the new IVEC and optional EER2 metric for ECUACs and WCUACs. The AHRI 1340–202X Draft provisions for determining IVEC and EER2 for ECUACs and WCUACs are largely the same as the provisions for ACUACs and ACUHPs; however, there are several provisions unique to ECUACs and WCUACs—specifically regarding (1) ESP requirements and (2) test temperatures.

As discussed, the IVEC and EER2 metrics include higher ESP requirements than the current DOE test procedures and AHRI 340/360–2022. For ECUACs and WCUACs with cooling capacity greater than or equal to 65,000 Btu/h, the AHRI 1340–202X Draft specifies the same ESP requirements for determining IVEC and EER2 for ECUACs and WCUACs as for ACUACs and ACUHPs (shown in Table III.1 in section III.F.4 of this NOPR). As discussed in section III.F.1.e of this NOPR, the AHRI 1340–202X Draft also includes an ESP requirement of 0.5 in H_2O for testing ECUACs and WCUACs with cooling capacity less than 65,000 Btu/h, which is consistent with the ESP requirement specified in AHRI 210/240–2023 for comparable air-cooled equipment (*i.e.,* air-cooled, three-phase CUACs and CUHPs with cooling capacity less than 65,000 Btu/h.

ECUACs and WCUACs use different types of test temperatures than ACUACs and ACUHPs, and AHRI 1340–202X Draft includes test temperature requirements for full-load and part-load test points for determining IVEC for ECUACs and WCUACs. Table III.3 and Table III.4 show the test temperatures included in the AHRI 1340–202X Draft for determining IVEC for ECUACs and WCUACs.

TABLE III.3—IVEC TEST TEMPERATURES FOR ECUACS

Test point	AHRI 340/360–2022 IEER test temperatures			AHRI 1340–202X draft IVEC test temperatures		
	Outdoor air dry-bulb (°F)	Outdoor air wet-bulb (°F)	Make-up water (°F)	Outdoor air dry-bulb (°F)	Outdoor air wet-bulb (°F)	Make-up water (°F)
A	95	75	85	95	75	85
B	81.5	66.2	77	85	65	77
C	68	57.5	77	75	57	77
D	65	52.8	77	65	52	77

TABLE III.4—IVEC TEST TEMPERATURES FOR WCUACS

Test point	AHRI 340/360–2022 IEER test temperatures		AHRI 1340–202X draft IVEC test temperatures	
	Entering water (°F)	Leaving water (°F) *	Entering water (°F)	Leaving water (°F) *
A	85	95	85	95
B	73.5		72	
C	62		62	
D	55		55	

* AHRI 340/360–2022 and the AHRI 1340–202X Draft include a leaving water temperature condition only for the A test. Testing with the specified entering and leaving water temperature test determines the water flow rate used for the A test. For part-load tests, AHRI 340/360–2022 and the AHRI 1340–202X Draft specify that the part-load water flow rate be set per the manufacturer's installation instructions; and for any full-load tests conducted at B, C, or D rating points (*i.e.,* for interpolation to reach the target percent load), that the water flow rate used match the flow rate measured for the A test. Therefore, a leaving water temperature is not specified for the B, C, and D tests.

DOE understands that the provisions for determining IVEC and EER2 for ECUACs and WCUACs included in the AHRI 1340–202X Draft (including higher ESP requirements and revised test temperature requirements) reflect industry consensus that the IVEC metric (and optional EER2 metric) provide a more representative measure of energy efficiency for ECUACs and WCUACs. Therefore, DOE tentatively concludes that the IVEC metric specified in the AHRI 1340–202X Draft (including ESP requirements and test temperatures) is more representative than the EER metric specified in the current DOE test procedure. Accordingly, DOE is proposing to adopt the IVEC metric (as well as the optional EER2 metric) specified in the AHRI 1340–202X Draft into appendix A1 of the Federal test procedure for ECUACs and WCUACs. At this time, DOE does not have sufficient evidence to propose alternate test conditions, but requests comment on whether alternate test conditions are appropriate for determining IVEC for ECUACs and WCUACs.

As mentioned previously, the current energy conservation standards of ECUACs and WCUACs are in terms of EER. Were DOE to adopt the appendix A1 test procedure for determining IVEC for ECUACs and WCUACs as proposed, testing to the IVEC metric would not be required until DOE adopts energy conservation standards for ECUACs and WCUACs in terms of that metric. As discussed, DOE is also proposing to update the current test procedure for all CUACs and CUHPs, including ECUACs and WCUACs, in appendix A to reference AHRI 340/360–2022, maintaining the current EER metric until DOE adopts energy conservation standards for ECUACs and WCUACs in terms of the proposed IVEC metric.

Issue 3: DOE requests comment in its proposal to adopt the IVEC metric for ECUACs and WCUACs in appendix A1 as specified in the AHRI 1340–202X Draft, including the test temperature requirements.

a. Heat Rejection Components for WCUACs

WCUACs are typically installed in the field with separate heat rejection components [23] that reject heat from the water loop to outdoor ambient air, but these separate heat rejection components are not accounted for in the testing of WCUACs under the current DOE test procedure. These heat rejection components typically consist of a circulating water pump (or pumps) and a cooling tower. To account for the power that would be consumed by these components in field installations, section 6.1.1.7 of AHRI 340/360–2022 specifies that WCUACs with cooling capacities less than 135,000 Btu/h shall add 10.0 W to the total power of the unit for every 1,000 Btu/h of cooling capacity.

The industry test procedure for dedicated outdoor air systems (DOASes)—AHRI 920–2020, ''2020 Standard for Performance Rating of Direct Expansion-Dedicated Outdoor Air System Units''—includes a different method to account for the additional power consumption of water pumps, with a pump power adder referred to as the ''water pump effect'' being added to the calculated total unit power. Specifically, section 6.1.6 of AHRI 920–2020 specifies that the water pump effect is calculated with an equation dependent on the water flow rate and liquid pressure drop across the heat exchanger, including a term that assumes a liquid ESP of 20 ft of water column. In the May 2022 RFI, DOE requested comment on the representativeness of the AHRI 920–2020 approach to account for power consumption of external heat rejection components as compared to the approach in AHRI 340/360–2022. 87 FR 31743, 31752 (May 25, 2022).

On this topic, AHRI stated that its members are still evaluating the applicability of the AHRI 920 approach but have some concerns regarding the applicability to air-cooled equipment. (AHRI, EERE–2022–BT–STD–0015–0008 at p. 6) DOE notes that the provisions discussed in this section pertain only to WCUACs and not to air-cooled equipment.

[23] Separate heat rejection components (*e.g.,* a cooling tower or circulating water pump) are not used with ACUACs or ECUACs.

The CA IOUs recommended DOE adopt the approach used in AHRI 920–2020 for adding power due to water pumps. The CA IOUs concurred with DOE that WCUAC and ECUAC equipment are niche products with a small market, and contended that a simple power adder or alignment with AHRI 920–2020 would be a good solution. (CA IOUs, EERE–2022–BT–STD–0015–0012 at p. 7)

Carrier commented that neither the AHRI 340/360–2022 nor the AHRI 920–2020 approach is appropriate, because both methods rely on fixed constants that may not give an accurate representation of each system in the field and ignore any opportunities for improvements and optimization of the building design. However, Carrier did not suggest an alternative method to accounting for the power consumption of water pumps or a cooling tower. Additionally, Carrier stated that both AHRI 920 and AHRI 340/360 ignore the impact of fouling,[24] and recommended fouling be considered for water-cooled and evaporatively-cooled equipment. (Carrier, EERE–2022–BT–STD–0015–0010 at pp. 15–16)

Section 6.2.4.3 of the AHRI 1340–202X Draft includes similar provisions for accounting for the power of heat rejection components for WCUACs to those in AHRI 340/360–2022. However, unlike AHRI 340/360–2022, the heat rejection component power addition is not limited to units with cooling capacities less than 135,000 Btu/h in the AHRI 1340–202X Draft, and instead applies to WCUACs of all cooling capacities.

In response to comments from stakeholders, DOE does not have any data to indicate that the approaches to account for the power required by heat rejection components in AHRI 340/360–2022, AHRI 920–2020, or the AHRI 1340–202X Draft are inaccurate. Despite expressing concerns regarding the representativeness of the methods in AHRI 340/360–2022 and AHRI 920–2020, Carrier did not suggest any alternative test method. While the CA IOUs expressed a preference for use of the method in AHRI 920, DOE has tentatively concluded that the latest approach presented in the AHRI 1340–202X Draft is representative of industry consensus to account for the power of heat rejection components in WCUACs, such as circulating water pumps and cooling towers. Therefore, consistent with the proposed adoption of the AHRI 340/360–202X Draft in appendix A1, DOE is not proposing any deviations from the provisions for accounting for the power of heat rejection components for WCUACs specified in section 6.2.4.3 of the AHRI 1340–202X Draft.

As previously indicated, water-cooled air conditioners and heat pumps rely on pumps to circulate the water that transfers heat to or from refrigerant in the water-to-refrigerant coil. Most water-cooled units rely on external circulating water pumps; however, some water-cooled units in other equipment categories (*e.g.,* water-source heat pumps and DOASes) have integral pumps included within the unit that serve this function. For such units with integral pumps, test provisions are warranted to specify how to test with the integral pump (*e.g.,* provisions specifying the liquid ESP at which to operate the integral pump). AHRI 340/360–2022 does not contain provisions specific to testing WCUACs with integral pumps. In contrast, DOE recently adopted provisions requiring that water-source DOASes with integral pumps be tested with a target external head pressure of 20 ft of water column (consistent with AHRI 920–2020). 87 FR 45164, 45181 (July 27, 2022). DOE requested comment on the prevalence of WCUACs with integral pumps in the May 2022 RFI, as it was not aware of any WCUACs on the market with integral pumps. DOE also sought comment on what liquid ESP would be representative for testing, if WCUACs with integral pumps do exist on the market. 87 FR 31743, 31752 (May 25, 2022).

AHRI and Carrier stated that they are not aware of any WCUACs on the market that contain integral pumps. (AHRI, EERE–2022–BT–STD–0015–0008 at p. 6; Carrier, EERE–2022–BT–STD–0015–0010 at p. 16) Carrier noted that typically, WCUACs are installed in buildings with multiple units and then connected to a central cooling tower system; Carrier asserted that it would not make sense to put pumps in each of the units because multiple units use a common cooling tower system. (Carrier, EERE–2022–BT–STD–0015–0010 at p. 16)

Based on commenter responses indicating a lack of WCUACs on the market with integral pumps and lack of provisions addressing WCUACs with integral pumps in AHRI 340/360–2022 and the AHRI 1340–202X Draft, DOE is not proposing to include test provisions for WCUACs with integral pumps.

8. Efficiency Metrics for Double-Duct Systems

As discussed in section III.B.3 of this NOPR, double-duct systems are equipment classes of ACUACs and ACUHPs, either single package or split, designed for indoor installation in constrained spaces, such that outdoor air must be ducted to and from the outdoor coil. DOE is proposing revisions to the definition for double-duct systems that align with the updated definition in AHRI 340/360–2022 and the AHRI 1340–202X Draft.

Pursuant to the current DOE test procedure (which references ANSI/AHRI 340/360–2007), double-duct systems are tested and rated under the same test conditions at zero outdoor air ESP as conventional ACUACs and ACUHPs (*i.e.,* that are not double-duct systems). AHRI 340/360–2022 added a test method in appendix I that specifies an outdoor air ESP requirement of 0.50 in. H_2O for double-duct systems. When testing with 0.50 in. H_2O outdoor air ESP, ratings are designated with the subscript ''DD'' (*e.g.,* EER_{DD}, COP_{DD}, and $IEER_{DD}$) to distinguish them from the ratings determined by testing at zero outdoor air ESP.

The ACUAC and ACUHP Working Group TP Term Sheet does not include provisions for double-duct systems. However, the AHRI 1340–202X Draft includes provisions for determining the new IVEC and IVHE metrics for double-duct systems. Specifically, similar to appendix I of AHRI 340/360–2022, the AHRI 1340–202X Draft applies a 0.50 in. H_2O outdoor air ESP requirement for determining IVEC and IVHE for double-duct systems. Other than this outdoor air ESP requirement, the AHRI 1340–202X Draft specifies no differences in determining IVEC and IVHE for double-duct systems as compared to conventional ACUACs and ACUHPs.

Because double-duct systems are installed indoors with ducting of outdoor air to and from the outdoor coil, DOE has tentatively concluded that testing at a non-zero outdoor air ESP (as specified in AHRI 1340–202X Draft) would be more representative of field applications than testing at zero outdoor air ESP (as specified in the current Federal test procedure). Further, DOE has tentatively concluded that the IVEC and IVHE metrics specified in the AHRI 1340–202X Draft are more representative than the EER, IEER, and COP metrics specified in the current DOE test procedure, for the reasons discussed throughout this NOPR (*e.g.,* sections III.F.4 and III.F.5 of this NOPR) for ACUACs and ACUHPs more generally. Further, DOE has tentatively concluded that the application of the IVEC and IVHE metrics in the AHRI 1340–202X Draft to double-duct systems reflect industry consensus that these metrics provide a more representative

[24] ''Fouling'' refers to the formation of unwanted material deposits on heat transfer surfaces.

measure of energy efficiency for double-duct systems.

Therefore, DOE proposes to include provisions in appendix A1 for determining IVEC and IVHE for double-duct systems. Although DOE is proposing generally to incorporate by reference AHRI 340/360–2022 in appendix A, DOE has tentatively determined not to reference in appendix A the modified testing requirements for double-duct systems specified in appendix I of AHRI 340/360–2022 because the modified ESP requirements would alter the measured efficiency of double-duct systems. Instead, DOE proposes to maintain the current metrics for double-duct systems in appendix A. As proposed, an outdoor air ESP requirement of 0.50 in. H_2O for double-duct systems would only apply when determining the new IVEC and IVHE metrics per appendix A1.

As mentioned previously, the current energy conservation standards for double-duct systems are in terms of EER and COP. Were DOE to adopt the test procedures for IVEC and IVHE for double-duct systems as proposed, testing to those metrics would not be required until DOE adopts energy conservation standards for double-duct systems in terms of those metrics.

Issue 4: DOE requests comment on its proposal to adopt the IVEC and IVHE metrics for double-duct systems in appendix A1 as specified in the AHRI 1340–202X Draft.

G. Test Method Changes in AHRI Standard 340/360

In the July 2017 TP RFI, DOE requested and received comments on a number of topics related to the current DOE test procedure for CUACs and CUHPs, and the most up-to-date version of AHRI 340/360 that was available at the time (*i.e.,* AHRI 340/360–2015). 82 FR 34427, 34439–34445 (July 25, 2017). With the publication of AHRI 340/360–2022 and the development of the AHRI 1340–202X Draft, many of these topics have been addressed in the updated and draft versions of the standard. DOE is not proposing any deviations from AHRI 340/360–2022 for appendix A. As discussed later in this document, DOE has tentatively determined, based upon clear and convincing evidence, that the updated industry test procedures in AHRI 340/360–2022 and the AHRI 1340–202X Draft, as proposed to be adopted by DOE in appendix A and appendix A1, would more fully comply with the EPCA requirements for the test procedures to be reasonably designed to produce test results that reflect the energy efficiency or energy use of CUACs and CUHPs during a representative average use cycle (as determined by the Secretary), and not be unduly burdensome to conduct. (42 U.S.C. 6314(a)(2)) In the following sections, DOE summarizes the comments received in response to the July 2017 TP RFI, and discusses changes in the industry test standard update that are related to comments received, as well as other changes to the industry test standard AHRI 340/360 that are relevant to DOE's test procedure for CUACs and CUHPs.

1. Vertical Separation of Indoor and Outdoor Units

In the July 2017 TP RFI, DOE noted that ANSI/AHRI 340/360–2007 does not limit the vertical separation of indoor and outdoor units when testing split systems. 82 FR 34427, 34442 (July 25, 2017). In contrast, section 6.1.3.5 of AHRI 340/360–2015 (the relevant revision of that industry test standard at the time of the July 2017 RFI) specifies that the maximum allowable vertical separation of the indoor and outdoor units be no more than 10 feet, presumably because separation greater than 10 feet can adversely affect measured performance. If test facilities use indoor and outdoor environmental chambers that are stacked vertically, the limitation on vertical separation may make it impractical or impossible to test split systems. As part of the July 2017 TP RFI, DOE requested comment on whether a maximum of 10 feet of vertical separation of indoor and outdoor units would limit the ability of existing facilities to test split-system CUACs and CUHPs and requested comment on the impact that vertical separation of split systems has on efficiency and capacity. *Id.*

On this topic, AHRI commented that if the vertical separation is too high, there will be a large negative impact on capacity and efficiency, and that if separation approaches 15 feet, intermediate traps may be needed. AHRI also commented that this requirement does not limit the ability of laboratories to test units. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 26) Similarly, Lennox commented that greater separation would negatively impact results, and that they were also not aware of any test laboratories that had difficulty with this requirement. (Lennox, EERE–2017–BT–TP–0018–0008 at p. 5) Carrier stated that vertical separation can impact performance but that the 10-foot maximum separation should not be an issue as long as the length of the interconnecting line in the outdoor section does not exceed 5 feet. (Carrier, EERE–2017–BT–TP–0018–0006 at p. 13) Goodman stated that a maximum of 10 feet of vertical separation of the indoor and outdoor units is appropriate. Goodman also stated that the 10-feet maximum allowable vertical separation ensures minimal impact of suction line losses and oil return problems, and that greater vertical separation will adversely impact cooling capacity and efficiency. (Goodman, EERE–2017–BT–TP–0018–0014 at p. 5) DOE received no other comments on this issue.

AHRI 340/360–2022 and the AHRI 1340–202X Draft do not include any specifications regarding the maximum allowable vertical separation of the indoor and outdoor units. DOE understands that the approach provided in both AHRI 340/360–2022 and the AHRI 1340–202X Draft represents industry consensus regarding setup for testing of CUACs and CUHPs, and surmises that the commenters' original positions on this provision changed during the course of developing the industry consensus standard. Consistent with the proposed adoption of AHRI 340/360–2022 (in appendix A) and AHRI 1340–202X Draft (in appendix A1), DOE is not proposing specifications regarding the maximum allowable vertical separation of the indoor and outdoor units.

2. Measurement of Air Conditions

In the July 2017 TP RFI, DOE requested comment on condenser inlet air size and uniformity using the criteria in appendix C of AHRI 340/360–2015. DOE also requested comment on whether the requirements of appendix C are sufficient to ensure reproducibility of results and/or any test data that demonstrate sufficient reproducibility. 82 FR 34427, 34442 (July 25, 2017).

Regarding this matter, AHRI and Lennox stated that alterations to the laboratory have been required to ensure the air in the room is uniform. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 25; Lennox, EERE–2017–BT–TP–0018–0008 at p. 5) Lennox stated that these alterations typically include adjustment to conditioning equipment supply ducts, air mixers within the test room, and temporary partitions to prevent air stratification surrounding the unit under test. (Lennox, EERE–2017–BT–TP–0018–0008 at p. 5) Carrier commented that the current method is well-proven and used on rooftop units and chillers. However, Carrier stated that airflow stratification is an area of concern; it requires not just measurement, but also good test facilities that provide uniform airflow. (Carrier, EERE–2017–BT–TP–0018–0006 at p. 12) In response to DOE asking specifically about ECUACs, AHRI commented that the air sampling tree requirements in appendix C of AHRI 340/360–2015 are feasible for all ECUACs, and that adding more wet-bulb measurements than what is currently in appendix C would not benefit test reproducibility. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 25)

Appendix C of AHRI 340/360–2022 and AHRI 1340–202X Draft contains a number of changes, including certain changes related to temperature uniformity, as well as provisions regarding air condition measurement for indoor air and outdoor outlet air. These changes would improve test representativeness and repeatability. DOE understands that the approach provided in appendix C of AHRI 340/360–2022 and the AHRI 1340–202X Draft represents industry consensus regarding the most appropriate method of measuring air conditions. Consistent with the proposed adoption of AHRI 340/360–2022 (in appendix A) and AHRI 1340–202X Draft (in appendix A1), DOE is not proposing any deviations from the provisions in appendix C of AHRI 340/360–2022 and AHRI 1340–202X Draft regarding measuring air conditions.

3. Refrigerant Charging Instructions

As part of the July 2017 TP RFI, DOE requested comment on whether it would be appropriate to adopt an approach regarding refrigerant charging requirements for ACUACs and ACUHPs that is similar or identical to the approach used in the DOE test procedure for central air conditioners and heat pumps (CACs and HPs). DOE also sought data to determine how sensitive the performance of ACUACs, ECUACs, and WCUACs is relative to changes in the various charge indicators used for different charging methods, specifically the method based on sub-cooling. 82 FR 34427, 34441 (July 25, 2017).

On this topic, AHRI and Lennox commented that charging instructions should first be determined from the supplemental PDF test instructions that are certified to DOE. If instructions are not found there, AHRI and Lennox stated that charging should be conducted in accordance with the manufacturer installation instructions provided with the unit. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 24; Lennox, EERE–2017–BT–TP–0018–0008 at p. 4) Lennox further stated that if neither the certified supplemental test instructions (STI) nor the installation instructions shipped with the unit provide charging information, then a predetermined method to set the refrigerant charge should be employed, consistent with the approach for CACs. Lennox also commented that charging methods should consider a consistent setup method in the test laboratories to account for charge adjustments for pressure transducers and any loss of charge in the application of transducers, and that charge verification is required when visible damage on the equipment is spotted, even if damage is minor. (Lennox, EERE–2017–BT–TP–0018–0008 at p. 4) Trane encouraged DOE to require the certification of detailed manufacturer instructions for setting up CUACs for unique test standard conditions, including the method that the manufacturer uses to vary refrigerant charge and the refrigerant charging instructions that are unique to that unit design. (Trane, EERE–2017–BT–TP–0018–0012 at p. 2)

Carrier commented that DOE currently requires charging instructions to be included in the certified supplemental test instructions for CUACs. Further, Carrier stated that if the manufacturer's charging instructions for a CUAC unit provide a specified range for superheat, sub-cooling, or refrigerant pressure, then DOE's test procedure should specify to use the average of the range to determine the refrigerant charge, consistent with AHRI 340/360–2015. (Carrier, EERE–2017–BT–TP–0018–0006 at p. 11) Goodman stated that while CUACs are sensitive to changes in charge, regardless of the charging method, manufacturers typically provide a range of target values for charging to allow for typical accuracy of pressure and temperature measurement equipment used in the field. Goodman further commented that it can provide a specific charging point in the supplemental testing instructions certified to DOE, but that adding specific charge points to certified instructions would be an added burden. (Goodman, EERE–2017–BT–TP–0018–0014 at p. 4)

Section 5.8 of AHRI 340/360–2022 and section 5.12 of the AHRI 1340–202X Draft include a comprehensive set of provisions regarding refrigerant charging for CUACs and CUHPs that is generally consistent with the approach for CACs/HPs. Specifically, they require that units be charged at conditions specified by the manufacturer in accordance with the manufacturer's installation instructions. If no manufacturer-specified charging conditions are provided, the test standards specify charging at the standard rating conditions (as defined in Table 6 of AHRI 340/360–2022 and Table 7 of the AHRI 1340–202X Draft). These provisions also provide additional charging instructions to be used if the manufacturer does not provide instructions or if the provided instructions are unclear or incomplete (*e.g.,* specifying default charging targets to use if none are provided by the manufacturer; specifying an instruction priority to be used in the event of conflicting information between multiple manufacturer-provided charging instructions).

DOE is proposing to adopt the charging instructions in AHRI 340/360–2022 and the AHRI 1340–202X Draft, which are consistent with the charging conditions DOE has established for CACs/HPs. Additionally, given the inclusion of these provisions in AHRI 340/360–2022 and AHRI 1340–202X Draft, DOE understands that the approach provided in section 5.8 of AHRI 340/360–2022 and section 5.12 of the AHRI 1340–202X Draft represents industry consensus regarding the most appropriate and representative approach for refrigerant charging when testing CUACs and CUHPs.

4. Primary and Secondary Methods for Capacity Measurements

DOE's current test procedure references ANSI/ASHRAE 37–2009 which includes requirements on how to perform the primary and secondary methods of capacity measurement, and further specifies which secondary method can be used when testing certain equipment classes. ASHRAE 37–2009 lists applicable test methods in Table 1 of that industry standard, but the table does not indicate that the outdoor air enthalpy method is applicable for any configuration of evaporatively-cooled equipment. Therefore, the secondary method for ECUACs is limited to use of the refrigerant enthalpy method or compressor calibration method for split systems and only the compressor calibration method for single-package equipment. As part of the July 2017 RFI, DOE requested comment and test data on whether there is difficulty in achieving a match between primary and secondary capacity measurements when testing ECUACs with rated capacities less than 135,000 Btu/h and whether the difficulty level is higher, lower, or the same when testing the unit at full-load conditions as compared to part-load conditions. 82 FR 34427, 34444 (July 25, 2017). DOE also requested comment on whether there would be a benefit in allowing the outdoor air enthalpy method as a secondary method of capacity measurement for ECUACs or whether there are other alternative approaches that could be considered for mitigating the potential test burden. *Id.*

In response to the July 2017 RFI, AHRI commented that it does not have data on whether there is difficulty with matching primary and secondary capacity measurements for ECUACs. AHRI added that it appreciates DOE's investigation of less burdensome secondary capacity measurements, but that its members are following ASHRAE 37 and, therefore, have not used the outdoor enthalpy method for ECUACs. (AHRI, EERE–2017–BT–TP–0018–0011 at pp. 28–29)

Appendix E of AHRI 340/360–2022 and the AHRI 1340–202X Draft include requirements related to the method of testing CUACs and CUHPs. These appendices include requirements for measuring capacity with the primary method (*i.e.,* the indoor air enthalpy method) and with a secondary method (*e.g.,* outdoor air enthalpy method, compressor calibration method, refrigerant enthalpy method). More specifically, AHRI 340/360–2022 and the AHRI 1340–202X Draft reference the primary and secondary methods for capacity measurements listed in ANSI/ASHRAE 37–2009 and specify that testing shall comply with all of the requirements in ANSI/ASHRAE 37–2009.

Additionally, section E6 of AHRI 340/360–2022 and the AHRI 1340–202X Draft specify secondary capacity measurement for all capacities of CUACs and CUHPs, including equipment with cooling capacity greater than or equal to 135,000 Btu/h. Correspondingly, section E6.2 of AHRI 340/360–2022 and the AHRI 1340–202X Draft allow use of the cooling condensate method (detailed in section E6.6 of AHRI 340/360–2022 and the AHRI 1340–202X Draft) as an acceptable secondary capacity measurement for (1) ECUACs with cooling capacity greater than or equal to 135,000 Btu/h and (2) single package ACUACs and ACUHPs with outdoor airflow rates above 9,000 scfm.[25]

DOE has tentatively concluded that requiring secondary capacity measurement for CUACs and CUHPs with cooling capacity greater than or equal to 135,000 Btu/h would provide more repeatable test results by ensuring that there is confirmation of accurate capacity measurements for testing all units, without adding substantive burden to testing. Further, DOE understands that many test laboratories are limited in their ability to measure outdoor airflow rates greater than 9,000 scfm (and thus limited in their ability to conduct the outdoor air enthalpy method for units with such outdoor airflow rates;[26]) therefore, DOE has tentatively concluded that use of the cooling condensate method for single package CUACs with outdoor airflow rates above 9,000 scfm would allow for sufficient confirmation of capacity measurement without making the test procedure unduly burdensome.

DOE understands that the approach provided in appendix E of AHRI 340/360–2022 and the AHRI 1340–202X Draft regarding primary and secondary methods of capacity measurement represents industry consensus regarding the most appropriate method for testing CUACs and CUHPs. Absent any data indicating that an alternative secondary method would reduce test burden while still providing representative and repeatable test results, DOE is proposing to adopt the provisions in appendix E of AHRI 340/360–2022 and the AHRI 1340–202X Draft regarding primary and secondary methods of capacity measurement.

5. Atmospheric Pressure

a. Adjustment for Different Atmospheric Pressure Conditions

The current DOE test procedures for CUACs and CUHPs do not include an adjustment for different atmospheric pressure conditions. Appendix D of AHRI 340/360–2015 includes an adjustment for indoor fan power and corresponding fan heat to address potential differences in measured results conducted at different atmospheric pressure conditions.

As part of the July 2017 TP RFI, DOE requested test data validating the supply fan power correction used in AHRI 340/360–2015. 82 FR 34427, 34442 (July 25, 2017). DOE also sought test data showing the impact that variations in atmospheric pressure have on the performance (*i.e.,* capacity and component power use) of ACUACs and ACUHPs. *Id.*

AHRI stated that it was planning to remove the atmospheric pressure corrections from AHRI Standard 340/360 until further industry research was completed. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 25) Carrier also stated that AHRI was planning on removing the atmospheric pressure correction and supported keeping a lower limit of 13.7 psia for the barometric pressure, because a lower value can result in degradation of performance. (Carrier, EERE–2017–BT–TP–0018–0006 at p. 12) Lennox commented that the adjustment method presented in AHRI 340/360–2015 is theoretically sound but recognized the need for additional research to verify the impacts of testing due to the nature of uncertainty and test repeatability of calorimeter room testing. (Lennox, EERE–2017–BT–TP–0018–0008 at p. 4)

Since publication of the July 2017 TP RFI, the atmospheric pressure correction has been removed from the industry test procedure and is not included AHRI 340/360–2022 or the AHRI 1340–202X Draft. DOE is not proposing any deviations from the provisions in AHRI 340/360–2022 or the AHRI 1340–202X Draft regarding an atmospheric pressure correction.

b. Minimum Atmospheric Pressure

Section 6.1.3.2 of AHRI 340/360–2015 specifies a minimum atmospheric pressure of 13.7 psia for testing equipment to address the potential impact of atmospheric pressure on the airflow rate and power of the outdoor fan(s). This differs from the current DOE test procedure in which there is no minimum atmospheric pressure requirement.

As part of the July 2017 TP RFI, DOE requested comment on whether the minimum atmospheric pressure of 13.7 psia specified in section 6.1.3.2 of AHRI 340/360–2015 would prevent any existing laboratories from testing equipment, and what burden, if any, would be imposed by such a requirement. 82 FR 34427, 34442.

AHRI commented it intends to keep the lower limit of 13.7 psia in AHRI Standard 340/360, and that the lower limit represents approximately 1900 ft above sea level, and that all known third party testing laboratories meet this requirement. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 25) Lennox and Carrier recommended that DOE adopt the lower limit of 13.7 psia. (Lennox, EERE–2017–BT–TP–0018–0008 at p. 4; Carrier, EERE–2017–BT–TP–0018–0006 at p. 12)

Section 6.1.3.2 of AHRI 340/360–2022 and section E2 of the AHRI 1340–202X Draft include the 13.7 psia minimum atmospheric pressure requirement. DOE is not proposing any deviations from the minimum atmospheric pressure provisions specified in section 6.1.3.2 of

[25] This provision of section E6.2 of AHRI 340/360–2022 and the AHRI 1340–202X Draft regarding the cooling condensate method only applies to units that do not reject condensate to the condenser coil. Section E6.2.1.1 of AHRI 340/360–2022 and the AHRI 1340–202X Draft specify that no secondary measurements are required for cooling or heating tests for equipment that reject condensate in the following groups: single package ACUACs with outdoor airflow rates above 9,000 scfm and (2) single package ECUACs with cooling capacity greater than or equal to 135,000 Btu/h.

[26] DOE understands the most commonly used secondary capacity measurement method for single package ACUACs to be the outdoor air enthalpy method. Measurement of outdoor airflow is required for conducting the outdoor air enthalpy method; therefore, the outdoor air enthalpy method cannot be conducted if the outdoor airflow cannot be measured.

AHRI 340/360–2022 and section E2 of the AHRI 1340–202X Draft.

c. Atmospheric Pressure Measurement

The accuracy of atmospheric pressure measurements required by section 5.2.2 of ANSI/ASHRAE 37–2009 (which is referenced in AHRI 340/360–2015) is ±2.5 percent. As part of the July 2017 TP RFI, DOE estimated that under certain circumstances, atmospheric pressure measurements at the extremes of this ANSI/ASHRAE 37–2009 tolerance can result in variation in capacity measurement of 1 to 2 percent. 82 FR 34427, 34443 (July 25, 2017). In the July 2017 TP RFI, DOE requested comment on the typical accuracy of the atmospheric pressure sensors used by existing test laboratories. *Id.*

In response, AHRI commented that the third-party laboratory used by AHRI for certification testing uses sensors with accuracy better than ±0.15 psia.[27] (AHRI, EERE–2017–BT–TP–0018–0011 at p. 27) Carrier commented that the brand of pressure sensors that are currently used have an accuracy of ±0.001 inches of mercury (in. Hg).[28] (Carrier, EERE–2017–BT–TP–0018–0006 at p. 15)

Section 5.12.1 of AHRI 340/360–2022 and section 5.16.2 of the AHRI 1340–202X Draft specify a minimum accuracy of atmospheric pressure measurement of ±0.50 percent, which is less stringent than the accuracy suggested by Carrier but more stringent than the accuracy suggested by AHRI. Because the committees to develop these standards include manufacturers and third-party test laboratory representatives, DOE has tentatively determined that this accuracy specification appropriately represents the capability of atmospheric pressure measuring instruments and DOE is not proposing any deviations from the minimum accuracy specified in section 5.12.1 of AHRI 340/360–2022 and section 5.16.2 of the AHRI 1340–202X Draft.

6. Condenser Head Pressure Controls

Condenser head pressure controls regulate the flow of refrigerant through the condenser and/or adjust operation of condenser fans to prevent condenser pressures from dropping too low during low-ambient operation. When employed, these controls ensure that the refrigerant pressure is high enough to maintain adequate flow through refrigerant expansion devices such as thermostatic expansion valves. The use of condenser head pressure controls influences a unit's performance when operating in the field.

Section F7.1 of AHRI 340/360–2015 includes a time average test procedure to be used in case head pressure controls cause cycling of the condenser fans and unsteady operation of the unit under test. Specifically, the provisions require two one-hour tests be run: one at the upper bound of the tolerance on outdoor ambient temperature, and one at the lower bound. The test results for both one-hour tests are averaged to determine the capacity and efficiency for the rating point that is used in the IEER calculation. This issue was reviewed by DOE in the context of ACUACs in the December 2015 CUAC TP final rule. In that final rule, DOE clarified that head pressure controls must be active during the test, but DOE did not adopt the time-averaged head pressure control test specified in AHRI 340/360–2015, indicating that AHRI 340/360–2015 was a draft document at the time and that DOE would reconsider adoption of the provisions for testing units with head pressure control in a future rulemaking. 80 FR 79655, 79660 (Dec. 23, 2015).

As part of the July 2017 TP RFI, DOE requested information and data regarding testing of CUACs and CUHPs with head pressure controls that would require the special test provisions described in section F7.1 of AHRI 340/360–2015, including: (1) whether such units can be tested in compliance with the relaxed stability requirements of these test provisions; (2) whether the test results accurately represent field use; and (3) whether the test burden associated with these tests is appropriate. 82 FR 34427, 34441 (July 25, 2017).

AHRI, Lennox, and Carrier stated that the time-average test method outlined in appendix F of AHRI 340/360–2015 is appropriate and that no problems have been encountered thus far. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 24; Lennox, EERE–2017–BT–TP–0018–0008 at p. 3; Carrier, EERE–2017–BT–TP–0018–0006 at p. 11) AHRI also commented that the burden of the time average test method is appropriate. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 24)

Section E7.2 of AHRI 340/360–2022 and the AHRI 1340–202X Draft also specify provisions for a time average test procedure, consistent with AHRI 340/360–2015. Further, sections E7.3 and E7.4 of AHRI 340/360–2022 and the AHRI 1340–202X Draft provide additional direction for achieving stability to be used if the tolerances for the head pressure control time average test cannot be met. In light of the head pressure control provisions in AHRI 340/360–2022 and the AHRI 1340–202X Draft, DOE understands that the approach provided in sections E7.2, E7.3, and E7.4 of AHRI 340/360–2022 and the AHRI 1340–202X Draft represent industry consensus regarding the most appropriate and representative approach for testing CUACs and CUHPs with head pressure controls. DOE has tentatively determined the approach in AHRI 340/360–2022 and the AHRI 1340–202X Draft appropriately represents the impact of head pressure controls and DOE is not proposing any deviations from the head pressure control provisions specified in these industry test standards.

7. Length of Refrigerant Line Exposed to Outdoor Conditions

ANSI/AHRI 340/360–2007, AHRI 340/360–2015, and AHRI 210/240–2008 require at least 25 feet of interconnecting refrigerant line when testing split systems. ANSI/AHRI 340/360–2007 and AHRI 340/360–2015 require at least 5 feet of the interconnecting refrigerant line to be exposed to outdoor test chamber conditions, whereas AHRI 210/240–2008 requires at least 10 feet to be exposed to outdoor test chamber conditions. As part of the July 2017 TP RFI, DOE requested comment and data regarding the typical length of refrigerant line that is exposed to outdoor conditions on split-system ACUAC, ECUAC, or WCUAC installations and whether this length varies depending on the capacity of the unit. 82 FR 34427, 34443 (July 25, 2017). DOE also requested comment and data on any measurements or calculations that have been made of the losses associated with refrigerant lines exposed to outdoor conditions. *Id.* DOE also estimated an upper bound of the capacity loss to be approximately 1 percent of the capacity of the unit per 10 feet of refrigerant line exposed to outdoor conditions and approximately 0.5 percent for 5 feet and requested comment on this estimate. *Id.*

AHRI commented that the length of refrigerant line that is exposed is entirely dependent on the building in which the unit is being installed, and that AHRI chose 25 feet as a standard value to ensure consistent testing. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 27) Lennox stated that DOE's calculation of capacity losses from refrigerant lines exposed to outdoor conditions is probably too high and that losses can be minimized with insulation. (Lennox, EERE–2017–BT–

[27] At standard atmospheric pressure (14.696 psia), an accuracy of ±0.15 psia is equivalent to an accuracy of ±1.0 percent.

[28] At standard atmospheric pressure (29.92 in. Hg), an accuracy of ±0.001 in. Hg is equivalent to an accuracy of ±0.003 percent.

TP–0018–0008 at p. 6) Carrier acknowledged the difference in exposure to outdoor conditions across test standards and initially suggested to change the requirement for commercial equipment (*e.g.,* equipment with a rated cooling capacity greater than or equal to 65,000 Btu/h) from 5 feet to 10 feet. Carrier requested more time to determine the length typically exposed to outdoor conditions in actual installations. Carrier also stated that DOE's loss estimate is probably reasonable, but that they need more time to develop a more accurate estimate. (Carrier, EERE–2017–BT–TP–0018–0006 at p. 15)

Since publication of the July 2017 TP RFI, the industry specification has been changed in AHRI 340/360. Section 5.7 of AHRI 340/360–2022 and section 5.11 of the AHRI 1340–202X Draft require that at least 10 feet of interconnected tubing be exposed to outdoor conditions. Therefore, DOE is not proposing any deviations from the provisions regarding length of refrigerant line exposed to outdoor conditions in section 5.7 of AHRI 340/360–2022 and section 5.11 of the AHRI 1340–202X Draft in appendix A and appendix A1, respectively.

8. Indoor Airflow Condition Tolerance

DOE's current test procedure for ACUACs and ACUHPs with a rated cooling capacity greater than or equal to 65,000 Btu/h specifies in section (6)(i) of appendix A that the indoor airflow for the full-load cooling test must be within ±3 percent of the rated airflow. DOE adopted a 3 percent tolerance on indoor airflow for testing ACUACs and ACUHPs to limit variation in EER and cooling capacity, based on test data and feedback provided by industry commenters. 80 FR 79655, 79659–79660 (Dec. 23, 2015). As part of the July 2017 RFI, DOE requested comment and data showing whether variations in indoor airflow impact the measured efficiency or capacity of ECUACs and WCUACs more or less than ACUACs and ACUHPs and whether the ±3 percent tolerance is appropriate for ECUACs and WCUACs. 82 FR 34427, 34442 (July 25, 2017).

In commenting on this issue, AHRI stated that the indoor airflow rate should not be influenced by the condenser heat rejection medium (*i.e.,* air-cooled, water-cooled, or evaporatively-cooled) and that the ± 3 percent tolerance should be appropriate for testing ECUACs and WCUACs. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 26) Similarly, Goodman stated that ACUACs and WCUACs include similar indoor fans, and therefore, the test procedure provisions for setting indoor airflow for WCUACs should match the existing provisions for ACUACs. (Goodman, EERE–2017–BT–TP–0018–0014 at p. 5)

Section 6.1.3.5.2.1 of AHRI 340/360–2022 and section 5.19.13.1 of AHRI 1340–202X Draft specify that the indoor airflow for the full-load cooling test must be within ± 3 percent of the rated airflow for all CUACs and CUHPs. Accordingly, DOE is proposing to adopt a 3-percent tolerance for ECUACs and WCUACs consistent with the requirement for ACUACs and ACUHPs, through adoption of AHRI 340/360–2022 into appendix A and AHRI 1340–202X Draft into appendix A1.

9. ECUACs and WCUACs With Cooling Capacity Less Than 65,000 Btu/h

As part of the July 2017 RFI, DOE requested comment on whether there are differences between ECUACs and WCUACs with cooling capacities less than 65,000 Btu/h and those with cooling capacities greater than or equal to 65,000 Btu/h that justify the incorporation by reference of different industry test standards for the different cooling capacity ranges. DOE also asked whether there are differences in field installations and field use of this equipment and the extent to which these differences impact performance. 82 FR 34427, 34444 (July 25, 2017).

In response, DOE received comments from Carrier and AHRI that supported testing of ECUACs and WCUACs with cooling capacities less than 65,000 Btu/h according to AHRI Standard 340/360 and stated that this equipment is not considered residential and is not subject to the residential efficiency metric, seasonal energy efficiency ratio (SEER). (Carrier, EERE–2017–BT–TP–0018–0006 at pp. 15–16; AHRI, EERE–2017–BT–TP–0018–0011 at p. 28) Carrier added that field installations are similar for these types of equipment regardless of capacity. (Carrier, EERE–2017–BT–TP–0018–0006 at p. 16)

As previously discussed, the current industry standard referenced in DOE's test procedure for ECUACs and WCUACs with cooling capacities less than 65,000 Btu/h is ANSI/AHRI 210/240–2008. However, AHRI published an updated version of AHRI 210/240 (*i.e.,* AHRI 210/240–2023), in which ECUACs and WCUACs with cooling capacities less than 65,000 Btu/h were removed from the scope of AHRI 210/240–2023. Instead, ECUACs and WCUACs with cooling capacities less than 65,000 Btu/h were included in the scope of AHRI 340/360–2022. Furthermore, DOE did not identify any substantive differences between AHRI 210/240–2017 and AHRI 340/360–2022 with respect to the test procedure for ECUACs and WCUACs with cooling capacities less than 65,000 Btu/h. Therefore, based on its review, DOE has tentatively determined that the test procedure in AHRI 340/360–2022 for ECUACs and WCUACs with cooling capacities less than 65,000 Btu/h is comparable to the current Federal test procedure for such equipment (which references ANSI/AHRI 210/240–2008). In January 2023, ASHRAE published ASHRAE Standard 90.1–2022, which included updates to the test procedure references for ECUACs and WCUACs with capacities less than 65,000 Btu/h to reference AHRI 210/240–2023. However, as discussed earlier in this paragraph, ECUACs and WCUACs with capacities less than 65,000 Btu/h are outside of the scope of AHRI 210/240–2023 and are instead included in AHRI 340/360–2022. Given these changes to the relevant industry test standards, DOE believes that such reference was an oversight. Therefore, in appendix A DOE is proposing to reference AHRI 340/360–2022 for ECUACs and WCUACs with cooling capacities less than 65,000 Btu/h. DOE has tentatively concluded that this proposal would not require retesting solely as a result of DOE's adoption of this proposed amendment to the test procedure, if made final.

As discussed in section III.F.6.d of this NOPR, DOE is proposing to reference the AHRI 1340–202X Draft in appendix A1 for measuring IVEC for ECUACs and WCUACs with cooling capacity less than 65,000 Btu/h. Measuring IVEC pursuant to appendix A1 would not be required until such time as compliance is required with any amended energy conservation standards for ECUACs and WCUACs in terms of IVEC.

10. Additional Test Method Topics for ECUACs

a. Outdoor Air Entering Wet-Bulb Temperature

In the July 2017 RFI, DOE requested comment on why the full-load outdoor air entering wet-bulb temperature test condition for the 100-percent capacity test point used to calculate IEER was changed from 75.0 °F in ANSI/AHRI 340/360–2007 (the industry standard referenced in the current DOE test procedure) to 74.5 °F in AHRI 340/360–2015, which differs from the outdoor air entering wet-bulb temperature test condition (75.0 °F) for the standard rating conditions. DOE requested comment on whether the outdoor air entering wet-bulb temperature should be 75.0 °F for both the standard rating conditions and the 100-percent capacity test point used to calculate IEER. DOE also requested comment on whether the outdoor air entering dry-bulb temperatures for air-cooled units in Table 6 of AHRI 340/360–2015 apply to evaporatively-cooled units. 82 FR 34427, 34442 (July 25, 2017).

AHRI, Carrier, and Lennox all commented that the different rating conditions reflect an error in AHRI 340/360–2015 which will be corrected, and that the requirement should be 75.0 °F for both purposes. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 26; Carrier, EERE–2017–BT–TP–0018–0006 at p. 13; Lennox, EERE–2017–BT–TP–0018–0008 at p. 5) Additionally, AHRI stated that outdoor air entering dry-bulb temperature is not a significant factor for ECUAC performance because heat transfer is driven by the outdoor air entering wet-bulb temperature. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 26) AHRI stated that it plans to add outdoor air entering dry-bulb temperature requirements for evaporatively-cooled units in an addendum to AHRI 340/360–2015, without specifying whether these new dry-bulb temperature requirements would be the same as the dry-bulb temperatures currently specified for air-cooled units. (*Id.*)

Since publication of the July 2017 RFI, this identified error has been corrected in AHRI 340/360–2022. The outdoor air entering wet-bulb temperature for the 100-percent capacity test point used to calculate IEER in Table 9 of AHRI 340/360–2022 is now set at 75.0 °F, which aligns with the outdoor air entering wet-bulb temperature requirement for the standard rating conditions. DOE is proposing to adopt the test conditions in Table 9 of AHRI 340/360–2022 in appendix A. The proposal would maintain the full-load outdoor air entering wet-bulb temperature test condition for the 100-percent capacity test point at 75.0 °F as required under the current DOE test procedure, which is consistent with the condition specified in AHRI 340/360–2022.

b. Make-Up Water Temperature

In the July 2017 RFI, DOE noted that neither ANSI/AHRI 340/360–2007 nor AHRI 340/360–2015 provide any specifications on the make-up water temperature for full-load or part-load tests for ECUACs. 82 FR 34427, 34444 (July 25, 2017). Therefore, DOE requested comment and data regarding the impact that the make-up water temperature has on the performance of ECUACs. *Id.* AHRI responded that the heat rejection caused by differences in the condenser make-up water temperature is insignificant in comparison to the heat rejected from the unit, and that, therefore, the impact on unit performance is negligible. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 28)

Both AHRI 340/360–2019 and AHRI 340/360–2022 specify make-up water temperatures of 85 °F for the full-load cooling test, but the standards differ in the make-up water temperatures specified for part-load cooling tests. Specifically, Table 8 of AHRI 340/360–2019 specifies make-up water temperatures of 81.5 °F, 68 °F, and 65 °F for the 75-percent, 50-percent, and 25-percent part-load cooling tests, respectively. In contrast, Table 9 of AHRI 340/360–2022 specifies a make-up water temperature of 77 °F for all part-load cooling tests, which aligns with the make-up water temperature specified in AHRI 210/240–2017 for ECUACs with cooling capacity less than 65,000 Btu/h.

DOE does not have data or information to indicate that the make-up water temperature specifications in AHRI 340/360–2022 are inappropriate. DOE understands that the make-up water temperatures specified in Table 9 of AHRI 340/360–2022 represent the prevailing industry consensus regarding the most appropriate method for testing ECUACs of all cooling capacities. Therefore, DOE has tentatively concluded that, consistent with comments from AHRI, the difference between part-load make-up water temperature conditions specified in AHRI 340/360–2019 and AHRI 340/360–2022 would have a negligible effect on the measured IEER for ECUACs. Additionally, DOE does not specify standards for ECUACs in terms of IEER, so the part-load make-up water temperature does not affect the efficiency (*i.e.,* EER) certified to DOE. For these reasons, DOE is not proposing any deviations from the provisions regarding make-up water temperature in Table 9 of AHRI 340/360–2022 for adoption in appendix A.

c. Piping Evaporator Condensate to Condenser Sump

As part of the July 2017 RFI, DOE requested comment on whether ECUACs that allow piping of evaporator condensate to the condenser sump (a variation not addressed in either the DOE or industry test procedures) present any complications (*e.g.,* maintaining proper slope in the piping from the evaporator to the outdoor unit and test repeatability issues) when testing in a laboratory. DOE also requested comment and data indicating what kind of impact piping the evaporator condensate to the condenser sump has on the efficiency and/or capacity of ECUACs. 82 FR 34427, 34444 (July 25, 2017).

In response, AHRI indicated that reusing the evaporator condensate would have a negligible impact on performance. AHRI also stated it was extremely important to follow the manufacturer's supplemental PDF instructions when setting up a unit for test to avoid complications. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 29)

Section E8.3 of AHRI 340/360–2022 and the AHRI 1340–202X Draft specify that if such a feature is an option for an ECUAC unit and the manufacturer's installation instructions do not require the unit to be set up with this option, then the unit should be tested without it.

In light of the provisions in AHRI 340/360–2022 and the AHRI 1340–202X Draft, DOE surmises that the provisions regarding testing with such a feature represent the prevailing industry consensus regarding the most appropriate and representative approach for testing ECUACs. Further, DOE has tentatively concluded that this provision would improve the repeatability of the test procedure by ensuring that any given ECUAC model is tested consistently with regards to this feature. Therefore, DOE is not proposing any deviations from the provisions regarding testing with this feature in section E8.3 of AHRI 340/360–2022 and the AHRI 1340–202X Draft.

d. Purge Water Settings

Some ECUACs require, as indicated in product literature, that the sump water be continuously or periodically purged to reduce mineral and scale build-up on the condenser heat exchanger. If an ECUAC either continuously or periodically purges during the test, the purge rate may affect measured test results. DOE's current test procedure for ECUACs does not address purge water settings.

As part of the July 2017 RFI, DOE requested comment on how the purge water rate should be set for laboratory testing if the manufacturer's instructions do not contain information on this topic. 82 FR 34427, 34444 (July 25, 2017). AHRI responded that the length of a typical laboratory test is not long enough for there to be significant scale or fouling build-up; therefore, purge should not be necessary. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 29)

Section E8.4 of AHRI 340/360–2022 and the AHRI 1340–202X Draft specify that purge water settings shall be set per the manufacturer's installation instructions, and also detail what purge rate to use in the case that the manufacturer's instructions do not provide sufficient guidance.

In light of the provisions in AHRI 340/360–2022 and the AHRI 1340–202X Draft, DOE understands that the purge water provisions in section E8.4 of AHRI 340/360–2022 and the AHRI 1340–202X Draft represent the prevailing industry consensus regarding the most appropriate and representative approach for testing these ECUACs. Further, DOE has tentatively concluded that this provision would improve the repeatability of the test procedure by ensuring ECUACs are tested consistently with regards to purge water settings, particularly when the manufacturer's instructions do not provide sufficient guidance. Therefore, DOE is not proposing any deviations from the provisions in section E8.4 of AHRI 340/360–2022 and the AHRI 1340–202X Draft regarding purge water settings.

e. Condenser Spray Pumps

As discussed in the July 2017 RFI, the rate that water is sprayed on the condenser coil may have an impact on the performance of an ECUAC. 82 FR 34427, 34445 (July 25, 2017). For units with sumps, this rate may be affected by the pump set-up, and, for units without sumps, the incoming water pressure may have an impact. DOE noted that neither DOE's current test procedures nor the industry test standards for ECUACs address these potential variations. *Id.* As part of the July 2017 RFI, DOE requested comment on whether the pump flow can be adjusted on any ECUACs on the market that have circulation pumps. DOE also requested comment on whether ECUACs without a sump exist and, if so, whether there are requirements on the incoming water pressure to ensure proper operation of the spray nozzles. DOE also requested comment and data regarding the sensitivity of performance test results to these adjustments. *Id.*

In response, AHRI indicated that it was not aware of any ECUACs with adjustable circulator pumps, but that if there are such units, they should be tested in accordance with the manufacturer's certified supplemental test instructions. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 30)

Subsequent to the July 2017 RFI, AHRI made relevant updates to AHRI 340/360. Section 5.2 of AHRI 340/360–2022 and section XX of the AHRI 1340–202X Draft both generally state that units shall be installed per the manufacturer's installation instructions, which would include condenser spray pump settings in the manufacturer's supplemental test instructions. In the case of conflicting information, section 5.2 of AHRI 340/360–2022 and section 5.4 of the AHRI 1340–202X Draft specify that priority shall be given to installation instructions on the unit's label over installation instructions shipped with the unit. DOE believes that using manufacturer instructions provides a repeatable test set-up that is representative of the installation and operation of equipment in the field. Therefore, DOE is not proposing any deviations from the provisions in section 5.2 of AHRI 340/360–2022 and section 5.4 of the AHRI 1340–202X Draft regarding installation of units per the manufacturer's installation instructions.

f. Additional Steps To Verify Proper Operation

As discussed in the July 2017 RFI, some ECUACs may use spray nozzles with very small diameter openings that may become easily clogged, thereby reducing the effectiveness of the heat exchanger. DOE requested comment on whether there are any additional steps that should be taken to verify proper operation of ECUACs during testing, such as ensuring nozzles are not blocked. 82 FR 34427, 34445 (July 25, 2017). AHRI responded that additional steps, if any, should be outlined in the manufacturer's supplemental test instructions. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 30)

Section 5.2 of AHRI 340/360–2022 and section 5.4 of the AHRI 1340–202X Draft both generally state that units shall be installed per the manufacturer's installation instructions, which would include additional steps to verify proper spray nozzle operation in the manufacturer's supplemental test instructions. Therefore, DOE is not proposing any deviations from the provisions in section 5.2 of AHRI 340/360–2022 and section 5.4 of the AHRI 1340–202X Draft regarding installation of units per the manufacturer's installation instructions.

H. General Comments Received in Response to the July 2017 TP RFI

In response to the July 2017 TP RFI, DOE received several general comments not specific to any one equipment category or test procedure provision. This section discusses those general comments received.

NCI recommended that DOE follow the development of ASHRAE 221P, ''Test Method to Measure and Score the Operating Performance of an Installed Constant Volume Unitary HVAC System,'' and consider where it may be appropriately applied within EPCA test procedures. (NCI, EERE–2017–BT–TP–0018–0004 at pp. 1–2) NCI stated that it has collected data indicating that typical split systems and packaged units serving residential and small commercial buildings typically deliver 50 percent to 60 percent of the rated capacity to the occupied zone, thereby making laboratory tests unrepresentative of field performance. *Id.*

As noted in section I.A, EPCA prescribes that if an industry testing procedure or rating procedure developed or recognized by industry (as referenced in ASHRAE Standard 90.1) is amended, DOE must update its test procedure to be consistent with the amended industry test procedure, unless DOE determines, by rule published in the **Federal Register** and supported by clear and convincing evidence, that such amended test procedure would not meet the requirements in 42 U.S.C. 6314(a)(2) and (3) related to representative use and test burden. (42 U.S.C. 6314(a)(4)(A) and (B)) DOE notes that ASHRAE Standard 90.1 does not reference ANSI/ASHRAE Standard 221–2020, ''Test Method to Field-Measure and Score the Cooling and Heating Performance of an Installed Unitary HVAC System'' [29] (ASHRAE 221–2020) as the applicable test procedure for CUACs and CUHPs. NCI also did not provide data on field performance or any correlations between field performance and laboratory test performance for CUACs and CUHPs for DOE to consider. Furthermore, ASHRAE 221–2020 does not provide a method to determine the efficiency of CUACs and CUHPs. As discussed, DOE is proposing to incorporate by reference AHRI 340/360–2022, the most recently published version of the industry test procedure recognized by ASHRAE Standard 90.1 for CUACs and CUHPs, consistent with EPCA requirements. Additionally, DOE is proposing to incorporate the testing requirements and efficiency metric calculation method outlined in the ACUAC and ACUHP Working Group TP Term Sheet in appendix A1.

The CA IOUs commented that while the July 2017 TP RFI expressed interest in reducing burden to manufacturers, DOE already took steps to reduce this burden by allowing alternative energy efficiency or energy use determination methods (AEDMs). (CA IOUs, EERE–2017–BT–TP–0018–0007 at pp. 1–2) The CA IOUs stated that there are no further opportunities to streamline test procedures to limit testing burden. *Id.* Additionally, the CA IOUs stressed the importance of accurate efficiency ratings for its incentive programs and for

[29] Found online at *webstore.ansi.org/Standards/ASHRAE/ANSIASHRAEStandard2212020.*

customer knowledge, referencing the statutory provision that test procedures must produce results that are representative of the product's energy efficiency. *Id.*

Lennox stated that it generally supports DOE's proposal to meet the statutory requirements for designing test procedures that measure energy efficiency during an average use cycle, but requested that DOE also consider overall impacts to consumers and manufacturers. (Lennox, EERE–2017–BT–TP–0018–0008 at pp. 1–2) Lennox stated that in commercial applications, predicting actual energy use from a single metric is difficult and that a metric better serves as a point of comparison rather than a measure of energy use. *Id.* Lennox suggested that DOE strike a balance between evaluating equipment in a meaningful way without introducing unwarranted regulatory burden from overly complex test procedures or calculations that provide little value to consumers. *Id.*

In response to the CA IOUs and Lennox, DOE notes that its approach to test procedures is dictated by the requirements of EPCA. As discussed, EPCA prescribes that the test procedures for commercial package air conditioning and heating equipment must be those generally accepted industry testing procedures or rating procedures developed or recognized by industry as referenced in ASHRAE Standard 90.1. (42 U.S.C. 6314(a)(4)(A)) If such an industry test procedure is amended, DOE must update its test procedure to be consistent with the amended industry test procedure, unless DOE determines, by rule published in the **Federal Register** and supported by clear and convincing evidence, that the amended test procedure would not meet the requirements in 42 U.S.C. 6314(a)(2) and (3) related to representative use and test burden. (42 U.S.C. 6314(a)(4)(B) and (C)) In establishing or amending its test procedures, DOE must develop test procedures that are reasonably designed to produce test results reflecting energy efficiency, energy use, and estimated operating costs of a type of industrial equipment during a representative average use cycle and that are not unduly burdensome to conduct. (42 U.S.C 6314(a)(2)) DOE's considerations of these requirements in relation to individual test method issues are discussed within the relevant sections of this NOPR.

ASAP, ASE, *et al.* stated that there are a number of ambiguities in industry test procedures and that DOE should address these ambiguities in order to provide a level playing field for manufacturers and to ensure that any verification or enforcement testing is consistent with manufacturers' own testing. (ASAP, ASE, *et al.,* EERE–2017–BT–TP–0018–0009 at p. 2)

DOE notes that ASAP, ASE, *et al.* did not identify any specific test provisions that were the cause of their concern. In the context of the test procedure for CUACs and CUHPs, DOE has evaluated the industry test standard in the context of the statutory criteria regarding representativeness of the measured energy efficiency and test burden. To the extent that existing provisions in the relevant industry test procedure may benefit from further detail, such provisions are discussed in the following sections of this document.

I. Configuration of Unit Under Test

1. Summary

CUACs and CUHPs are sold with a wide variety of components, including many that can optionally be installed on or within the unit both in the factory and in the field. The following sections address the required configuration of units under test. In all cases, these components are distributed in commerce with the CUAC and CUHP but can be packaged or shipped in different ways from the point of manufacture for ease of transportation. Each optional component may or may not affect a model's measured efficiency when tested to the DOE test procedure proposed in this NOPR. For certain components not directly addressed in the DOE test procedure, this NOPR proposes more specific instructions on how each component should be handled for the purposes of making representations in 10 CFR part 429. Specifically, these proposed instructions would provide manufacturers with clarity on how components should be treated and how to group individual models with and without optional components for the purposes of representations to reduce burden. DOE is proposing these provisions in 10 CFR part 429 to allow for testing of certain individual models that can be used as a proxy to represent the performance of equipment with multiple combinations of components.

In this NOPR, DOE is proposing to handle CUAC and CUHP components in two distinct ways to help manufacturers better understand their options for developing representations for their differing product offerings. First, DOE proposes that the treatment of certain components be specified by the test procedure, such that their impact on measured efficiency is limited. For example, a fresh air damper must be set in the closed position and sealed during testing, resulting in a measured efficiency that would be similar or identical to the measured efficiency for a unit without a fresh air damper. Second, DOE is proposing provisions expressly allowing certain models to be grouped together for the purposes of making representations and allowing the performance of a model without certain optional components to be used as a proxy for models with any combinations of the specified components, even if such components would impact the measured efficiency of a model. A steam/hydronic coil is an example of such a component. The efficiency representation for a model with a steam/hydronic coil is based on the measured performance of the CUAC and CUHP as tested without the component installed because the steam/hydronic coil is not easily removed from the CUAC and CUHP for testing.[30]

2. Background

In 2013, ASRAC formed the Commercial HVAC Working Group to engage in a negotiated rulemaking effort regarding the certification of certain commercial heating, ventilating, and air conditioning equipment, including CUACs and CUHPs. (*See* 78 FR 15653 (March 12, 2013)) This Commercial HVAC Working Group submitted a term sheet (Commercial HVAC Term Sheet) providing the Commercial HVAC Working Group's recommendations. (*See* EERE–2013–BT–NOC–0023–0052) [31] The Commercial HVAC Working Group recommended that DOE issue guidance under current regulations on how to test certain equipment features when included in a basic model, until such time as the testing of such features can be addressed through a test procedure rulemaking. The Commercial HVAC Term Sheet listed the subject features under the heading ''Equipment Features Requiring Test Procedure Action.'' (*Id* at pp. 3–9) The Commercial HVAC Working Group also recommended that DOE issue an enforcement policy stating that DOE would exclude certain equipment with specified features from DOE testing, but only when the manufacturer offers for sale at all times a model that is identical in all other features; otherwise, the model with that feature would be eligible for DOE testing. These features were listed under the heading

[30] Note that in certain cases, as explained further in section III.I.3.b of this document, the representation may have to be based on an individual model with a steam/hydronic coil.

[31] Available at *www.regulations.gov/document/EERE-2013-BT-NOC-0023-0052.*

''Equipment Features Subject to Enforcement Policy.'' (*Id.* at pp. 9–15)

On January 30, 2015, DOE issued a Commercial HVAC Enforcement Policy addressing the treatment of specific features during DOE testing of commercial HVAC equipment. (See *www.energy.gov/gc/downloads/commercial-equipment-testing-enforcement-policies*) The Commercial HVAC Enforcement Policy stated that—for the purposes of assessment testing pursuant to 10 CFR 429.104, verification testing pursuant to 10 CFR 429.70(c)(5), and enforcement testing pursuant to 10 CFR 429.110—DOE would not test a unit with one of the optional features listed for a specified equipment type if a manufacturer distributes in commerce an otherwise identical unit that does not include that optional feature. (Commercial HVAC Enforcement Policy at p. 1) The objective of the Commercial HVAC Enforcement Policy is to ensure that each basic model has a commercially-available version eligible for DOE testing. That is, each basic model includes a model either without the optional feature(s) listed in the policy or that is eligible for testing with the feature(s). *Id.* The features in the Commercial HVAC Enforcement Policy for CUACs and CUHPs (*Id.* at pp. 1–3 and 5–6) align with the Commercial HVAC Term Sheet's list designated ''Equipment Features Subject to Enforcement Policy.'' (EERE–2013–BT–NOC–0023–0052, pp. 9–15)

By way of comparison, AHRI 340/360–2022 and AHRI 1340–202X Draft include appendix D, ''Unit Configuration for Standard Efficiency Determination—Normative.'' Section D3 to appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft includes a list of features that are optional for testing, and it further specifies the following general provisions regarding testing of units with optional features:

- If an otherwise identical model (within the basic model) without the feature is not distributed in commerce, conduct tests with the feature according to the individual provisions specified in section D3 to appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft.
- For each optional feature, section D3 to appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft includes explicit instructions on how to conduct testing for equipment with the optional feature present.

The optional features provisions in AHRI 340/360–2022 and AHRI 1340–202X Draft are generally consistent with DOE's Commercial HVAC Enforcement Policy, but the optional features in section D3 to appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft do not entirely align with the list of features included for CUACs and CUHPs in the Commercial HVAC Enforcement Policy.

DOE notes that the list of features and provisions in section D3 to appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft conflate components that can be addressed by testing provisions with components that, if present on a unit under test, could have a substantive impact on test results and that cannot be disabled or otherwise mitigated. This differentiation was central to the Commercial HVAC Term Sheet, which as noted previously, included separate lists for ''Equipment Features Requiring Test Procedure Action'' and ''Equipment Features Subject to Enforcement Policy,'' and remains central to providing clarity in DOE's regulations. Therefore, DOE has tentatively determined that provisions more explicit than those included in section D3 of appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft are warranted to clarify treatment of models that include more than one optional component.

In order to provide clarity between test procedure provisions (*i.e.,* how to test a specific unit) and certification and enforcement provisions (*e.g.,* which model to test), DOE is not proposing to adopt appendix D of AHRI 340/360–2022 or AHRI 1340–202X Draft and instead is proposing related provisions in 10 CFR 429.43, 10 CFR 429.134, and 10 CFR part 431, subpart F, appendices A and A1.

3. Proposed Approach for Exclusion of Certain Components

DOE's proposals for addressing treatment of certain components are discussed in the following sub-sections. Were DOE to adopt the provisions in 10 CFR 429.43, 10 CFR 429.134, and 10 CFR part 431, subpart F, appendices A and A1 as proposed, DOE would rescind the Commercial HVAC Enforcement Policy to the extent it is applicable to CUACs and CUHPs.

Issue 5: DOE seeks comment on its proposals regarding specific components in 10 CFR 429.43, 10 CFR 429.134, and 10 CFR part 431, subpart F, appendices A and A1.

a. Components Addressed Through Test Provisions of 10 CFR Part 431, Subpart F, Appendices A and A1

In 10 CFR part 431, subpart F, appendices A and A1, DOE proposes test provisions for specific components, including all of the components listed in section D3 to appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft, for which there is a test procedure action that limits the impacts on measured efficiency (*i.e.,* test procedure provisions specific to the component that are not addressed by general provisions in AHRI 340/360–2022 or AHRI 1340–202X Draft that negate the component's impact on performance). These provisions would specify how to test a unit with such a component (*e.g.,* for a unit with hail guards, remove hail guards for testing). These proposed test provisions are consistent with the provision in section D3 to appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft but include revisions for further clarity and specificity (*e.g.,* adding clarifying provisions for how to test units with modular economizers as opposed to units shipped with economizers installed). Specifically, DOE is proposing to require in appendices A and A1 that steps be taken during unit set-up and testing to limit the impacts on the measurement of these components:

- Air Economizers
- Barometric Relief Dampers
- Desiccant Dehumidification Components
- Evaporative Pre-cooling of Air-cooled Condenser Intake Air
- Fire/Smoke/Isolation Dampers
- Fresh Air Dampers
- Hail Guards
- High-Effectiveness Indoor Air Filtration
- Power Correction Capacitors
- Process Heat Recovery/Reclaim Coils/Thermal Storage
- Refrigerant Reheat Coils
- Steam/Hydronic Heat Coils
- UV Lights
- Ventilation Energy Recovery Systems (VERS)

The components are listed and described in Table 1 in section 4 of the amendments proposed for appendix A, and Table 1 in section 4 of the amendments proposed for appendix A1. Test provisions for the components are provided in the tables.

b. Components Addressed Through Representation Provisions of 10 CFR 429.43

Consistent with the Commercial HVAC Term Sheet and the Commercial HVAC Enforcement Policy, DOE is proposing provisions that explicitly allow representations for individual models with certain components to be based on testing for individual models without those components. DOE is proposing a table (Table 6 to 10 CFR 429.43) at 10 CFR 429.43(a)(3)(v)(A) listing the components for which these provisions would apply. DOE is proposing the following components be listed in Table 6 to 10 CFR 429.43:

- Air Economizers
- Desiccant Dehumidification Components
- Evaporative Pre-cooling of Air-cooled Condenser Intake Air
- Fire/Smoke/Isolation Dampers
- Indirect/Direct Evaporative Cooling of Ventilation Air
- Non-Standard Ducted Condenser Fans
- Non-Standard Indoor Fan Motors
- Powered Exhaust/Powered Return Air Fans
- Process Heat Recovery/Reclaim Coils/Thermal Storage
- Refrigerant Reheat Coils
- Sound Traps/Sound Attenuators
- Steam/Hydronic Heat Coils
- Ventilation Energy Recovery Systems (VERS)

In this NOPR, DOE is proposing to specify that the basic model representation must be based on the least efficient individual model that comprises a basic model, and clarifying how this long-standing basic model provision interacts with the proposed component treatment in 10 CFR 429.43. DOE believes that regulated entities may benefit from clarity in the regulatory text as to how the least efficient individual model within a basic model provision works in concert with the component treatment for CUACs and CUHPs. The amendments in this NOPR explicitly state that excluding the specified components from consideration in determining basic model efficiency in certain scenarios is an exception to basing representations on the least-efficient individual model within a basic model. In other words, the components listed in 10 CFR 429.43 are not being considered as part of the representation under DOE's regulatory framework if certain conditions are met as discussed in the following paragraphs, and, thus, their impact on efficiency is not reflected in the representation. In this case, the basic model's representation is generally determined by applying the testing and sampling provisions to the least efficient individual model in the basic model that does not have a component listed in 10 CFR 429.43.

DOE is proposing clarifying instructions for instances when individual models within a basic model may have more than one of the specified components and there may be no individual model without any of the specified components. DOE is proposing the concept of an ''otherwise comparable model group'' (OCMG). An OCMG is a group of individual models within the basic model that do not differ in components that affect energy consumption as measured according to the applicable test procedure other than the specific components listed in Table 6 to 10 CFR 429.43 but may include individual models with any combination of such specified components. Therefore, a basic model can be composed of multiple OCMGs, each representing a unique combination of components that affect energy consumption as measured according to the applicable test procedure, other than the specified excluded components listed in Table 6 to 10 CFR 429.43. For example, a manufacturer might include two tiers of control systems within the same basic model, in which one of the control systems has sophisticated diagnostics capabilities that require a more powerful control board with a higher wattage input. CUAC and CUHP individual models with the ''standard'' control system would be part of OCMG A, while individual models with the ''premium'' control system would be part of a different OCMG B, because the control system is not one of the specified exempt components listed in Table 6 to 10 CFR 429.43. However, both OCMGs may include different combinations of specified exempt components. Also, both OCMGs may include any combination of characteristics that do not affect the efficiency measurement, such as paint color.

An OCMG identifies which individual models are to be used to determine a represented value. Specifically, when identifying the individual model within an OCMG for the purpose of determining a representation for the basic model, only the individual model(s) with the least number (which could be zero) of the specific components listed in Table 6 to 10 CFR 429.43 is considered. This clarifies which individual models are exempted from consideration for determination of represented values in the case of an OCMG with multiple specified components and no individual models with zero specific components listed in Table 6 to 10 CFR 429.43 (*i.e.,* models with a number of specific components listed in Table 6 to 10 CFR 429.43 greater than the least number in the OCMG are exempted). In the case that the OCMG includes an individual model with no specific components listed in Table 1 to 10 CFR 429.43, then all individual models in the OCMG with specified components would be exempted from consideration. The least efficient individual model across the OCMGs within a basic model would be used to determine the representation of the basic model. In the case where there are multiple individual models within a single OCMG with the same non-zero least number of specified components, the least efficient of these would be considered.

DOE relies on the term ''comparable'' as opposed to ''identical'' to indicate that, for the purpose of representations, the components that impact energy consumption as measured by the applicable test procedure are the relevant components to consider. In other words, differences that do not impact energy consumption, such as unit color and presence of utility outlets, would not warrant separate OCMGs.

The use of the OCMG concept results in the represented values of performance that are representative of the individual model(s) with the lowest efficiency found within the basic model, excluding certain individual models with the specific components listed in Table 6 to 10 CFR 429.43. Specifically with regard to basic models of CUACs and CUHPs distributed in commerce with multiple different heating capacities of furnaces, the individual model with the lowest efficiency found within the basic model (with the aforementioned exception) would likely include the furnace with the highest offered heating capacity. Additionally, selection of the individual model with the lowest efficiency within the basic model would be required to consider all options for factory-installed components and manufacturer-supplied field-installed components (*e.g.,* electric resistance supplementary heat), excluding the specific components listed in Table 6 to 10 CFR 429.43. If manufacturers were to want to represent more efficient models within the same group, they would be able to establish those units as new basic models and test and report the results accordingly. Further, the approach, as proposed, is structured to more explicitly address individual models with more than one of the specific components listed in Table 6 to 10 CFR 429.43, as well as instances in which there is no comparable model without any of the specified components. DOE developed a document of examples to illustrate the approach proposed in this NOPR for determining represented values for CUACs and CUHPs with specific components, and in particular the OCMG concept (*see* EERE–2023–BT–TP–0014).

DOE's proposed provisions in 10 CFR 429.43(a)(3)(v)(A) include each of the components specified in section D3 to appendix D of AHRI 340/360–2022 for which the test provisions for a unit with these components may result in differences in ratings compared to testing a unit without these components. Non-standard indoor fan motors and coated coils are discussed in the following sub-sections.

(1) High-Static Non-Standard Indoor Fan Motors

The Commercial HVAC Enforcement Policy includes high-static indoor blowers or oversized motors as an optional feature for CUACs and CUHPs, among other equipment. The Commercial HVAC Enforcement Policy states that when selecting a unit of a basic model for DOE-initiated testing, if the basic model includes a variety of high-static indoor blowers or oversized motor options,[32] DOE will test a unit that has a standard indoor fan assembly (as described in the STI that is part of the manufacturer's certification, including information about the standard motor and associated drive that was used in determining the certified rating). This policy only applies where: (a) the manufacturer distributes in commerce a model within the basic model with the standard indoor fan assembly (*i.e.,* standard motor and drive), and (b) all models in the basic model have a motor with the same or better relative efficiency performance as the standard motor included in the test unit, as described in a separate guidance document discussed subsequently. If the manufacturer does not offer models with the standard motor identified in the STI or offers models with high-static motors that do not comply with the comparable efficiency guidance, DOE will test any indoor fan assembly offered for sale by the manufacturer.

DOE subsequently issued a draft guidance document (Draft Commercial HVAC Guidance Document) on June 29, 2015 to request comment on a method for comparing the efficiencies of a standard motor and a high-static indoor blower/oversized motor.[33] As presented in the Draft Commercial HVAC Guidance Document, the relative efficiency of an indoor fan motor would be determined by comparing the percent losses of the standard indoor fan motor to the percent losses of the non-standard (oversized) indoor fan motor. The percent losses would be determined by comparing each motor's wattage losses to the wattage losses of a corresponding reference motor. Additionally, the draft method contains a table that includes a number of situations with different combinations of characteristics of the standard motor and oversized motor (*e.g.,* whether each motor is subject to Federal standards for motors; whether each motor can be tested to the Federal test procedure for motors; whether each motor horsepower is less than 1 and specifies for each combination whether the non-standard fan enforcement policy would apply (*i.e.,* whether DOE would not test a model with an oversized motor, as long as the relative efficiency of the oversized motor is at least as good as performance of the standard motor)). DOE has not issued a final guidance document and is instead addressing the issue for CUACs and CUHPs in this test procedure rulemaking.

The current Federal test procedure does not address this issue. Section D4.1 of appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft provide an approach for including an individual model with a non-standard indoor fan motor as part of the same basic model as an individual model with a standard indoor fan motor. Under the approach in section D4.1 of appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft, the non-standard indoor fan motor efficiency must exceed the minimum value calculated using equation D1 in appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft. This minimum non-standard motor efficiency calculation is dependent on the efficiency of the standard fan motor and the reference efficiencies (determined per Table D1 of appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft) of the standard and non-standard fan motors.

Section D4.2 of appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft contain a method for how to compare performance for integrated fans and motors (IFMs). Because the fan motor in an IFM is not separately rated from the fan, this method compares the performance of the entire fan-motor assemblies for the standard and non-standard IFMs, rather than just the fan motors. This approach enables comparing relative performance of standard and non-standard IFMs, for which motor efficiencies could otherwise not be compared using the method specified in section D4.1 of appendix D of AHRI 340/360–2022 or AHRI 1340–202X Draft. Specifically, this method determines the ratio of the input power of the non-standard IFM to the input power of the standard IFM at the same duty point as defined in section D4.2 of appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft (*i.e.,* operating at the maximum ESP for the standard IFM at the rated airflow). If the input power ratio does not exceed the maximum ratio specified in Table D3 of appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft, the individual model with the non-standard IFM may be included within the same basic model as the individual model with the standard IFM. Section D4.2 of appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft allow these calculations to be conducted using either test data or simulated performance data.

The approaches in section D4 of appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft for high-static non-standard indoor fan motors and non-standard indoor IFMs generally align with the approaches of the Commercial HVAC Term Sheet, the Commercial HVAC Enforcement Policy, and the Draft Commercial HVAC Guidance Document, while providing greater detail and accommodating a wider range of fan motor options. For the reasons presented in the preceding paragraphs, DOE proposes to adopt in Table 6 to 10 CFR 429.43 the provisions for comparing performance of standard and high-static non-standard indoor fan motors/IFMs in section D4 of appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft[34] for the determination of the represented efficiency value for CUACs and CUHPs at 10 CFR 429.43(a)(3). Were DOE to adopt the provisions of section D4 of appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft as proposed, the Commercial HVAC Enforcement Policy and draft guidance document, to the extent applicable to indoor fan motors for CUACs and CUHPs, would no longer apply.

(2) Coated Coils

DOE is proposing to exclude coated coils from the specific components list specified in 10 CFR 429.43 because DOE has tentatively concluded that the presence of coated coils does not result in a significant impact to performance of CUACs and CUHPs, and, therefore, models with coated coils should be rated based on performance of models with coated coils present (rather than

[32] The Commercial HVAC Enforcement Policy defines "high static indoors blower or oversized motor" as an indoor fan assembly, including a motor, that drives the fan and can deliver higher external static pressure than the standard indoor fan assembly sold with the equipment. (*See www.energy.gov/sites/default/files/2019/04/f62/Enforcement_Policy-Commercial_HVAC.pdf at p.6*)

[33] Available at *www1.eere.energy.gov/buildings/appliance_standards/pdfs/draft-commercial-hvac-motor-faq-2015-06-29.pdf.*

[34] Per DOE's existing certification regulations, if a manufacturer were to use the proposed approach to certify a basic model, the manufacturer would be required to maintain documentation of how the relative efficiencies of the standard and non-standard fan motors or the input powers of the standard and non-standard IFMs were determined, as well as the supporting calculations. *See* 10 CFR 429.71.

based on performance of an individual model within an OCMG without coated coils).

c. Enforcement Provisions of 10 CFR 429.134

Consistent with the Commercial HVAC Term Sheet and the Commercial HVAC Enforcement Policy, DOE is proposing provisions in 10 CFR 429.134(g)(2) regarding how DOE would assess compliance for basic models of CUACs and CUHPs that include individual models distributed in commerce if DOE cannot obtain for testing individual models without certain components consistent with the model that served as the basis of representation. Specifically, DOE proposes that if a basic model includes individual models with components listed at Table 6 to 10 CFR 429.43 and DOE is not able to obtain an individual model with the least number of those components within an OCMG (as defined in 10 CFR 429.43(a)(3)(v)(A)(1) and discussed in section III.I.3.b of this NOPR), DOE may test any individual model within the OCMG.

d. Testing Specially Built Units That Are Not Distributed in Commerce

Unlike section D3 to appendix D of AHRI 340/360–2022 and AHRI 1340–202X Draft, DOE's Commercial HVAC Enforcement Policy does not allow a manufacturer to test a model that is specially built for testing without a feature if models without that feature are not actually distributed in commerce. Because testing such specially built models would not provide ratings representative of equipment distributed in commerce, DOE has tentatively concluded that this approach is not appropriate. Therefore, consistent with the Commercial HVAC Enforcement Policy, DOE is not proposing to allow testing of specially built units in its representation and enforcement provisions.

J. Represented Values

In the following sections, DOE discusses requirements regarding represented values. To the extent DOE is proposing changes to the requirements specified in 10 CFR 429 regarding representations of CUACs and CUHPs, such amendments to 10 CFR part 429, if made final, would be required starting 360 days after publication in the **Federal Register** of the test procedure final rule. Prior to 360 days after publication in the **Federal Register** of the test procedure final rule, the current requirements would apply.

1. Cooling Capacity

For CUACs and CUHPs, cooling capacity determines equipment class, which in turn determines the applicable energy conservation standard. 10 CFR 431.97. Cooling capacity also dictates the minimum ESP test condition applicable under Table 7 of AHRI 340/360–2022 (*i.e.,* larger capacity units are required to be tested at higher ESPs), which in turn affects the performance of the unit. Cooling capacity is a required represented value for all CUACs and CUHPs, but the requirements currently specified in 10 CFR 429.43(a)(1)(iv) regarding how the represented value of cooling capacity is determined only apply to ACUACs and ACUHPs.

DOE proposes to the make certain modifications to these provisions and expand the applicability of these provisions as amended to all of the CUACs and CUHPs that are the subject of this NOPR. DOE proposes that the represented value of cooling capacity must be between 95 and 100 percent of the mean of the total cooling capacities measured for the units in the sample. DOE also proposes to require for units where the represented value is determined through an AEDM that the represented value of cooling capacity must be between 95 and 100 percent of the total cooling capacity output simulated by the AEDM. Additionally, DOE proposes to remove the existing requirement in 10 CFR 429.43(a)(1)(iv) that the represented value of cooling capacity correspond to the nearest appropriate Btu/h multiple according to Table 4 of ANSI/AHRI 340/360–2007 in order to allow manufacturers flexibility in certifying a rated value that provides a representation of cooling capacity that may be more meaningful for commercial consumers.

DOE currently outlines product-specific enforcement provisions at 10 CFR 429.134(g) for ACUACs and ACUHPs, specifically that the mean of cooling capacity measurements will be used to determine the applicable standards (which depend on cooling capacity) for purposes of compliance. First, DOE proposes to expand the scope of this requirement to include ECUACs and WCUACs. Second, DOE proposes for all CUACs and CUHPs that are the subject of this NOPR that if the mean of the cooling capacity measurements exceeds by more than 5 percent the cooling capacity certified by the manufacturer, the mean of the measurement(s) will be used to select the applicable minimum ESP test condition from Table 7 of AHRI 340/360–2022 in appendix A or from Table 5 of the AHRI 1340–202X Draft in appendix A1.

These proposals would ensure the rated capacity is representative of the unit's performance, that the unit is being tested to the appropriate ESP, and that the unit is being evaluated against the appropriate standard. The proposals would allow manufacturers to conservatively rate capacity if the manufacturer deemed such conservative rating necessary to ensure that equipment is capable of performing at the cooling capacity for which it is represented to consumers. This flexibility was requested by manufacturers of CUACs and CUHPs as summarized in a test procedure final rule published on December 23, 2015. 80 FR 79655, 79662–79663. In addition to the flexibility these proposals would provide to manufacturers, DOE has also tentatively determined that they would ensure enforcement testing is based on representative cooling capacities.

Issue 6: DOE requests comment on its proposals related to represented values and verification testing of cooling capacity.

In response to the May 2022 TP/ECS RFI, the CA IOUs expressed concern that manufacturers are marketing equipment using the ''nominal capacity'' while rating it to a potentially substantially different ''rated capacity'' for compliance with DOE energy conservation standards. (CA IOUs, EERE–2022–BT–STD–0015–0012 at p. 5) The CA IOUs included an example of a 40-ton CUAC with a nominal capacity of 40 tons and 480,000 Btu/h, but was only rated at 35.4 tons and 425,000 Btu/h. *Id.* The CA IOUs recommended that DOE address this potential issue, and suggested that DOE should require nominal and rated capacity to align within a certain percentage. *Id.* The CA IOUs included an example of AHRI Standard 1230–2014, an older edition of the VRF test procedure which had a requirement that the nominal capacity not be greater than 105 percent of the rated capacity. *Id.*

DOE surmises that there is benefit in allowing manufacturers to group capacities nominally, such that some rounding of capacity values may be involved. DOE has not found sufficient evidence that any differences between nominal and rated capacity are problematic for consumers of this equipment, and notes that product literature provides specific ratings for each unit and is publicly accessible. Additionally, DOE notes that the CA IOUs were involved in the Working Group meetings, and that no mention of the issue between nominal and rated capacity was included in the ACUAC and ACUHP Working Group TP Term Sheet. DOE does not have sufficient evidence to warrant any changes regarding this issue; therefore, DOE is not proposing any provisions regarding nominal capacity of CUACs and CUHPs.

2. Single-Zone Variable-Air-Volume and Multi-Zone Variable-Air-Volume

AHRI 340/360–2015 added definitions and test provisions for SZVAV and MZVAV equipment. Specifically, AHRI 340/360–2015 (and the subsequent editions of AHRI 340/360) defines MZVAV units as those designed to vary the indoor air volume and refrigeration capacity/staging at a controlled discharge air temperature and static pressure as a means of providing space temperature control to independent multiple spaces with independent thermostats. AHRI 340/360–2015 (and the subsequent editions of AHRI 340/360) defines SZVAV units as those with a control system designed to vary the indoor air volume and refrigeration capacity/staging as a means to provide zone control to a single or common zones. The SZVAV definition further provides that the capacity, as well as the supply air shall be controlled either through modulation, discrete steps or combinations of modulation and step control based on the defined control logic.

As part of the July 2017 TP RFI, DOE requested comment on whether a CUAC model that could operate as both a SZVAV unit and a MZVAV unit should be tested both ways, representing two separate basic models. If tested as one basic model, DOE requested information regarding how to determine which of the two test methods would apply. DOE also requested comment on whether status as a proportionally controlled unit would be the appropriate indication of whether a CUAC can be used as a MZVAV unit, or whether some other characteristics regarding variable capacity control would have to be satisfied. 82 FR 34427, 34443.

Carrier, Goodman, and Lennox indicated that SZVAV and MZVAV models should be certified as different basic models. (Carrier, EERE–2017–BT–TP–0018–0006 at p. 14; Goodman, EERE–2017–BT–TP–0018–0014 at p. 5; Lennox, EERE–2017–BT–TP–0018–0008 at p. 5) Lennox also stated that it has different model numbers for the two product types characterizing SZVAV and MZVAV models. (Lennox, EERE–2017–BT–TP–0018–0008 at p. 5) Carrier stated that typically a MZVAV model has fully variable speed fans and more stages of capacity than a SZVAV model. (Carrier, EERE–2017–BT–TP–0018–0006 at p. 14) Goodman commented that SZVAV and MZVAV models are capable of having different ratings based on control strategy. (Goodman, EERE–2017–BT–TP–0018–0014 at p. 5) Lennox also stated that SZVAV and MZVAV models have different control algorithms and performance ratings. (Lennox, EERE–2017–BT–TP–0018–0008 at p. 5) AHRI stated that while some models are built to be specifically SZVAV or MZVAV units, other models can operate as both. AHRI further commented that if a unit can operate as both, it is possible for the IEER to be slightly different in each configuration. AHRI also stated that it is important to follow the STI when performing the test. (AHRI, EERE–2017–BT–TP–0018–0011 at p. 27)

AHRI 340/360–2022 includes definitions for SZVAV and MZVAV that align with AHRI 340/360–2015, and includes revised provisions for setting airflow for SZVAV and MZVAV equipment. However, Recommendation #12 of the ACUAC and ACUHP Working Group TP Term Sheet specifies that for determining the IVEC and IVHE metrics there would be no separate test provisions for MZVAV units. Consistent with the ACUAC and ACUHP Working Group TP Term Sheet, AHRI 1340–202X Draft does not specify separate test provisions for testing MZVAV units—instead the provisions for setting airflow apply for all units, including those classified as MZVAV units in AHRI 340/360–2015 and AHRI 340/360–2022.

As discussed, DOE is proposing to incorporate by reference AHRI 340/360–2022 for determining the current metrics for CUACs and CUHPs in appendix A, and to adopt the AHRI 1340–202X Draft for determining IVEC and IVHE in appendix A1. DOE has tentatively concluded that the proposed test procedure in appendix A (referencing AHRI 340/360–2022) is sufficient for determining ratings for SZVAV and MZVAV equipment, and because provisions for MZVAV equipment are not included in the AHRI 1340–202X Draft, DOE has tentatively determined that additional provisions for determining represented values for SZVAV and MZVAV equipment are not warranted for appendix A1.

3. Confidence Limit

In response to the July 2017 TP RFI, Lennox recommended that DOE harmonize the certification criteria in 10 CFR 429.43 applicable to commercial heating, ventilating, and air conditioning (HVAC) equipment, with that for central air conditioners, a consumer product, in 10 CFR 429.16. In particular, Lennox stated that commercial equipment currently has a more stringent confidence limit of 95 percent (as compared to 90 percent for residential CACs) and stated that current testing technology does not support this level of precision. (Lennox, EERE–2017–BT–TP–0018–0008 at p. 6)

Other manufacturers did not raise concerns regarding the confidence limit required for sampling commercial package air conditioners and heat pumps (including CUACs and CUHPs). DOE also notes that Lennox did not provide any data to support its view regarding the alleged variability of units in production and testing to support a difference confidence limit. Absent such data, DOE is unable to determine whether the more stringent confidence level for commercial heating, ventilating, and air conditioning equipment presents an actual problem. Consequently, DOE is not proposing a change to its confidence level at this time.[35]

4. AEDM Tolerance for IVEC and IVHE

As discussed previously, DOE's existing testing regulations allow the use of an AEDM, in lieu of testing, to simulate the efficiency of CUACs and CUHPs. 10 CFR 429.43(a). For models certified with an AEDM, results from DOE verification tests are subject to certain tolerances when compared to certified ratings. In Table 2 to paragraph (c)(5)(vi)(B) at 10 CFR 429.70, DOE is proposing to specify a tolerance of 10 percent for CUAC and CUHP verification tests for IVEC and IVHE. This is identical to the current tolerance specified for IEER (for ACUACs and ACUHPs) and for integrated metrics for other categories of commercial air conditioners and heat pumps (*e.g.,* integrated seasonal coefficient of performance 2 and integrated seasonal moisture removal efficiency 2 for DX–DOASes). DOE is also proposing to specify a tolerance of 5 percent for CUAC and CUHP verification testing for the optional EER2 and COP2 metrics. This is identical to the current tolerances specified for EER and COP for CUACs and CUHPs.

5. Minimum Part-Load Airflow

As previously discussed in sections III.F.1.d, III.F.4, and III.F.5, the IVEC and IVHE metrics account for energy consumed (specifically that of the indoor fan) in mechanical cooling and heating as well as modes other than mechanical cooling and heating (*e.g.,*

[35] DOE notes that it has previously requested data regarding the variability of units in production and testing to enable DOE to review and make any necessary adjustments to the specified confidence levels. 80 FR 79655, 79659. DOE did not receive any relevant data in response to that request.

economizer-only cooling, cooling season ventilation, heating season ventilation). IVEC and IVHE do not include separate tests or airflow rates for ventilation hours or economizer-only cooling (only applicable to IVEC). For example, for the economizer-only cooling hours in the D bin, the indoor fan power measured when operating at the lowest manufacturer-specified part-load airflow for a given load bin is applied for economizer-only cooling hours in that bin. Section 6.2.7 of the AHRI 1340–202X Draft requires that the lowest indoor fan power measured for all cooling or heating tests is applied for cooling-season ventilation hours in IVEC and heating-season ventilation hours in IVHE. Therefore, considering mechanical cooling and heating as well as other operating modes (economizer-only cooling, ventilation), the indoor fan power measured at the lowest manufacturer-specified part-load cooling and heating airflow rates represents a significant fraction of the power included in the IVEC and IVHE metrics (*i.e.,* indoor fan power measured at these airflow rates is weighted by a significant number of hours), and differences in the lowest manufacturer-specified part-load airflow can significantly impact IVEC and IVHE ratings.

Based on examination of publicly-available product literature, DOE understands that many basic models of a CUAC or CUHP have controls that allow for modulation of the minimum airflow used across a wide range of airflow turndown. DOE's research suggests that many models are distributed in commerce with an ''as-shipped'' minimum airflow and/or a default minimum airflow setting recommended in manufacturer installation instructions. However, in many cases DOE observed that the unit controls allow the installer to change this minimum airflow setting during installation to reflect any constraints specific to a particular installation. DOE understands that such constraints may include the duct distribution system, the thermostat the CUAC or CUHP is paired with, and the minimum ventilation rate for the conditioned space served by the CUAC or CUHP. To ensure that IVEC and IVHE ratings reflect indoor fan power that is generally representative of airflow rates that would be used in the field for a given basic model, DOE considered two options for requirements related to minimum part-load airflow used for representations of IVEC and IVHE:

1. Representations of IVEC and IVHE (including IVHEc, as applicable) must be based on setting the lowest stage of airflow to the highest part-load airflow allowable by the basic model's system controls. For example, if fan control settings for a basic model allow its lowest stage of airflow to range from 40 to 60 percent, the basic model would need to be represented based on the lowest stage of airflow set to 60 percent of the full-load airflow.

2. Representations of IVEC and IVHE (including IVHEc, as applicable) must be determined using minimum part-load airflow that is no lower than the highest of the following: (1) the minimum part-load airflow obtained using the as-shipped system control settings; (2) the minimum part-load airflow obtained using the default system control settings specified in the manufacturer installation instructions (as applicable); and (3) the minimum airflow rate specified in Section 5.18.2 of AHRI 1340–202X Draft.

DOE has tentatively concluded that option 1, which requires representations based on the highest minimum part-load airflow allowable by system controls, may result in unrepresentatively high airflow rates in cases in which a basic model allows configuration of minimum airflow to a very high percentage to accommodate a small fraction of installations in which minimum part-load airflow must be high (*e.g.,* in applications with very high minimum ventilation rates). In this NOPR, DOE is proposing option 2 as the default settings or as-shipped settings would provide IVEC and IVHE ratings representative of how the basic model is most typically installed in field applications. However, DOE welcomes comment on the approach laid out in option 1 or other alternative approaches not listed here.

As discussed, DOE is not proposing amendments to certification requirements for CUACs and CUHPs in this rulemaking, but DOE may consider such amendments in a separate rulemaking for certification, compliance, and enforcement. As part of that rulemaking, DOE may consider certification requirements pertaining to this minimum airflow issue, such as requiring certification of the range of minimum part-load airflow allowed by system controls for each basic model.

Issue 7: DOE requests comment on its proposal to require that a basic model's representation(s) of IVEC and IVHE (including IVHEc, as applicable) must be determined using a minimum part-load airflow that is no lower than the highest of the following: (1) the minimum part-load airflow obtained using the as-shipped system control settings; (2) the minimum part-load airflow obtained using the default system control settings specified in the manufacturer installation instructions (as applicable); and (3) the minimum airflow rate specified in section 5.18.2 of AHRI 1340–202X Draft. DOE also seeks feedback on the alternate option listed or any alternate options not listed that would ensure representations of IVEC and IVHE are based on minimum part-load airflow that is representative of field installations.

K. Enforcement Procedure for Verifying Cut-In and Cut-Out Temperatures

Recommendation #10 of the ACUAC and ACUHP Working Group TP Term Sheet states that DOE will adopt product-specific enforcement provisions for ACUHPs that include a method to verify certified cut-out and cut-in temperatures based on the test method outlined in the Residential Cold-Climate Heat Pump Technology Challenge (''CCHP Challenge'').[36] Therefore, in this NOPR, DOE proposes to adopt a method for verifying certified cut-out and cut-in temperatures at 10 CFR 429.134(g) consistent with Recommendation #10 of the ACUAC and ACUHP Working Group TP Term Sheet. Specifically, consistent with the CCHP Challenge method and the ACUAC and ACUHP Working Group TP Term Sheet, the proposed method involves gradually ramping down outdoor air temperature until the unit cuts out and gradually ramping back up outdoor air temperature until the cuts back on, with the temperature ramp-up and ramp-down conducted at 1.0 °F every 5 minutes. DOE will address certification requirements for CUACs and CUHPs, including the potential requirement for certification of cut-out and cut-in temperatures, in a separate rulemaking for certification, compliance, and enforcement.

L. Proposed Organization of the Regulatory Text for CUACs and CUHPs

In addition to the substantive changes discussed previously in this document, DOE proposes to make organizational changes to Table 1 to 10 CFR 431.96(b) and Tables 1 through 6 to 10 CFR 431.97. These proposed changes are not substantive and are intended to reflect terminology changes proposed in this document and to improve the overall readability of the tables. Specifically, in Table 1 to 10 CFR 431.96 (regarding test procedures for commercial air conditioners and heat pumps), DOE proposes to revise terminology to reflect the proposed definition for commercial unitary air conditioners with a rated

[36] See *www.energy.gov/sites/default/files/2021-10/bto-cchp-tech-challenge-spec-102521.pdf.*

cooling capacity greater than or equal to 65,000 Btu/h (CUACs) and commercial unitary heat pumps with a rated cooling capacity greater than or equal to 65,000 Btu/h (CUHPs), discussed further in section III.B.1 of this NOPR. Tables 1 through 6 to 10 CFR 431.97 currently specify cooling and heating standards for CUACs, CUHPs and water-source heat pumps (WSHPs). DOE proposes to revise terminology to reflect the proposed definition for CUACs and CUHPs, remove outdated standards no longer in effect, combine cooling and heating standards into the same tables, and create separate tables for standards for ACUACs and ACUHPs (in Table 1), WCUACs (in Table 2), ECUACs (in Table 3), double-duct systems (in Table 4), and WSHPs (in Table 5). In the proposed regulatory text, Tables 1 and 2 to 10 CFR 431.97 would specify cooling and heating standards, respectively, for ACUACs and ACUHPs with cooling capacity greater than 65,000 Btu/h (other than double-duct systems), ECUACs, and WCUACs; Tables 3 and 4 to 10 CFR 431.97 would specify cooling and heating standards, respectively, for WSHPs; and Tables 5 and 6 to 10 CFR 431.97 would specify cooling and heating standards, respectively, for double-duct systems.

M. Compliance Date

EPCA prescribes that, if DOE amends a test procedure, all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with that amended test procedure, beginning 360 days after publication of such a test procedure final rule in the **Federal Register**. (42 U.S.C. 6314(d)(1)) To the extent the modified test procedure proposed in this document is required only for the evaluation and issuance of updated efficiency standards, use of the modified test procedure, if finalized, would not be required until the compliance date of updated energy conversation standards. 10 CFR part 430, subpart C, appendix A, section 8(e); 10 CFR 431.4.

N. Test Procedure Costs and Impact

EPCA requires that the test procedures for commercial package air conditioning and heating equipment, which includes CUACs and CUHPs, be those generally accepted industry testing procedures or rating procedures developed or recognized by AHRI or by ASHRAE, as referenced in ASHRAE Standard 90.1. (42 U.S.C. 6314(a)(4)(A)) Further, if such an industry test procedure is amended, DOE must amend its test procedure to be consistent with the amended industry test procedure, unless DOE determines, by rule published in the **Federal Register** and supported by clear and convincing evidence, that such amended test procedure would not meet the requirements in 42 U.S.C. 6314(a)(2) and (3) related to representative use and test burden. (42 U.S.C. 6314(a)(4)(B))

As discussed, DOE is proposing to revise the existing test procedure for CUACs and CUHPs (consolidating for ACUACs and ACUHPs, ECUACs, and WCUACs) at appendix A and to adopt an amended test procedure at appendix A1. These proposals are discussed in the following sub-sections. DOE also proposes to amend its representation and enforcement provisions for CUACs and CUHPs.

1. Appendix A

In this NOPR, DOE proposes to amend the existing Federal test procedure for CUACs and CUHPs (including double-duct systems), which is currently located at appendix A for ACUACs and ACUHPs and 10 CFR 431.96 for ECUACs and WCUACs. Specifically, DOE proposes to consolidate the test procedures for ACUACs and ACUHPs, ECUACs, and WCUACs at appendix A and to update the test procedure to incorporate by reference an updated version of the applicable industry test method, AHRI 340/360–2022. The proposed revisions to appendix A would retain the current efficiency metrics—EER, IEER, and COP. The proposed testing requirements in appendix A are generally consistent with those in AHRI 340/360–2022, which in turn references ANSI/ASHRAE 37–2009.

DOE has tentatively determined that the proposed amendments to appendix A would improve the representativeness, accuracy, and reproducibility of the test results and would not be unduly burdensome for manufacturers to conduct or result in increased testing cost as compared to the current test procedure. The proposed revisions to the test procedure in appendix A for measuring EER, IEER, and COP per AHRI 340/360–2022 would not increase third-party laboratory testing costs per unit relative to the current DOE test procedure. DOE estimates the current costs of physical testing to the current required metrics to be $10,500 for ACUACs, $12,000 for ACUHPs, $6,800 for double-duct air conditioners, $8,500 for double-duct heat pumps, and $6,800 for ECUACs and WCUACs. Further, DOE has tentatively concluded that the proposed revisions to the test procedure in appendix A would not change efficiency ratings for CUACs and CUHPs, and therefore would not require retesting solely as a result of DOE's adoption of this proposed amendment to the DOE test procedure, if made final.[37]

2. Appendix A1

DOE is proposing to amend the existing test procedure for CUACs and CUHPs (including double-duct equipment) by adopting a new appendix A1 that utilizes the most recent draft version of the applicable industry consensus test procedure, AHRI 1340–202X Draft, including the IVEC and IVHE energy efficiency metrics. To the extent that AHRI 1340 is finalized consistent with the draft standard, DOE intends to incorporate the industry test standard by reference. If there are substantive changes between the draft and published versions of AHRI 1340, DOE may adopt the substance of the AHRI 1340–202X Draft or provide additional opportunity for comment.

Should DOE adopt standards in a future energy conservation standards rulemaking in terms of the new metrics, the proposed test procedure in appendix A1 (which DOE proposes to be substantively the same as AHRI 1340–202X Draft) would be required. DOE has tentatively determined that these proposed amendments would be representative of an average use cycle and would not be unduly burdensome for manufacturers to conduct. The proposed test procedure in appendix A1 would lead to an increase in test cost from the current Federal test procedure, as discussed in the following paragraphs. The following paragraphs include estimates for increases in cost of testing at a third-party laboratory.

The change in ESP requirements discussed in section III.F.4 that apply to measuring the IVEC and IVHE metrics would require additional test setup that DOE expects would increase test costs. DOE has tentatively concluded that metal ductwork would need to be fabricated for testing to withstand the higher ESP requirements (as compared to foamboard ductwork typically used for testing to the current test procedure). DOE estimates a test cost increase ranging from $500 to $1500 per unit, depending on the unit size/cooling capacity, associated with this transition

[37] Manufacturers are not required to perform laboratory testing on all basic models. In accordance with 10 CFR 429.70, CUAC and CUHP 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.

to metal ductwork. To meet the return/supply duct ESP requirement, DOE estimates an increase of $200 per unit for the time required to apply return duct restrictions. In combination, DOE estimates a total test cost increase of between $700 and $1700 per unit to meet the proposed ESP requirements.

For determining IVEC, DOE has tentatively concluded that there would not be an increase in testing cost as compared to measuring IEER per the current Federal test procedure, beyond the costs associated with the proposed ESP requirements discussed previously.

For determining IVHE, there are two required heating tests and several additional optional heating tests. The required heating tests are full-load tests at 47 °F and 17 °F. The full-load test at 47 °F is already required for the current Federal test procedure for determining COP. The full-load test at 17 °F which is currently required for the AHRI certification program. Because most CUHP manufacturers are AHRI members and participate in the AHRI certification program, DOE expects that that the required heating tests for IVHE would not increase test cost as compared to testing that is typically already conducted, beyond the costs associated with the proposed ESP requirements discussed previously.

Optional heating tests for CUHPs would increase the cost of heating testing if conducted. The optional tests for IVHE are outlined in section III.F.5 of this NOPR, which include: (1) an additional full-load test at 5 °F; (2) part-load tests at 17 °F and 47 °F (including up to 2 part-load tests at each temperature); and (3) for variable-speed units, boost tests at 17 °F and 5 °F. DOE estimates that each optional test conducted would increase the cost of heating testing by $2,000 to $4,000 depending on the test condition.

For ECUACs, WCUACs, and double-duct systems, the current Federal test procedure requires testing to EER for cooling tests—testing to IEER is not currently required for ECUACs, WCUACs, or double-duct systems. Because measuring EER requires only a single test, DOE expects that measuring IVEC for ECUACs, WCUACs, and double-duct systems would increase the cost of cooling testing. Specifically, DOE estimates the cost of additional cooling tests to be $3,700 per unit. Further, the previously discussed costs associated with the proposed indoor air ESP requirements ($700 to $1,700 depending on unit size) would also apply to ECUACs, WCUACs, and double-duct systems. In addition, for double-duct systems DOE expects that testing to appendix A1 would require an additional $2000 per unit for setup to meet the proposed non-zero outdoor air ESP requirement. Otherwise, DOE expects similar test burden for determining IVHE for double-duct systems as for determining IVHE for conventional ACUHPs as discussed in the preceding paragraphs.

Table III.6 shows DOE's estimates for testing to the current Federal test procedure and the proposed test procedure in appendix A1.

TABLE III.5—TEST COST ESTIMATES FOR THE PROPOSED TEST PROCEDURE IN APPENDIX A1

Equipment type	Test cost for current federal test procedure	Test cost for proposed test procedure in appendix A1
ACUACs	$10,500	$11,200–$12,200.
ACUHPs	12,000	$12,700–$13,700 (plus $2,000–$4,000 per optional heating test).
Double-duct air conditioners	6,800	$13,200–$14,200.
Double-duct heat pumps	8,300	$14,700–$15,700 (plus $2,000–$4,000 per optional heating test).
ECUACs and WCUACs	6,800	$11,200–$12,200.

DOE has tentatively concluded that that the potential adoption of standards denominated in terms of IVEC and IVHE (and corresponding requirement to use the proposed test procedure in appendix A1) would alter the measured energy efficiency of CUACs and CUHPs. Consequently, manufacturers would not be able to rely on data generated under the current test procedure and would therefore be required to re-rate CUAC and CUHP models. In accordance with 10 CFR 429.70, CUAC and CUHP manufacturers may elect to use AEDMs to rate models, which significantly reduces costs to industry. DOE estimates the cost to develop and validate an AEDM for determining IVEC (and IVHE as applicable) for CUACs and CUHPs (including double-duct systems) to be $19,000 per AEDM. Once the AEDM is developed, DOE estimates that it would take 1 hour of an engineer's time (calculated based upon an engineering technician wage of $41 per hour) to determine efficiency for each basic model using the AEDM.

Issue 8: DOE requests comment on its tentative understanding of the impact of the test procedure proposals in this NOPR, particularly regarding DOE's initial estimates of the cost impacts associated with the proposed appendix A1.

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Orders 12866, 13563 and 14094

Executive Order (E.O.) 12866, ''Regulatory Planning and Review,'' 58 FR 51735 (Oct. 4, 1993), as supplemented and reaffirmed by E.O. 13563, ''Improving Regulation and Regulatory Review,'' 76 FR 3821 (Jan. 21, 2011) and amended by E.O. 14094, ''Modernizing Regulatory Review,'' 88 FR 21879 (April 11, 2023), requires agencies, to the extent permitted by law, to (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public. DOE emphasizes as well that E.O. 13563 requires agencies to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. In its guidance, the Office of

Information and Regulatory Affairs (OIRA) in the Office of Management and Budget (OMB) has emphasized that such techniques may include identifying changing future compliance costs that might result from technological innovation or anticipated behavioral changes. For the reasons stated in the preamble, this proposed 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 proposed 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 an initial regulatory flexibility analysis (IRFA) for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, ''Proper Consideration of Small Entities in Agency Rulemaking,'' 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel's website: *www.energy.gov/gc/office-general-counsel.* DOE reviewed this proposed rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003.

The following sections detail DOE's IRFA for this test procedure proposed rulemaking.

1. Description of Reasons Why Action Is Being Considered

DOE is proposing to amend the existing DOE test procedures for air-cooled unitary air conditioners (ACUACs) and air-cooled unitary heat pumps (ACUHPs) with cooling capacity greater than or equal to 65,000 Btu/h, as well as evaporatively-cooled commercial package air conditioners (ECUACs) and water-cooled commercial package air conditioners (WCUACs) of all capacities (referred to collectively as CUACs and CUHPs) to reflect updates to the relevant industry test standard. DOE is proposing amendments to the test procedures for CUACs and CUHPs to satisfy its statutory requirements under EPCA to remain consistent with updates to the applicable industry test procedure and to re-evaluate its test procedures at least once every 7 years. (42 U.S.C. 6314(a)(4)(A) and (B); 42 U.S.C. 6314(a)(1)(A))

2. Objectives of, and Legal Basis for, Rule

EPCA, as amended, requires that the test procedures for commercial package air conditioning and heating equipment, which includes CUACs and CUHPs, be those generally accepted industry testing procedures or rating procedures developed or recognized by AHRI or by ASHRAE, as referenced in ASHRAE Standard 90.1. (42 U.S.C. 6314(a)(4)(A)) Further, if such an industry test procedure is amended, DOE must amend its test procedure to be consistent with the amended industry test procedure, unless DOE determines, by rule published in the **Federal Register** and supported by clear and convincing evidence, that such amended test procedure would not meet the requirements in 42 U.S.C. 6314(a)(2) and (3) related to representative use and test burden. (42 U.S.C. 6314(a)(4)(B))

EPCA also requires that, at least once every seven years, DOE evaluate test procedures for each type of covered equipment, including CUACs and CUHPs, to determine whether amended test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating costs during a representative average use cycle. (42 U.S.C. 614(a)(1)(A))

DOE is publishing this NOPR proposing amendments to the test procedure for CUACs and CUHPs in satisfaction of the aforementioned obligations under EPCA.

3. Description and Estimated Number of Small Entities Regulated

For manufacturers of CUACs and CUHPs, the Small Business Administration (SBA) has set a size threshold, which defines those entities classified as ''small businesses'' for the purposes of the statute. DOE used the SBA's small business size standards to determine whether any small entities would be subject to the requirements of the rule. *See* 13 CFR part 121. The equipment covered by this rule is classified under North American Industry Classification System (NAICS) code 333415,[38] ''Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing.'' In 13 CFR 121.201, 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 reviewed the test procedures proposed in this NOPR under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. DOE utilized DOE's Compliance Certification Database (CCD)[39] and manufacturer websites to identify potential small businesses that manufacture CUACs and CUHPs covered by this rulemaking. DOE identified 18 companies that are original equipment manufacturers (OEMs) of CUACs and CUHPs covered by this rulemaking. Next, DOE screened out companies that do not meet the definition of a ''small business'' or are foreign-owned and operated. Ultimately, DOE identified three small, domestic OEMs for consideration. All three companies are AHRI members. DOE used subscription-based business information tools (*e.g.,* reports from Dun & Bradstreet[40]) to determine headcount and revenue of the small business.

Issue 9: DOE requests comment on the number of small business OEMs of CUACs and CUHPs.

4. Description and Estimate of Compliance Requirements

In this NOPR, DOE is proposing to revise the existing test procedure for CUACs and CUHPs (consolidating for ACUACs and ACUHPs, ECUACs, and WCUACs) at appendix A of subpart F of part 431 (appendix A) by adopting sections of AHRI 340/360–2022. DOE is also proposing an amended test procedure for CUACs and CUHPs at appendix A1 to subpart F of part 431 (appendix A1) that adopts the draft industry test standard AHRI 1340–202X Draft. Additionally, this NOPR seeks to amend representation and enforcement provisions for CUACs and CUHPs in 10 CFR part 429 and certain definitions for CUACs and CUHPs in 10 CFR part 431. Specific cost and compliance associated with each proposed appendix are discussed in the subsections that follow.

[38] The size standards are listed by NAICS code and industry description and are available at: *www.sba.gov/document/support--table-size-standards* (Last accessed Apr. 4, 2023).

[39] Certified equipment in the CCD is listed by equipment class and can be accessed at *www.regulations.doe.gov/certification-data/#q=Product_Group_s%3A** (Last accessed Apr. 4, 2023).

[40] Market research is available through the Dun & Bradstreet Hoovers login page at: *app.dnbhoovers.com* (Last accessed April 3, 2023).

a. Cost and Compliance Associated With Appendix A

In appendix A, DOE proposes to amend the existing test procedure for CUACs and CUHPs (relocated to appendix A for ECUACs and WCUACs, for which the current test procedure is located at 10 CFR 431.96) by incorporating by reference an updated version of the applicable industry test method, AHRI 340/360–2022, which includes the energy efficiency metrics IEER (required metric for ACUACs and ACUHPs), EER (required metric for ECUACs, WCUACs, and double-duct systems), and COP (required metric for ACUHPs and double-duct heat pumps) and maintaining an existing reference to industry test method ANSI/ASHRAE 37–2009. The proposed test procedure at appendix A would not change efficiency ratings as compared to the current Federal test procedure, and therefore would not require retesting nor increase third-party laboratory testing costs per unit solely as a result of DOE's adoption of this proposed amendment to the test procedure, if made final. DOE estimates the current costs of physical testing to the current required metrics to be: $10,500 for ACUACs; $12,000 for ACUHPs; $6,800 for ECUACs, WCUACs, and double-duct air conditioners; and $8,300 for double-duct heat pumps. In accordance with 10 CFR 429.70, CUAC and CUHP manufacturers may elect to use AEDMs to rate models which significantly reduces costs to industry.

b. Cost and Compliance Associated With Appendix A1

In appendix A1, DOE is proposing to adopt the test conditions and procedures in AHRI 1340–202X Draft and ANSI/ASHRAE 37–2009. The proposed test procedure in appendix A1 includes provisions for measuring CUAC and CUHP energy efficiency using the IVEC and IVHE metrics to be consistent with the updated draft industry test procedure. Should DOE adopt amended energy conservation standards in the future denominated in terms of IVEC and IVHE, the Department expects there would be an increase in third-partly lab testing cost relative to the current Federal test procedure, outlined in the following paragraphs:

The proposed change in external static pressure (ESP) requirements discussed that apply to measuring the IVEC and IVHE metrics would require additional test setup that DOE expects would increase test costs. DOE has tentatively concluded that metal ductwork would need to be fabricated for testing to withstand the higher ESP requirements (as compared to foamboard ductwork typically used for testing to the current test procedure). DOE estimates a test cost increase ranging from $500 to $1500 per unit, depending on the unit size/cooling capacity, associated with this transition to metal ductwork. To meet the proposed requirement regarding split of ESP between return and supply ductwork, DOE estimates an increase of $200 per unit for the time required to apply return duct restrictions. In combination, DOE estimates a total test cost increase of between $700 and $1700 per unit to meet the proposed ESP requirements.

For determining IVEC, DOE has tentatively concluded that there would not be an increase in testing cost as compared to measuring IEER per the current Federal test procedure, beyond the costs associated with the proposed ESP requirements discussed previously.

For determining IVHE, there are two required heating tests and several additional optional heating tests. The required heating tests are full-load tests at 47 °F and 17 °F. The full-load test at 47 °F is already required for the current Federal test procedure for determining COP. The full-load test at 17 °F which is currently required for the AHRI certification program. Because most CUHP manufacturers are AHRI members and participate in the AHRI certification program, DOE expects that that the required heating tests for IVHE would not increase test cost as compared to testing that is typically already conducted, beyond the costs associated with the proposed ESP requirements discussed previously.

Optional heating tests for CUHPs would increase the cost of heating testing if conducted. The optional tests for IVHE are outlined in section III.F.5, which include: (1) an additional full-load test at 5 °F; (2) part-load tests at 17 °F and 47 °F (including up to 2 part-load tests at each temperature); and (3) for variable-speed units, boost tests at 17 °F and 5 °F. DOE estimates that each optional test conducted would increase the cost of heating testing by $2,000 to $4,000 depending on the test condition.

For ECUACs, WCUACs, and double-duct systems, the current Federal test procedure requires testing to EER for cooling tests—testing to IEER is not currently required for ECUACs, WCUACs, and double-duct systems. Because measuring EER requires only a single test while IVEC requires testing at four different test conditions, DOE expects that measuring IVEC for WCUACs, ECUACs, and double-duct systems would increase the cost of cooling testing. Specifically, DOE estimates the cost of additional cooling tests to be $3,700 per unit. Further, the previously discussed costs associated with the proposed indoor air ESP requirements ($700 to $1,700 depending on unit size) would also apply to ECUACs, WCUACs, and double-duct systems. In addition, for double-duct systems DOE expects that testing to appendix A1 would require an additional $2,000 per unit for setup to meet the proposed non-zero outdoor air ESP requirement associated with the IVEC and IVHE metrics. Otherwise, DOE expects similar test burden for determining IVHE for double-duct systems as for determining IVHE for conventional ACUHPs as discussed in the preceding paragraphs.

Table IV.1 shows DOE's estimates for testing to the current Federal test procedure and the proposed test procedure in appendix A1.

TABLE IV.1—TEST COST ESTIMATES FOR THE PROPOSED TEST PROCEDURE IN APPENDIX A1

Equipment type	Test cost for current federal test procedure	Test cost for proposed test procedure in appendix A1
ACUACs	$10,500	$11,200–$12,200.
ACUHPs	12,000	$12,700–$13,700 (plus $2,000–$4,000 per optional heating test).
Double-duct air conditioners	6,800	$13,200-$14,200.
Double-duct heat pumps	8,300	$14,700–$15,700 (plus $2,000–$4,000 per optional heating test).
ECUACs and WCUACs	6,800	$11,200–$12,200.

Testing in accordance with appendix A1 would not be required until such time as compliance is required with amended energy conservation standards for CUACs and CUHPs based on the proposed new IVEC and IVHE metrics, should DOE adopt such standards.

If CUAC and CUHP manufacturers conduct physical testing to certify a basic model, two units are required to be tested per basic model. However, manufacturers are not required to perform laboratory testing on all basic models, as manufacturers may elect to use AEDMs.[41] 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 reduce the burden and cost associated with testing.

Small businesses would be expected to have different potential regulatory costs depending on whether they are a member of AHRI. DOE understands that all AHRI members and all manufacturers currently certifying to the AHRI Directory will be testing their CUAC and CUHP models in accordance with the final version of the AHRI 1340–202X Draft, the industry test procedure DOE is proposing to adopt (if finalized and consistent with the AHRI 1340–202X Draft), and using AHRI's certification program.

The proposed test procedure amendments would not add any additional testing burden to manufacturers which are members of AHRI. As discussed, DOE did not identify any small, domestic OEMs that are not AHRI members. Therefore, DOE has tentatively concluded that the proposed test procedure amendments would not add additional testing burden, as those members soon will be using the finalized version of the AHRI 1340–202X draft test procedure.

Issue 10: DOE seeks comment on its estimate of the potential impacts of its proposed amendments to the test procedure for CUACs and CUHPs on small business manufacturers.

5. Duplication, Overlap, and Conflict With Other Rules and Regulations

DOE is not aware of any rules or regulations that duplicate, overlap, or conflict with the rule being considered today.

[41] In accordance with 10 CFR 429.70.

6. Significant Alternatives to the Rule

DOE proposes to reduce burden on manufacturers, including small businesses, by allowing AEDMs in lieu of physically testing all basic models. The use of an AEDM is less costly than physical testing of CUAC and CUHP models, including double-duct systems. DOE estimates the cost to develop an AEDM to be $19,000 per AEDM. The development of the AEDM would reduce the need for physical testing if the manufacturer expands its model offerings. Once the AEDM is developed, DOE estimates that it would take 1 hour of an engineer's time (calculated based upon an engineering technician's fully-burdened wage of $41 per hour) to determine efficiency for each basic model using the AEDM.

Additionally, DOE considered alternative test methods and modifications to the proposed test procedures in appendices A and A1 for CUACs and CUHPs, referencing AHRI 340/360–2022 and the AHRI 1340–202X Draft, respectively. However, DOE has tentatively determined that there are no better alternatives than the proposed test procedures, in terms of both meeting the agency's objectives and reducing burden on manufacturers. Therefore, DOE is proposing to amend the existing DOE test procedure for CUACs and CUHPs through incorporation by reference of AHRI 340/360–2022 in appendix A, and adoption of AHRI 1340–202X Draft in appendix A1.

In addition, individual manufacturers may petition for a waiver of the applicable test procedure. (*See* 10 CFR 431.401) Also, section 504 of the Department of Energy Organization Act, 42 U.S.C. 7194, provides authority for the Secretary to adjust a rule issued under EPCA in order to prevent ''special hardship, inequity, or unfair distribution of burdens'' that may be imposed on that manufacturer as a result of such rule. Manufacturers should refer to 10 CFR part 1003 for additional details.

C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of CUACs and CUHPs 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 CUACs and CUHPs. (*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 proposing to amend the certification or reporting requirements for CUACs and CUHPs in this NOPR. Instead, DOE may consider proposals to amend the certification requirements and reporting for CUACs and CUHPs 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 NOPR, DOE proposes test procedure amendments that it expects will be used to develop and implement future energy conservation standards for CUACs and CUHPs. DOE has determined that this proposed 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, subpart D, appendix A, sections 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 for agencies formulating and implementing policies or regulations that preempt State law or that have federalism implications. The

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

F. Review Under Executive Order 12988

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

G. Review Under the Unfunded Mandates Reform Act of 1995

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

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

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

I. Review Under Executive Order 12630

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

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

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

K. Review Under Executive Order 13211

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

The proposed regulatory action to amend the test procedure for measuring the energy efficiency of CUACs and CUHPs is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

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

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

The proposed modifications to the test procedure for CUACs and CUHPs would incorporate testing methods contained in certain sections of the following commercial standards: AHRI 340/360–2022 and ANSI/ASHRAE 37–2009. 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 will consult with both the Attorney General and the Chairman of the FTC concerning the impact of these test procedures on competition prior to prescribing a final rule.

M. Description of Materials Incorporated by Reference

In this NOPR, DOE proposes to incorporate by reference the following test standards:

AHRI Standard 340/360–2022. This test standard is an industry-accepted test procedure for measuring the performance of air-cooled, evaporatively-cooled, and water-cooled unitary air-conditioning and heat pump equipment.

Copies of AHRI Standard 340/360–2022 can be obtained from AHRI, 2311 Wilson Blvd., Suite 400, Arlington, VA 22201, (703) 524–8800, or found online at: *www.ahrinet.org.*

AHRI Standard 1340–202X Draft. This test standard is in draft form and its text was provided to DOE for the purposes of review only during the drafting of this NOPR. DOE intends to update the reference to the final published version of AHRI 1340 in the subsequent final rule. If there are substantive changes between the draft and published versions for which DOE receives stakeholder comments in response to this NOPR recommending that DOE adopt provisions consistent with the published version of AHRI 1340–202X, then DOE may consider adopting those provisions. If there are substantive changes between the draft and published versions for which stakeholder comments do not express support, DOE may adopt the substance of the AHRI 1340–202X Draft or provide additional opportunity for comment on the changes to the industry consensus test procedure.

ANSI/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.

Copies of ANSI/ASHRAE 37–2009 is available on ASHRAE's website at *www.ashrae.org.*

The following standards included in the proposed regulatory text were previously approved for incorporation by reference for the locations where they appear in this proposed rule: AHRI 210/240–2008 and AHRI 340/360–2007.

V. Public Participation

A. Participation in the Webinar

The time and date of the webinar meeting are listed in the **DATES** section at the beginning of this document. Webinar registration information, participant instructions, and information about the capabilities available to webinar participants will be published on DOE's website: *www.energy.gov/eere/buildings/public-meetings-and-comment-deadlines.* Participants are responsible for ensuring their systems are compatible with the webinar software.

B. Procedure for Submitting Prepared General Statements for Distribution

Any person who has an interest in the topics addressed in this NOPR, or who is representative of a group or class of persons that has an interest in these issues, may request an opportunity to make an oral presentation at the webinar. Such persons may submit to *ApplianceStandardsQuestions@ee.doe.gov.* Persons who wish to speak should include with their request a computer file in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format that briefly describes the nature of their interest in this rulemaking and the topics they wish to discuss. Such persons should also provide a daytime telephone number where they can be reached.

DOE requests persons selected to make an oral presentation to submit an advance copy of their statements at least two weeks before the webinar. At its discretion, DOE may permit persons who cannot supply an advance copy of their statement to participate, if those persons have made advance alternative arrangements with the Building Technologies Office. As necessary, requests to give an oral presentation should ask for such alternative arrangements.

C. Conduct of the Webinar

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

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

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

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

D. Submission of Comments

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

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

However, your contact information will be publicly viewable if you include it in the comment or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached to your comment. Otherwise, persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

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

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

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

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

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

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

Confidential Business Information. Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email two well-marked copies: one copy of the document marked ''confidential'' including all the information believed to be confidential, and one copy of the document marked ''non-confidential'' with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

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

E. Issues on Which DOE Seeks Comment

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

Issue 1: DOE seeks comment on its proposed definition for CUACs and CUHPs.

Issue 2: DOE requests feedback on its proposal to adopt the IVEC and IVHE metrics as determined under AHRI 1340–202X Draft in appendix A1 of the Federal test procedure for ACUACs and ACUHPs (including double-duct systems), ECUACs, and WCUACs.

Issue 3: DOE requests comment in its proposal to adopt the IVEC metric for ECUACs and WCUACs in appendix A1 as specified in the AHRI 1340–202X Draft, including the test temperature requirements.

Issue 4: DOE requests comment on its proposal to adopt the IVEC and IVHE metrics for double-duct systems in appendix A1 as specified in the AHRI 1340–202X Draft.

Issue 5: DOE seeks comment on its proposals regarding specific components in 10 CFR 429.43, 10 CFR 429.134, and 10 CFR part 431, subpart F, appendices A and A1.

Issue 6: DOE requests comment on its proposals related to represented values and verification testing of cooling capacity.

Issue 7: DOE requests comment on its proposal to require that a basic model's representation(s) of IVEC and IVHE (including IVHEc, as applicable) must be determined using a minimum part-load airflow that is no lower than the highest of the following: (1) the minimum part-load airflow obtained using the as-shipped system control settings; (2) the minimum part-load airflow obtained using the default system control settings specified in the manufacturer installation instructions (as applicable); and (3) the minimum airflow rate specified in section 5.18.2 of AHRI 1340–202X Draft. DOE also seeks feedback on the alternate option listed or any alternate options not listed that would ensure representations of IVEC and IVHE are based on minimum part-load airflow that is representative of field installations.

Issue 8: DOE requests comment on its tentative understanding of the impact of the test procedure proposals in this NOPR, particularly regarding DOE's initial estimates of the cost impacts associated with the proposed appendix A1.

Issue 9: DOE requests comment on the number of small business OEMs of CUACs and CUHPs.

Issue 10: DOE seeks comment on its estimate of the potential impacts of its proposed amendments to the test procedure for CUACs and CUHPs on small business manufacturers.

Additionally, DOE welcomes comments on other issues relevant to the conduct of this proposed rulemaking that may not be specifically identified in this document.

VI. Approval of the Office of the Secretary

The Secretary of Energy has approved publication of this notice of proposed rulemaking and request for comment.

List of Subjects

10 CFR Part 429

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

10 CFR Part 431

Administrative practice and procedure, Confidential business information, Energy conservation test procedures, Incorporation by reference, Reporting and recordkeeping requirements.

Signing Authority

This document of the Department of Energy was signed on July 20, 2023, by Francisco Alejandro Moreno, Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on July 21, 2023.

Treena V. Garrett,

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

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

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 paragraph (c)(2);
■ b. Redesignating paragraphs (c)(6) through (7) as (c)(7) through (8); and
■ c. Adding new paragraph (c)(6).

The revision and addition read as follows.

§ 429.4 Materials incorporated by reference.

* * * * *

(c) * * *

(2) AHRI Standard 340/360–2022 (I–P) (''AHRI 340/360–2022''), *2022 Standard for Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment,* AHRI-approved January 26, 2022; IBR approved for §§ 429.43 and 429.134.

* * * * *

(6) AHRI Standard 1340–202X Draft (I–P) (''AHRI 1340–202XDraft''), *202X Standard for Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment* [publication expected 2023]; IBR approved for §§ 429.43 and 429.134.

* * * * *

§ 429.12 [Amended]

■ 3. Amend § 429.12 paragraph (b)(8)(ii) by removing the words ''small commercial package air conditioning and heating equipment'', and adding in their place, the words ''commercial unitary air conditioners and heat pumps''.
■ 4. Amend § 429.43 by:
■ a. Revising the section heading;
■ b. Removing paragraph (a)(1)(iv);
■ c. Remove and reserve paragraph (a)(2)(ii);
■ d. Adding paragraph (a)(3)(v);
■ e. Revising introductory paragraphs of (b)(2)(i) and (ii);
■ f. In paragraph (b)(4)(i), in the first sentence removing the words ''Commercial package air-conditioning equipment (except commercial package air conditioning equipment that is air-cooled with a cooling capacity less than 65,000 Btu/h):'' and adding in their place, the words ''Commercial unitary air conditioners (except air-cooled, three-phase, commercial unitary air conditioners with a cooling capacity of less than 65,000 Btu/h):''; and
■ g. In paragraph (b)(4)(ii), in the first sentence removing the words ''Commercial package heating equipment (except commercial package heating equipment that is air-cooled with a cooling capacity less than 65,000 Btu/h):'' and adding in their place, the words ''Commercial unitary heat pumps (except air-cooled, three-phase, commercial unitary heat pumps with a cooling capacity of less than 65,000 Btu/h):''.

The revisions and addition read as follows.

§ 429.43 Commercial heating, ventilating, air conditioning (HVAC) equipment (excluding air-cooled, three-phase, commercial unitary air conditioners and heat pumps with a cooling capacity of less than 65,000 British thermal units per hour and air-cooled, three-phase, variable refrigerant flow multi-split air conditioners and heat pumps with less than 65,000 British thermal units per hour cooling capacity).

(a) * * *

(3) * * *

(v) Commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h). Before [*Date 360 days after date of publication of the final rule in the* **Federal Register**], the provisions in § 429.43 of this title as it appeared in the 10 CFR parts 200–499 edition revised as of January 1, 2023 are applicable. When certifying on or after [*Date 360 days after date of publication of the final rule in the* **Federal Register**], the following provisions apply.

(A) Individual model selection:

(1) Representations for a basic model must be based on the least-efficient individual model(s) distributed in commerce among all otherwise comparable model groups comprising the basic model, with selection of the least-efficient individual model considering all options for factory-installed components and manufacturer-supplied components for field installation, except as provided in

paragraph (a)(3)(v)(A)(*2*) of this section for individual models that include components listed in table 6 to paragraph (a)(3)(v)(A) of this section. For the purpose of this paragraph (a)(3)(v)(A)(*1*), ''otherwise comparable model group'' means a group of individual models distributed in commerce within the basic model that do not differ in components that affect energy consumption as measured according to the applicable test procedure specified at 10 CFR 431.96 other than those listed in table 6 to paragraph (a)(3)(v)(A) of this section. An otherwise comparable model group may include individual models distributed in commerce with any combination of the components listed in table 6 (or none of the components listed in table 6). An otherwise comparable model group may consist of only one individual model.

(2) For a basic model that includes individual models distributed in commerce with components listed in table 6 to paragraph (a)(3)(v)(A) of this section, the requirements for determining representations apply only to the individual model(s) of a specific otherwise comparable model group distributed in commerce with the least number (which could be zero) of components listed in table 6 included in individual models of the group. Testing under this paragraph shall be consistent with any component-specific test provisions specified in section 4 of appendix A and section 4 of appendix A1 to subpart F of part 431.

TABLE 6 TO PARAGRAPH (a)(3)(v)(A)—SPECIFIC COMPONENTS FOR COMMERCIAL UNITARY AIR CONDITIONERS AND HEAT PUMPS

[Excluding Air-Cooled Equipment With a Cooling Capacity of Less Than 65,000 Btu/h]

Component	Description
Air Economizers	An automatic system that enables a cooling system to supply outdoor air to reduce or eliminate the need for mechanical cooling during mid or cold weather.
Desiccant Dehumidification Components.	An assembly that reduces the moisture content of the supply air through moisture transfer with solid or liquid desiccants.
Evaporative Pre-cooling of Air-cooled Condenser Intake Air.	Water is evaporated into the air entering the air-cooled condenser to lower the dry-bulb temperature and thereby increase efficiency of the refrigeration cycle.
Fire/Smoke/Isolation Dampers.	A damper assembly including means to open and close the damper mounted at the supply or return duct opening of the equipment.
Indirect/Direct Evaporative Cooling of Ventilation Air.	Water is used indirectly or directly to cool ventilation air. In a direct system the water is introduced directly into the ventilation air and in an indirect system the water is evaporated in secondary air stream and the heat is removed through a heat exchanger.
Non-Standard Ducted Condenser Fans (not applicable to Double-duct Systems).	A higher-static condenser fan/motor assembly designed for external ducting of condenser air that provides greater pressure rise and has a higher rated motor horsepower than the condenser fan provided as a standard component with the equipment.
Non-Standard High-Static Indoor Fan Motors.	The standard indoor fan motor is the motor specified in the manufacturer's installation instructions for testing and shall be distributed in commerce as part of a particular model. A non-standard motor is an indoor fan motor that is not the standard indoor fan motor and that is distributed in commerce as part of an individual model within the same basic model. For a non-standard high-static indoor fan motor(s) to be considered a specific component for a basic model (and thus subject to the provisions of (a)(3)(v)(A)(*2*) of this section), the following provisions must be met: *(i)* If testing per appendix A to subpart F of part 431, non-standard high-static indoor fan motor(s) must meet the minimum allowable efficiency determined per section D4.1 of AHRI 340/360–2022 (incorporated by reference, see § 429.4) for non-standard high-static indoor fan motors or per section D4.2 of AHRI 340/360–2022 for non-standard high-static indoor integrated fan and motor combinations. *(ii)* If testing per appendix A1 to subpart F of part 431, non-standard high-static indoor fan motor(s) must meet the minimum allowable efficiency determined per section D4.1 of AHRI 1340–202X Draft (incorporated by reference, see § 429.4) for non-standard high-static indoor fan motors or per section D4.2 of AHRI 1340–202X Draft for non-standard high-static indoor integrated fan and motor combinations. *(iii)* If the standard indoor fan motor can vary fan speed through control system adjustment of motor speed, all non-standard high-static indoor fan motors must also allow speed control (including with the use of variable-frequency drive).
Powered Exhaust/Powered Return Air Fans.	A powered exhaust fan is a fan that transfers directly to the outside a portion of the building air that is returning to the unit, rather than allowing it to recirculate to the indoor coil and back to the building. A powered return fan is a fan that draws building air into the equipment.
Process Heat recovery/Reclaim Coils/Thermal Storage.	A heat exchanger located inside the unit that conditions the equipment's supply air using energy transferred from an external source using a vapor, gas, or liquid.
Refrigerant Reheat Coils	A heat exchanger located downstream of the indoor coil that heats the supply air during cooling operation using high pressure refrigerant in order to increase the ratio of moisture removal to cooling capacity provided by the equipment.
Sound Traps/Sound Attenuators.	An assembly of structures through which the supply air passes before leaving the equipment or through which the return air from the building passes immediately after entering the equipment for which the sound insertion loss is at least 6 dB for the 125 Hz octave band frequency range.
Steam/Hydronic Heat Coils	Coils used to provide supplemental heating.
Ventilation Energy Recovery System (VERS).	An assembly that preconditions outdoor air entering the equipment through direct or indirect thermal and/or moisture exchange with the exhaust air, which is defined as the building air being exhausted to the outside from the equipment.

(B) The represented value of total cooling capacity must be between 95 percent and 100 percent of the mean of the total cooling capacities measured for the units in the sample selected as described in paragraph (a)(1)(ii) of this section, or between 95 percent and 100 percent of the total cooling capacity output simulated by the AEDM as described in paragraph (a)(2) of this section.

(C) Representations of IVEC and IVHE (including $IVHE_c$, as applicable) must be determined using a minimum part-load airflow that is no lower than the highest of the following:

(*1*) The minimum part-load airflow obtained using the as-shipped system control settings;

(*2*) The minimum part-load airflow obtained using the default system control settings specified in the manufacturer installation instructions (as applicable); and

(*3*) The minimum airflow rate specified in section 5.18.2 of AHRI 1340–202XDraft.

(b) * * *

(2) * * *

(i) Commercial unitary air conditioners (except air-cooled, three-phase, commercial unitary air conditioners with a cooling capacity of less than 65,000 Btu/h): * * *

(ii) Commercial unitary heat pumps (except air-cooled, three-phase, commercial unitary heat pumps with a cooling capacity of less than 65,000 Btu/h): * * *

* * * * *

§ 429.67 [Amended]

■ 5. Amend § 429.67 by:

■ a. In the section heading and paragraphs (a)(1), (2), and (c)(1), removing the words ''small commercial package air conditioning and heating equipment'', and adding in their place, the words ''commercial unitary air conditioners and heat pumps'';

■ b. In paragraph (f)(2)(i), removing the words ''Commercial package air conditioning equipment that is air-cooled with a cooling capacity of less than 65,000 Btu/h (3-Phase)'', and adding in their place, the words ''Air-cooled, three-phase, commercial unitary air conditioners with a cooling capacity of less than 65,000 Btu/h'';

■ c. In paragraph (f)(2)(ii), removing the words ''Commercial package heating equipment that is air-cooled with a cooling capacity of less than 65,000 Btu/h (3-Phase)'', and adding in their place, the words ''Air-cooled, three-phase, commercial unitary heat pumps with a cooling capacity of less than 65,000 Btu/h''; and

■ d. In paragraph (f)(3)(i), removing the words ''Air cooled commercial package air conditioning equipment with a cooling capacity of less than 65,000 Btu/h (3-phase)'', and adding in their place, the words ''Air-cooled, three-phase, commercial unitary air conditioners with a cooling capacity of less than 65,000 Btu/h''.

■ e. In paragraph (f)(3)(ii), removing the words ''Commercial package heating equipment that is air-cooled with a cooling capacity of less than 65,000 Btu/h (3-Phase)'', and adding in their place, the words ''Air-cooled, three-phase, commercial unitary heat pumps with a cooling capacity of less than 65,000 Btu/h''; and

■ 6. Amend § 429.70 by:

■ a. Removing the words ''commercial package air conditioning and heating equipment'' and adding in their place, the words ''commercial unitary air conditioners and heat pumps'' in paragraph heading (c);

■ b. Revising table 1 to paragraph (c)(2)(iv);

■ c. Revising table 2 to paragraph (c)(5)(vi)(B); and

■ d. Removing the words ''commercial package air conditioning and heating equipment'' and adding in their place, the words ''commercial unitary air conditioners and heat pumps'' in the headings for paragraph (l), and in paragraphs (l)(1)(i), (l)(1)(ii), and (l)(3).

The revisions read as follows:

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

* * * * *

(c) * * *

(2) * * *

(iv) * * *

TABLE 1 TO PARAGRAPH (c)(2)(iv)

Validation class	Minimum number of distinct models that must be tested per AEDM
(A) Commercial HVAC Validation Classes	
Air-Cooled Commercial Unitary Air Conditioners and Heat Pumps greater than or equal to 65,000 Btu/h Cooling Capacity.	2 Basic Models.
Water-Cooled Commercial Unitary Air Conditioners, All Capacities	2 Basic Models.
Evaporatively-Cooled, Commercial Unitary Air Conditioners, All Capacities	2 Basic Models.
Water-Source HPs, All Capacities	2 Basic Models.
Single Package Vertical ACs and HPs	2 Basic Models.
Packaged Terminal ACs and HPs	2 Basic Models.
Air-Cooled, Variable Refrigerant Flow ACs and HPs	2 Basic Models.
Water-Cooled, Variable Refrigerant Flow ACs and HPs	2 Basic Models.
Computer Room Air Conditioners, Air Cooled	2 Basic Models.
Computer Room Air Conditioners, Water-Cooled and Glycol-Cooled	2 Basic Models.
Direct Expansion-Dedicated Outdoor Air Systems, Air-cooled or Air-source Heat Pump, Without Ventilation Energy Recovery Systems.	2 Basic Models.
Direct Expansion-Dedicated Outdoor Air Systems, Air-cooled or Air-source Heat Pump, With Ventilation Energy Recovery Systems.	2 Basic Models.
Direct Expansion-Dedicated Outdoor Air Systems, Water-cooled, Water-source Heat Pump, or Ground Source Closed-loop Heat Pump, Without Ventilation Energy Recovery Systems.	2 Basic Models.
Direct Expansion-Dedicated Outdoor Air Systems, Water-cooled, Water-source Heat Pump, or Ground Source Closed-loop Heat Pump, With Ventilation Energy Recovery Systems.	2 Basic Models.
(B) Commercial Water Heater Validation Classes	
Gas-fired Water Heaters and Hot Water Supply Boilers Less than 10 Gallons	2 Basic Models.
Gas-fired Water Heaters and Hot Water Supply Boilers Greater than or Equal to 10 Gallons	2 Basic Models.

TABLE 1 TO PARAGRAPH (C)(2)(iv)—Continued

Validation class	Minimum number of distinct models that must be tested per AEDM
Oil-fired Water Heaters and Hot Water Supply Boilers Less than 10 Gallons	2 Basic Models.
Oil-fired Water Heaters and Hot Water Supply Boilers Greater than or Equal to 10 Gallons	2 Basic Models.
Electric Water Heaters	2 Basic Models.
Heat Pump Water Heaters	2 Basic Models.
Unfired Hot Water Storage Tanks	2 Basic Models.
(C) Commercial Packaged Boilers Validation Classes	
Gas-fired, Hot Water Only Commercial Packaged Boilers	2 Basic Models.
Gas-fired, Steam Only Commercial Packaged Boilers	2 Basic Models.
Gas-fired Hot Water/Steam Commercial Packaged Boilers	2 Basic Models.
Oil-fired, Hot Water Only Commercial Packaged Boilers	2 Basic Models.
Oil-fired, Steam Only Commercial Packaged Boilers	2 Basic Models.
Oil-fired Hot Water/Steam Commercial Packaged Boilers	2 Basic Models.
(D) Commercial Furnace Validation Classes	
Gas-fired Furnaces	2 Basic Models.
Oil-fired Furnaces	2 Basic Models.
(E) Commercial Refrigeration Equipment Validation Classes [1]	
Self-Contained Open Refrigerators	2 Basic Models.
Self-Contained Open Freezers	2 Basic Models.
Remote Condensing Open Refrigerators	2 Basic Models.
Remote Condensing Open Freezers	2 Basic Models.
Self-Contained Closed Refrigerators	2 Basic Models.
Self-Contained Closed Freezers	2 Basic Models.
Remote Condensing Closed Refrigerators	2 Basic Models.
Remote Condensing Closed Freezers	2 Basic Models.

[1] The minimum number of tests indicated above must be comprised of a transparent model, a solid model, a vertical model, a semi-vertical model, a horizontal model, and a service-over-the counter model, as applicable based on the equipment offering. However, manufacturers do not need to include all types of these models if it will increase the minimum number of tests that need to be conducted.

* * * * *

(5) * * *

(vi) * * *

(B) * * *

TABLE 2 TO PARAGRAPH (C)(5)(vi)(B)

Equipment	Metric	Applicable tolerance
Commercial Packaged Boilers	Combustion Efficiency	5% (0.05)
	Thermal Efficiency	5% (0.05)
Commercial Water Heaters or Hot Water Supply Boilers	Thermal Efficiency	5% (0.05)
	Standby Loss	10% (0.1)
Unfired Storage Tanks	R-Value	10% (0.1)
Air-Cooled Commercial Unitary Air Conditioners and Heat Pumps greater than or equal to 65,000 Btu/h Cooling Capacity.	Energy Efficiency Ratio	5% (0.05)
	Energy Efficiency Ratio 2	5% (0.05)
	Coefficient of Performance	5% (0.05)
	Coefficient of Performance 2	5% (0.05)
	Integrated Energy Efficiency Ratio	10% (0.1)
	Integrated Ventilation, Economizing, and Cooling	10% (0.1)
	Integrated Ventilation and Heating Efficiency	10% (0.1)
Water-Cooled Commercial Unitary Air Conditioners, All Cooling Capacities.	Energy Efficiency Ratio	5% (0.05)
	Energy Efficiency Ratio 2	5% (0.05)
	Integrated Energy Efficiency Ratio	10% (0.1)
	Integrated Ventilation, Economizing, and Cooling	10% (0.1)
Evaporatively-Cooled Commercial Unitary Air Conditioners, All Capacities.	Energy Efficiency Ratio	5% (0.05)
	Energy Efficiency Ratio 2	5% (0.05)
	Integrated Energy Efficiency Ratio	10% (0.1)
	Integrated Ventilation, Economizing, and Cooling	10% (0.1)
Water-Source HPs, All Capacities	Energy Efficiency Ratio	5% (0.05)
	Coefficient of Performance	5% (0.05)
	Integrated Energy Efficiency Ratio	10% (0.1)
Single Package Vertical ACs and HPs	Energy Efficiency Ratio	5% (0.05)

TABLE 2 TO PARAGRAPH (C)(5)(vi)(B)—Continued

Equipment	Metric	Applicable tolerance
	Coefficient of Performance	5% (0.05)
Packaged Terminal ACs and HPs	Energy Efficiency Ratio	5% (0.05)
	Coefficient of Performance	5% (0.05)
Variable Refrigerant Flow ACs and HPs	Energy Efficiency Ratio	5% (0.05)
	Coefficient of Performance	5% (0.05)
	Integrated Energy Efficiency Ratio	10% (0.1)
Computer Room Air Conditioners	Sensible Coefficient of Performance	5% (0.05)
	Net Sensible Coefficient of Performance	5% (0.05)
Direct Expansion- Dedicated Outdoor Air Systems	Integrated Seasonal Coefficient of Performance 2	10% (0.1)
	Integrated Seasonal Moisture Removal Efficiency 2	10% (0.1)
Commercial Warm-Air Furnaces Commercial Refrigeration Equipment.	Thermal Efficiency	5% (0.05)
	Daily Energy Consumption	5% (0.05)

* * * * *

■ 7. Amend § 429.134 by:

■ a. Revising paragraph (g); and

■ b. In paragraph heading (y), removing the words ''small commercial package air conditioning and heating equipment'', and adding in their place, the words ''commercial unitary air conditioners and heat pumps''.

The revision reads as follows:

§ 429.134 Product-specific enforcement provisions.

* * * * *

(g) *Commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h).* Before [*Date 360 days after date of publication of the final rule in the* **Federal Register**], 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 [*Date 360 days after date of publication of the final rule in the* **Federal Register**], the following provisions apply.

(1) *Verification of cooling capacity.* The cooling capacity of each tested unit of the basic model will be measured pursuant to the test requirements of appendix A or appendix A1 to subpart F of 10 CFR part 431. The mean of the cooling capacity measurement(s) will be used to determine the applicable standards for purposes of compliance. If the mean of the cooling capacity measurements exceeds the certified cooling capacity by more than 5 percent of the certified value, the mean of the cooling capacity measurement(s) will be used to determine the applicable minimum external static pressure test condition specified in Table 7 of AHRI 340/360–2022 (incorporated by reference, see § 429.4) when testing in accordance with appendix A or in Table 5 of AHRI 1340–202X Draft when testing in accordance with appendix A1.

(2) *Specific Components.* If a basic model includes individual models with components listed at Table 6 to § 429.43(a)(3)(v)(A) and DOE is not able to obtain an individual model with the least number (which could be zero) of those components within an otherwise comparable model group (as defined in § 429.43(a)(3)(v)(A)(*1*)), DOE may test any individual model within the otherwise comparable model group.

(3) *Verification of cut-out and cut-in temperatures.*

(i) For assessment and enforcement testing of models of commercial unitary heat pumps subject to energy conservation standards denominated in terms of IVHE, the cut-out and cut-in temperatures may be verified using the method in paragraph (g)(3)(ii) of this section. If this method is conducted, the cut-in and cut-out temperatures determined using this method will be used to calculate IVHE for purposes of compliance.

(ii) Test method for verification of cut-out and cut-in temperatures.

(A) Capacity does not need to be measured. Measure a parameter that provides positive indication that the heat pump is operating in heat pump mode (*e.g.,* power or discharge pressure). Also monitor the temperature of air entering the outdoor coil using one or more air samplers or parallel thermocouple grid(s) on each side of the heat pump that has air inlets. Record measurements at a time interval of one minute or shorter.

(B) Ensure that the heat pump is operating. Compensation load on the indoor room may be reduced during the test to avoid compressor temporary boost mode or excessive room temperature reduction. Set outdoor chamber temperature to the lower of (1) 17.0 °F or (2) 3.0 °F warmer than the certified cut-out temperature. Maintain the outdoor chamber at this temperature for 3 minutes to allow conditions to stabilize.

(C) Reduce outdoor chamber temperature in steps or continuously at an average rate of 1.0 °F every 5 minutes. When the heat pump stops operating, continue recording data for 5 minutes. At this point, reverse the temperature ramp and increase outdoor chamber temperature 1.0 °F every 5 minutes. Continue the test until 5 minutes after the heat pump operation restarts. Note the average outdoor coil air inlet temperature when the heat pump stops operation as the cut-out temperature and the temperature 30 seconds after it restarts as the cut-in temperature.

* * * * *

PART 431—ENERGY EFFICIENCY PROGRAM FOR CERTAIN COMMERCIAL AND INDUSTRIAL EQUIPMENT

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

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

■ 9. Amend § 431.92 by:

■ a. Revising the definition for ''Basic model'' and ''Coefficient of performance, or COP'';

■ b. Adding in alphabetical order definitions for ''Coefficient of performance 2, or ''COP2'' and ''Commercial unitary air conditioner and commercial unitary heat pump'';

■ c. Revising the definitions for ''Double-duct air conditioner or heat pump'' and ''Energy efficiency ratio, or EER'';

■ d. Adding in alphabetical order a definition for ''Energy efficiency ratio 2, or EER2'';

■ e. Revising the definition for ''Integrated energy efficiency ratio, or IEER''; and

■ f. Adding in alphabetical order definitions for ''Integrated ventilation and heating efficiency, or IVHE'' and ''Integrated ventilation, economizing, and cooling, or IVEC''.

The revisions and additions read as follows:

§ 431.92 Definitions concerning commercial air conditioners and heat pumps.

* * * * *

Basic model means:

(1) *For air-cooled, three-phase, commercial unitary air conditioners and heat pumps with a cooling capacity of less than 65,000 Btu/h and air-cooled, three-phase, variable refrigerant flow multi-split air conditioners and heat pumps with a cooling capacity of less than 65,000 Btu/h:* All units manufactured by one manufacturer, having the same primary energy source, and, which have essentially identical electrical, physical, and functional (or hydraulic) characteristics that affect energy consumption, energy efficiency, water consumption, or water efficiency; where essentially identical electrical, physical, and functional (or hydraulic) characteristics means:

(i) For split systems manufactured by outdoor unit manufacturers (OUMs): all individual combinations having the same model of outdoor unit, which means comparably performing compressor(s) [a variation of no more than five percent in displacement rate (volume per time) as rated by the compressor manufacturer, and no more than five percent in capacity and power input for the same operating conditions as rated by the compressor manufacturer], outdoor coil(s) [no more than five percent variation in face area and total fin surface area; same fin material; same tube material], and outdoor fan(s) [no more than ten percent variation in airflow and no more than twenty percent variation in power input];

(ii) For split systems having indoor units manufactured by independent coil manufacturers (ICMs): all individual combinations having comparably performing indoor coil(s) [plus or minus one square foot face area, plus or minus one fin per inch fin density, and the same fin material, tube material, number of tube rows, tube pattern, and tube size]; and

(iii) For single-package systems: all individual models having comparably performing compressor(s) [no more than five percent variation in displacement rate (volume per time) rated by the compressor manufacturer, and no more than five percent variations in capacity and power input rated by the compressor manufacturer corresponding to the same compressor rating conditions], outdoor coil(s) and indoor coil(s) [no more than five percent variation in face area and total fin surface area; same fin material; same tube material], outdoor fan(s) [no more than ten percent variation in outdoor airflow], and indoor blower(s) [no more than ten percent variation in indoor airflow, with no more than twenty percent variation in fan motor power input];

(iv) Except that,

(A) For single-package systems and single-split systems, manufacturers may instead choose to make each individual model/combination its own basic model provided the testing and represented value requirements in 10 CFR 429.67 of this chapter are met; and

(B) For multi-split, multi-circuit, and multi-head mini-split combinations, a basic model may not include both individual small-duct, high velocity (SDHV) combinations and non-SDHV combinations even when they include the same model of outdoor unit. The manufacturer may choose to identify specific individual combinations as additional basic models.

(2) *For commercial unitary air conditioners and heat pumps (excluding air-cooled, three-phase, commercial unitary air conditioners and heat pumps with a cooling capacity of less than 65,000 Btu/h):* All units manufactured by one manufacturer within a single equipment class, having the same or comparably performing compressor(s), heat exchangers, and air moving system(s) that have a common ''nominal'' cooling capacity.

(3) *For computer room air conditioners:* All units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.,* electric or gas), and which have the same or comparably performing compressor(s), heat exchangers, and air moving system(s) that have a common ''nominal'' cooling capacity.

(4) *For direct expansion-dedicated outdoor air system:* All units manufactured by one manufacturer, having the same primary energy source (*e.g.,* electric or gas), within a single equipment class; with the same or comparably performing compressor(s), heat exchangers, ventilation energy recovery system(s) (if present), and air moving system(s) that have a common ''nominal'' moisture removal capacity.

(5) *For packaged terminal air conditioner (PTAC) or packaged terminal heat pump (PTHP):* All units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.,* electric or gas), and which have the same or comparable compressors, same or comparable heat exchangers, and same or comparable air moving systems that have a cooling capacity within 300 Btu/h of one another.

(6) *For single package vertical units:* All units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.,* electric or gas), and which have the same or comparably performing compressor(s), heat exchangers, and air moving system(s) that have a rated cooling capacity within 1500 Btu/h of one another.

(7) *For variable refrigerant flow systems (excluding air-cooled, three-phase, variable refrigerant flow air conditioners and heat pumps with a cooling capacity of less than 65,000 Btu/h):* All units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.,* electric or gas), and which have the same or comparably performing compressor(s) that have a common ''nominal'' cooling capacity and the same heat rejection medium (*e.g.,* air or water) (includes VRF water source heat pumps).

(8) *For water-source heat pumps:* All units manufactured by one manufacturer within a single equipment class, having the same primary energy source (*e.g.,* electric or gas), and which have the same or comparable compressors, same or comparable heat exchangers, and same or comparable ''nominal'' capacity.

* * * * *

Coefficient of performance, or *COP* means the ratio of the produced cooling effect of an air conditioner or heat pump (or its produced heating effect, depending on the mode of operation) to its net work input, when both the cooling (or heating) effect and the net work input are expressed in identical units of measurement. For air-cooled commercial unitary air conditioners and heat pumps (excluding equipment with a cooling capacity less than 65,000 Btu/h), COP is measured per appendix A to this subpart.

Coefficient of performance 2, or *COP2* means the ratio of the produced cooling effect of an air conditioner or heat pump (or its produced heating effect, depending on the mode of operation) to its net work input, when both the cooling (or heating) effect and the net work input are expressed in identical units of measurement. COP2 must be used with a subscript to indicate the outdoor temperature in degrees Fahrenheit at which the COP2 was measured (*e.g.,* $COP2_{17}$ for COP2 measured at 17 °F). For air-cooled commercial unitary air conditioners and heat pumps (excluding equipment with a cooling capacity less than 65,000 Btu/

h), COP2 is measured per appendix A1 to this subpart.

* * * * *

Commercial unitary air conditioner and *commercial unitary heat pump* means any small, large, or very large air-cooled, water-cooled, or evaporatively-cooled commercial package air-conditioning and heating equipment that consists of one or more factory-made assemblies that provide space conditioning; and does not include:

(1) Single package vertical air conditioners and heat pumps,

(2) Variable refrigerant flow multi-split air conditioners and heat pumps,

(3) Water-source heat pumps,

(4) Equipment marketed only for use in computer rooms, data processing rooms, or other information technology cooling applications, and

(5) Equipment only capable of providing ventilation and conditioning of 100-percent outdoor air, or marketed only for ventilation and conditioning of 100-percent outdoor air.

* * * * *

Double-duct air conditioner or heat pump means an air-cooled commercial unitary air conditioner or heat pump that meets the following criteria—

(1) Is either a horizontal single package or split-system unit; or a vertical unit that consists of two components that may be shipped or installed either connected or split; or a vertical single packaged unit that is not intended for exterior mounting on, adjacent interior to, or through an outside wall;

(2) Is intended for indoor installation with ducting of outdoor air from the building exterior to and from the unit (*e.g.,* the unit and/or all of its components are non-weatherized);

(3) If it is a horizontal unit, the complete unit shall have a maximum height of 35 inches or the unit shall have components that do not exceed a maximum height of 35 inches. If it is a vertical unit, the complete (split, connected, or assembled) unit shall have components that do not exceed a maximum depth of 35 inches; and

(4) Has a rated cooling capacity greater than or equal to 65,000 Btu/h and less than 300,000 Btu/h.

* * * * *

Energy efficiency ratio, or *EER* means the ratio of the produced cooling effect of an air conditioner or heat pump to its net work input, expressed in Btu/watt-hour. For commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h), EER is measured per appendix A to this subpart.

Energy efficiency ratio 2, or *EER2* means the ratio of the produced cooling effect of an air conditioner or heat pump to its net work input, expressed in Btu/watt-hour. For commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h), EER2 is measured per appendix A1 to this subpart.

* * * * *

Integrated energy efficiency ratio, or *IEER,* means a weighted average calculation of mechanical cooling EERs determined for four load levels and corresponding rating conditions, expressed in Btu/watt-hour. IEER is measured:

(1) Per appendix A to this subpart for commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h);

(2) Per appendix D1 to this subpart for variable refrigerant flow multi-split air conditioners and heat pumps (other than air-cooled with rated cooling capacity less than 65,000 Btu/h); and

(3) Per appendix G1 to this subpart for single package vertical air conditioners and single package vertical heat pumps.

* * * * *

Integrated ventilation and heating efficiency or *IVHE,* means a sum of the space heating provided (Btu) divided by the sum of the energy consumed (Wh), including mechanical heating, supplementary electric resistance heating, and heating season ventilation operating modes. IVHE with subscript C ($IVHE_C$) refers to the IVHE of heat pumps using a cold-climate heating load line. For air-cooled commercial unitary air conditioners and heat pumps (excluding equipment with a cooling capacity less than 65,000 Btu/h), IVHE and $IVHE_C$ are measured per appendix A1 to this subpart.

Integrated ventilation, economizing, and cooling or *IVEC,* means a sum of the space cooling provided (Btu) divided by the sum of the energy consumed (Wh), including mechanical cooling, economizing, and cooling season ventilation operating modes. For commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h), IVEC is measured per appendix A1 to this subpart.

* * * * *

■ 10. Amend § 431.95 by:

■ a. Revising paragraph (b)(4);

■ b. Redesignating paragraph (b)(10) as paragraph (b)(11);

■ c. Adding new paragraph (b)(10); and

■ d. In paragraph (c)(2), removing the words "appendices A" and adding in its place, the words "appendices A, A1".

The revision and addition reads as follows:

§ 431.95 Materials incorporated by reference.

* * * * *

(b) * * *

(4) AHRI Standard 340/360–2022 (I–P), ("AHRI 340/360–2022"), "2022 Standard for *Performance Rating of Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment*," published in January 2022; IBR approved for appendix A to this subpart.

* * * * *

(10) AHRI Standard 1340(I–P)–202X Draft, ("AHRI 1340–202X Draft"), "202X *Performance Rating of Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment*," [publication expected 2023]; IBR approved for appendix A1 to this subpart.

* * * * *

■ 11. Amend § 431.96 by revising Table 1 to paragraph (b) to read as follows:

§ 431.96 Uniform test method for the measurement of energy efficiency of commercial air conditioners and heat pumps.

* * * * *

(b) * * *

TABLE 1 TO PARAGRAPH (b)—TEST PROCEDURES FOR COMMERCIAL AIR CONDITIONERS AND HEAT PUMPS

Equipment	Category	Cooling capacity	Energy efficiency descriptor	Use tests, conditions, and procedures [1] in	Additional test procedure provisions as indicated in the listed paragraphs of this section
Commercial Unitary Air Conditioners and Heat Pumps.	Air-Cooled AC and HP (excluding double-duct AC and HP).	≥65,000 Btu/h and <760,000 Btu/h.	EER, IEER, and COP	Appendix A [3] to this subpart.	None.
Commercial Unitary Air Conditioners and Heat Pumps.	Air-Cooled AC and HP (excluding double-duct AC and HP).	≥65,000 Btu/h and <760,000 Btu/h.	EER2, COP2, IVEC, and IVHE.	Appendix A1 [3] to this subpart.	None.

TABLE 1 TO PARAGRAPH (b)—TEST PROCEDURES FOR COMMERCIAL AIR CONDITIONERS AND HEAT PUMPS—Continued

Equipment	Category	Cooling capacity	Energy efficiency descriptor	Use tests, conditions, and procedures [1] in	Additional test procedure provisions as indicated in the listed paragraphs of this section
Commercial Unitary Air Conditioners and Heat Pumps.	Double-duct AC and HP	≥65,000 Btu/h and <300,000 Btu/h.	EER, IEER, and COP	Appendix A [3] to this subpart.	None.
Commercial Unitary Air Conditioners and Heat Pumps.	Double-duct AC and HP	≥65,000 Btu/h and <300,000 Btu/h.	EER2, COP2, IVEC, and IVHE.	Appendix A1 [3] to this subpart.	None.
Commercial Unitary Air Conditioners.	Water-Cooled and Evaporatively-Cooled AC.	<760,000 Btu/h	EER and IEER	Appendix A [3] to this subpart.	None.
Commercial Unitary Air Conditioners.	Water-Cooled and Evaporatively-Cooled AC.	<760,000 Btu/h	EER2 and IVEC	Appendix A1 [3] to this subpart.	None.
Water-Source Heat Pumps.	HP	<135,000 Btu/h	EER and COP	ISO Standard 13256–1 (1998).	Paragraph (e).
Packaged Terminal Air Conditioners and Heat Pumps.	AC and HP	<760,000 Btu/h	EER and COP	Paragraph (g) of this section.	Paragraphs (c), (e), and (g).
Computer Room Air Conditioners.	AC	<760,000 Btu/h	SCOP	Appendix E to this subpart [3].	None.
Computer Room Air Conditioners.	AC	<760,000 Btu/h or <930,000 Btu/h [4].	NSenCOP	Appendix E1 to this subpart [3].	None.
Variable Refrigerant Flow Multi-split Systems.	AC	<65,000 Btu/h (3-phase)	SEER	Appendix F to this subpart [3].	None.
Variable Refrigerant Flow Multi-split Systems.	AC	≥65,000 Btu/h and <760,000 Btu/h.	SEER2	Appendix F1 to this subpart [3].	None.
Variable Refrigerant Flow Multi-split Systems, Air-cooled.	HP	<65,000 Btu/h (3-phase)	EER and COP	Appendix F to this subpart [3].	None.
Variable Refrigerant Flow Multi-split Systems, Air-cooled.	HP	≥65,000 Btu/h and <760,000 Btu/h.	IEER and COP	Appendix F1 to this subpart [3].	None.
Variable Refrigerant Flow Multi-split Systems, Water-source.	HP	<760,000 Btu/h	EER and COP	Appendix D to this subpart [3].	None.
Variable Refrigerant Flow Multi-split Systems, Water-source.	HP	<760,000 Btu/h	IEER and COP	Appendix D1 to this subpart [3].	None.
Single Package Vertical Air Conditioners and Single Package Vertical Heat Pumps.	AC and HP	<760,000 Btu/h	EER and COP	Appendix G to this subpart [3].	None.
Single Package Vertical Air Conditioners and Single Package Vertical Heat Pumps.	AC and HP	<760,000 Btu/h	EER, IEER, and COP	Appendix G1 to this subpart [3].	None.
Direct Expansion-Dedicated Outdoor Air Systems.	All	<324 lbs. of moisture removal/hr.	ISMRE2 and ISCOP2	Appendix B to this subpart.	None.

[1] Incorporated by reference; see § 431.95.
[2] Moisture removal capacity applies only to direct expansion-dedicated outdoor air systems.
[3] For equipment with multiple appendices listed in this table, consult the notes at the beginning of those appendices to determine the applicable appendix to use for testing.
[4] For upflow ducted and downflow floor-mounted computer room air conditioners, the test procedure in appendix E1 of this subpart applies to equipment with net sensible cooling capacity less than 930,000 Btu/h. For all other configurations of computer room air conditioners, the test procedure in appendix E1 applies to equipment with net sensible cooling capacity less than 760,000 Btu/h.

* * * * *

■ 12. Amend § 431.97 by:

■ a. Revising paragraphs (a) and (b);

■ b. Redesignating paragraphs (c) through (h) as paragraphs (d) through (i);

■ c. Adding new paragraph (c);

■ d. In newly redesignated paragraph (d), removing the words ''tables 7 to this paragraph (c)'' and adding in their place ''table 6 to this paragraph'', removing the words ''Table 7 of this section'' and adding in their place ''table 6 to this paragraph'', removing the words ''table 8 to this paragraph (c)'' and adding in their place ''table 7 to this paragraph'', redesignating Table 7 to § 431.97(c) as Table 6 to § 431.97(d), and redesignating Table 8 to § 431.97(c) as Table 7 to § 431.97(d);

■ e. In newly redesignated paragraph (e), redesignating Table 9 to § 431.97(d)(1) as Table 8 to § 431.97(e)(1), redesignating Table 10 to § 431.97(d)(2) as Table 9 to § 431.97(e)(2), and redesignating Table 11 to § 431.97(d)(3) as Table 10 to § 431.97(e)(3);

■ f. In newly redesignated paragraph (f), removing the words ''table 12 to this paragraph (e)(1)'' and adding in their place ''table 11 to this paragraph'', redesignating Table 12 to § 431.97(e)(1) as Table 11 to § 431.97(f)(1), removing the words ''tables 13 and 14 to this paragraph (e)(2)'' and adding in their place ''tables 12 and 13 to this paragraph'', redesignating Table 13 to § 431.97(e)(2) as Table 12 to § 431.97(f)(2), and redesignating Table 14 to § 431.97(e)(2) as Table 13 to § 431.97(f)(2);

■ g. In newly redesignated paragraph (g), removing the words ''table 15 to this paragraph (f)(1)'' and adding in their place ''table 14 to this paragraph'', redesignating Table 15 to § 431.97(f)(1) as Table 14 to § 431.97(g)(1), removing the words ''table 16 to this paragraph (f)(2.)'' and adding in their place ''table 15 to this paragraph.'', and redesignating Table 16 to § 431.97(f)(2) as Table 15 to § 431.97(g)(2);

■ h. In newly redesignated paragraph (h), removing the words ''table 17 to this paragraph (g)'' and adding in their place ''table 16 to this paragraph'', and redesignating Table 17 to § 431.97(g) as Table 16 to § 431.97(h); and

■ i. Revising newly redesignated paragraph (i).

The revisions and addition read as follows:

§ 431.97 Energy efficiency standards and their compliance dates.

(a) All basic models of commercial package air-conditioning and heating equipment must be tested for performance using the applicable DOE test procedure in § 431.96, be compliant with the applicable standards set forth in paragraphs (b) through (i) of this section, and be certified to the Department under 10 CFR part 429.

(b) Each commercial unitary air conditioner or heat pump (excluding air-cooled equipment with cooling capacity less than 65,000 Btu/h) manufactured starting on the compliance date listed in the corresponding table must meet the applicable minimum energy efficiency standard level(s) set forth in Tables 1 through 4 of this section.

TABLE 1 TO § 431.97(b)—MINIMUM EFFICIENCY STANDARDS FOR AIR-COOLED COMMERCIAL UNITARY AIR CONDITIONERS AND HEAT PUMPS WITH A COOLING CAPACITY GREATER THAN OR EQUAL TO 65,000 Btu/h (EXCLUDING DOUBLE-DUCT AIR-CONDITIONERS AND HEAT PUMPS)

Cooling capacity	Subcategory	Supplementary heating type	Minimum efficiency [1]	Compliance date: equipment manufactured starting on . . .
Air-Cooled Commercial Unitary Air Conditioners and Heat Pumps with a Cooling Capacity Greater Than or Equal to 65,000 Btu/h (Excluding Double-Duct Air-Conditioners and Heat Pumps)				
≥65,000 Btu/h and <135,000 Btu/h	AC	Electric Resistance Heating or No Heating	IEER = 14.8	January 1, 2023.
≥65,000 Btu/h and <135,000 Btu/h	AC	All Other Types of Heating	IEER = 14.6	January 1, 2023.
≥65,000 Btu/h and <135,000 Btu/h	HP	Electric Resistance Heating or No Heating	IEER = 14.1 COP = 3.4.	January 1, 2023.
≥65,000 Btu/h and <135,000 Btu/h	HP	All Other Types of Heating	IEER = 13.9 COP = 3.4.	January 1, 2023.
≥135,000 Btu/h and <240,000 Btu/h	AC	Electric Resistance Heating or No Heating	IEER = 14.2	January 1, 2023.
≥135,000 Btu/h and <240,000 Btu/h	AC	All Other Types of Heating	IEER = 14.0	January 1, 2023.
≥135,000 Btu/h and <240,000 Btu/h	HP	Electric Resistance Heating or No Heating	IEER = 13.5 COP = 3.3.	January 1, 2023.
≥135,000 Btu/h and <240,000 Btu/h	HP	All Other Types of Heating	IEER = 13.3 COP = 3.3.	January 1, 2023.
≥240,000 Btu/h and <760,000 Btu/h	AC	Electric Resistance Heating or No Heating	IEER = 13.2	January 1, 2023.
≥240,000 Btu/h and <760,000 Btu/h	AC	All Other Types of Heating	IEER = 13.0	January 1, 2023.
≥240,000 Btu/h and <760,000 Btu/h	HP	Electric Resistance Heating or No Heating	IEER = 12.5 COP = 3.2.	January 1, 2023.
≥240,000 Btu/h and <760,000 Btu/h	HP	All Other Types of Heating	IEER = 12.3 COP = 3.2.	January 1, 2023. January 1, 2018.

[1] Per section 3 of Appendix A to this Subpart, COP standards for commercial unitary heat pumps are based on performance at the ''Standard Rating Conditions (High Temperature Steady-State Heating)'' condition specified in Table 6 of AHRI 340/360–2022.

TABLE 2 TO § 431.97(b)—MINIMUM COOLING EFFICIENCY STANDARDS FOR WATER-COOLED COMMERCIAL UNITARY AIR CONDITIONERS

Cooling capacity	Supplementary heating type	Minimum efficiency	Compliance date: equipment manufactured starting on . . .
Water-Cooled Commercial Unitary Air Conditioners			
<65,000 Btu/h	All	EER = 12.1	October 29, 2003.
≥65,000 Btu/h and <135,000 Btu/h	No Heating or Electric Resistance Heating	EER = 12.1	June 1, 2013.
≥65,000 Btu/h and <135,000 Btu/h	All Other Types of Heating	EER = 11.9	June 1, 2013.
≥135,000 Btu/h and <240,000 Btu/h	No Heating or Electric Resistance Heating	EER = 12.5	June 1, 2014.
≥135,000 Btu/h and <240,000 Btu/h	All Other Types of Heating	EER = 12.3	June 1, 2014.
≥240,000 Btu/h and <760,000 Btu/h	No Heating or Electric Resistance Heating	EER = 12.4	June 1, 2014.
≥240,000 Btu/h and <760,000 Btu/h	All Other Types of Heating	EER = 12.2	June 1, 2014.

TABLE 3 TO § 431.97(b)—MINIMUM COOLING EFFICIENCY STANDARDS FOR EVAPORATIVELY-COOLED COMMERCIAL UNITARY AIR CONDITIONERS

Cooling capacity	Supplementary heating type	Minimum efficiency	Compliance date: equipment manufactured starting on . . .
Evaporatively-Cooled Commercial Unitary Air Conditioners			
<65,000 Btu/h	All	EER = 12.1	October 29, 2003.
≥65,000 Btu/h and <135,000 Btu/h	No Heating or Electric Resistance Heating	EER = 12.1	June 1, 2013.
≥65,000 Btu/h and <135,000 Btu/h	All Other Types of Heating	EER = 11.9	June 1, 2013.
≥135,000 Btu/h and <240,000 Btu/h	No Heating or Electric Resistance Heating	EER = 12.0	June 1, 2014.

TABLE 3 TO § 431.97(b)—MINIMUM COOLING EFFICIENCY STANDARDS FOR EVAPORATIVELY-COOLED COMMERCIAL UNITARY AIR CONDITIONERS—Continued

Cooling capacity	Supplementary heating type	Minimum efficiency	Compliance date: equipment manufactured starting on . . .
≥135,000 Btu/h and <240,000 Btu/h	All Other Types of Heating	EER = 11.8	June 1, 2014.
≥240,000 Btu/h and <760,000 Btu/h	No Heating or Electric Resistance Heating	EER = 11.9	June 1, 2014.
≥240,000 Btu/h and <760,000 Btu/h	All Other Types of Heating	EER = 11.7	June 1, 2014.

TABLE 4 TO § 431.97(b)—MINIMUM EFFICIENCY STANDARDS FOR DOUBLE-DUCT AIR-CONDITIONERS AND HEAT PUMPS

Cooling capacity	Subcategory	Supplementary heating type	Minimum efficiency [1]	Compliance date: equipment manufactured starting on . . .
Double-Duct Air-Conditioners and Heat Pumps				
≥65,000 Btu/h and <135,000 Btu/h	AC	Electric Resistance Heating or No Heating	EER = 11.2	January 1, 2010.
≥65,000 Btu/h and <135,000 Btu/h	AC	All Other Types of Heating	EER = 11.0	January 1, 2010.
≥65,000 Btu/h and <135,000 Btu/h	HP	Electric Resistance Heating or No Heating	EER = 11.0 COP = 3.3.	January 1, 2010.
≥65,000 Btu/h and <135,000 Btu/h	HP	All Other Types of Heating	EER = 10.8 COP = 3.3.	January 1, 2010.
≥135,000 Btu/h and <240,000 Btu/h	AC	Electric Resistance Heating or No Heating	EER = 11.0	January 1, 2010.
≥135,000 Btu/h and <240,000 Btu/h	AC	All Other Types of Heating	EER = 10.8	January 1, 2010.
≥135,000 Btu/h and <240,000 Btu/h	HP	Electric Resistance Heating or No Heating	EER = 10.6 COP = 3.2.	January 1, 2010.
≥135,000 Btu/h and <240,000 Btu/h	HP	All Other Types of Heating	EER = 10.4 COP = 3.2.	January 1, 2010.
≥240,000 Btu/h and <300,000 Btu/h	AC	Electric Resistance Heating or No Heating	EER = 10.0	January 1, 2010.
≥240,000 Btu/h and <300,000 Btu/h	AC	All Other Types of Heating	EER = 9.8	January 1, 2010.
≥240,000 Btu/h and <300,000 Btu/h	HP	Electric Resistance Heating or No Heating	EER = 9.5 COP = 3.2.	January 1, 2010.
≥240,000 Btu/h and <300,000 Btu/h	HP	All Other Types of Heating	EER = 9.3 COP = 3.2.	January 1, 2010.

[1] Per section 3 of Appendix A to this Subpart, COP standards for commercial unitary heat pumps are based on performance at the "Standard Rating Conditions (High Temperature Steady-State Heating)" condition specified in Table 6 of AHRI 340/360–2022.

(c) Each water-source heat pump manufactured starting on the compliance date listed in the corresponding table must meet the applicable minimum energy efficiency standard level(s) set forth in Table 5 of this section.

TABLE 5 TO § 431.97(c)—MINIMUM EFFICIENCY STANDARDS FOR WATER-SOURCE HEAT PUMPS (WATER-TO-AIR, WATER-LOOP)

Cooling capacity	Minimum efficiency	Compliance date: equipment manufactured starting on . . .
Water-Source Heat Pumps (Water-to-Air, Water-Loop)		
<17,000 Btu/h	EER = 12.2 COP = 4.3.	October 9, 2015.
≥17,000 Btu/h and <65,000 Btu/h	EER = 13.0 COP = 4.3.	October 9, 2015.
≥65,000 Btu/h and <135,000 Btu/h	EER = 13.0 COP = 4.3.	October 9, 2015.

* * * * *

(i) Each air-cooled, three-phase, commercial unitary air conditioner and heat pump with a cooling capacity of less than 65,000 Btu/h and air-cooled, three-phase variable refrigerant flow multi-split air conditioning and heating equipment with a cooling capacity of less than 65,000 Btu/h manufactured on or after the compliance date listed in the corresponding table must meet the applicable minimum energy efficiency standard level(s) set forth in Tables 17 and 18 of this section.

TABLE 17 TO § 431.97(i)—MINIMUM EFFICIENCY STANDARDS FOR AIR-COOLED, THREE-PHASE, COMMERCIAL UNITARY AIR CONDITIONERS AND HEAT PUMPS WITH A COOLING CAPACITY OF LESS THAN 65,000 BTU/H AND AIR-COOLED, THREE-PHASE, SMALL VARIABLE REFRIGERANT FLOW MULTI-SPLIT AIR CONDITIONING AND HEATING EQUIPMENT WITH A COOLING CAPACITY OF LESS THAN 65,000 BTU/H

Equipment type	Cooling capacity	Subcategory	Minimum efficiency	Compliance date: equipment manufactured starting on . . .
Commercial Unitary Air Conditioners	<65,000 Btu/h	Split-System	13.0 SEER	June 16, 2008.[1]
Commercial Unitary Air Conditioners	<65,000 Btu/h	Single-Package	14.0 SEER	January 1, 2017.[1]
Commercial Unitary Heat Pumps	<65,000 Btu/h	Split-System	14.0 SEER 8.2 HSPF.	January 1, 2017.[1]
Commercial Unitary Heat Pumps	<65,000 Btu/h	Single-Package	14.0 SEER 8.0 HSPF.	January 1, 2017.[1]
VRF Air Conditioners	<65,000 Btu/h		13.0 SEER	June 16, 2008.[1]
VRF Heat Pumps	<65,000 Btu/h		13.0 SEER 7.7 HSPF.	June 16, 2008.[1]

[1] And manufactured before January 1, 2025. For equipment manufactured on or after January 1, 2025, see Table 19 to paragraph (h) of this section for updated efficiency standards.

TABLE 18 TO § 431.97(i)—UPDATED MINIMUM EFFICIENCY STANDARDS FOR AIR-COOLED, THREE-PHASE, COMMERCIAL UNITARY AIR CONDITIONERS AND HEAT PUMPS WITH A COOLING CAPACITY OF LESS THAN 65,000 BTU/H AND AIR-COOLED, THREE-PHASE, SMALL VARIABLE REFRIGERANT FLOW MULTI-SPLIT AIR CONDITIONING AND HEATING EQUIPMENT WITH A COOLING CAPACITY OF LESS THAN 65,000 BTU/H

Equipment type	Cooling capacity	Subcategory	Minimum efficiency	Compliance date: equipment manufactured starting on . . .
Commercial Unitary Air Conditioners	<65,000 Btu/h	Split-System	13.4 SEER2	January 1, 2025.
Commercial Unitary Air Conditioners	<65,000 Btu/h	Single-Package	13.4 SEER2	January 1, 2025.
Commercial Unitary Heat Pumps	<65,000 Btu/h	Split-System	14.3 SEER2 7.5 HSPF2.	January 1, 2025.
Commercial Unitary Heat Pumps	<65,000 Btu/h	Single-Package	13.4 SEER2 6.7 HSPF2.	January 1, 2025.
Space-Constrained Commercial Unitary Air Conditioners	≤30,000 Btu/h	Split-System	12.7 SEER2	January 1, 2025.
Space-Constrained Commercial Unitary Air Conditioners	≤30,000 Btu/h	Single-Package	13.9 SEER2	January 1, 2025.
Space-Constrained Commercial Unitary Heat Pumps	≤30,000 Btu/h	Split-System	13.9 SEER2 7.0 HSPF2.	January 1, 2025.
Space-Constrained Commercial Unitary Heat Pumps	≤30,000 Btu/h	Single-Package	13.9 SEER2 6.7 HSPF2.	January 1, 2025.
Small-Duct, High-Velocity Commercial Unitary Air Conditioners	<65,000 Btu/h	Split-System	13.0 SEER2	January 1, 2025.
Small-Duct, High-Velocity Commercial Unitary Heat Pumps	<65,000 Btu/h	Split-System	14.0 SEER2 6.9 HSPF2.	January 1, 2025.
VRF Air Conditioners	<65,000 Btu/h		13.4 SEER2	January 1, 2025.
VRF Heat Pumps	<65,000 Btu/h		13.4 SEER2 7.5 HSPF2.	January 1, 2025.

■ 13. Appendix A to subpart F of part 431 is revised to read as follows:

Appendix A to Subpart F of Part 431—Uniform Test Method for the Measurement of Energy Consumption of Commercial Unitary Air Conditioners and Heat Pumps (Excluding Air-Cooled Equipment With a Cooling Capacity Less Than 65,000 Btu/h)

Note: Prior to [*Date 360 days after date of publication of the final rule in the* **Federal Register**], representations with respect to the energy use or efficiency of commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h), including compliance certifications, must be based on testing conducted in accordance with:

(a) The applicable provisions (Appendix A for air-cooled equipment, and Table 1 to § 431.96 for water-cooled and evaporatively-cooled equipment) as they appeared in subpart F of this part, in the 10 CFR parts 200 through 499 edition revised as of January 1, 2023; or

(b) This appendix.

Beginning [*Date 360 days after date of publication of the final rule in the* **Federal Register**], and prior to the compliance date of amended standards for commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h) based on integrated ventilation, economizing, and cooling (''IVEC'') and integrated ventilation and heating efficiency (IVHE), representations with respect to energy use or efficiency of commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h), including compliance certifications, must be based on testing conducted in accordance with this appendix.

Beginning on the compliance date of amended standards for commercial unitary air conditioners and heat pumps (excluding equipment with a cooling capacity less than 65,000 Btu/h) based on IVEC and IVHE, representations with respect to energy use or efficiency of commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h), including compliance certifications, must be based on testing conducted in accordance with appendix A1 to this subpart.

Manufacturers may also certify compliance with any amended energy conservation standards for commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h) based on IVEC or IVHE prior to the applicable compliance date for those standards, and those compliance certifications must be based on testing in accordance with appendix A1 to this subpart.

1. Incorporation by Reference

DOE incorporated by reference in § 431.95, the entire standard for AHRI 340/360–2022 and ANSI/ASHRAE 37–2009. However, certain enumerated provisions of AHRI 340/360–2022 and ANSI/ASHRAE 37–2009, as set forth in paragraphs 1.1 and 1.2 of this section 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 340/360–2022:

(a) Section 1 Purpose is inapplicable,
(b) Section 2 Scope is inapplicable,
(c) The following subsections of Section 3 Definitions are inapplicable: 3.2 (Basic Model), 3.4 (Commercial and Industrial Unitary Air-conditioning Equipment), 3.5 (Commercial and Industrial Unitary Heat Pump), 3.7 (Double-duct System), 3.8 (Energy Efficiency Ratio (EER)), 3.12 (Heating Coefficient of Performance (COP_H)), 3.14 (Integrated Energy Efficiency Ratio (IEER)), 3.23 (Published Rating), 3.26 (Single Package Air-Conditioners), 3.27 (Single Package Heat Pumps), 3.29 (Split System Air-conditioners), 3.30 (Split System Heat Pump), 3.36 (Year Round Single Package Air-conditioners),
(d) Section 7 Minimum Data Requirements for Published Ratings is inapplicable,
(e) Section 8 Operating Requirements is inapplicable,
(f) Section 9 Marking and Nameplate Data is inapplicable,
(g) Section 10 Conformance Conditions is inapplicable,
(h) Appendix B References—Informative is inapplicable,
(i) Sections D1 (Purpose), D2 (Configuration Requirements), and D3 (Optional System Features) of Appendix D Unit Configuration For Standard Efficiency Determination—Normative are inapplicable,
(j) Appendix F International Rating Conditions—Normative is inapplicable,
(k) Appendix G Examples of IEER Calculations—Informative is inapplicable,
(l) Appendix H Example of Determination of Fan and Motor Efficiency for Non-standard Integrated Indoor Fan and Motors—Informative is inapplicable, and
(m) Appendix I Double-duct System Efficiency Metrics with Non-Zero Outdoor Air External Static Pressure (ESP)—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.

2. General

Determine the applicable energy efficiency metrics (IEER, EER, and COP) in accordance with the specified sections of AHRI 340/360–2022 and the specified sections of ANSI/ASHRAE 37–2009.

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 by AHRI 340/360–2022, followed by ANSI/ASHRAE 37–2009. 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. Test Conditions

The following conditions specified in Table 6 of AHRI 340/360–2022 apply when testing to certify to the energy conservation standards in § 431.97. For cooling mode tests for equipment subject to standards in terms of EER, test using the ''Standard Rating Conditions Cooling''. For cooling mode tests for equipment subject to standards in terms of IEER, test using the ''Standard Rating Conditions Cooling'' and the ''Standard Rating Part-Load Conditions (IEER)''. For heat pump heating mode tests, test using the ''Standard Rating Conditions (High Temperature Steady State Heating)''.

For equipment subject to standards in terms of EER, representations of IEER made using the ''Standard Rating Part-Load Conditions (IEER)'' in Table 6 of AHRI 340/360–2022 are optional. For equipment subject to standards in terms of IEER, representations of EER made using the ''Standard Rating Conditions Cooling'' in Table 6 of AHRI 340/360–2022 are optional. Representations of COP made using the ''Standard Rating Conditions (Low Temperature Steady State Heating)'' in Table 6 of AHRI 340/360–2022 are optional.

4. Set-Up and Test Provisions for Specific Components

When testing equipment that includes any of the features listed in Table 1, test in accordance with the set-up and test provisions specified in Table 1.

TABLE 1—TEST PROVISIONS FOR SPECIFIC COMPONENTS

Component	Description	Test provisions
Air Economizers	An automatic system that enables a cooling system to supply outdoor air to reduce or eliminate the need for mechanical cooling during mid or cold weather.	For any air economizer that is factory-installed, place the economizer in the 100% return position and close and seal the outside air dampers for testing. For any modular air economizer shipped with the unit but not factory-installed, do not install the economizer for testing.
Barometric Relief Dampers	An assembly with dampers and means to automatically set the damper position in a closed position and one or more open positions to allow venting directly to the outside a portion of the building air that is returning to the unit, rather than allowing it to recirculate to the indoor coil and back to the building.	For any barometric relief dampers that are factory-installed, close and seal the dampers for testing. For any modular barometric relief dampers shipped with the unit but not factory-installed, do not install the dampers for testing.
Desiccant Dehumidification Components.	An assembly that reduces the moisture content of the supply air through moisture transfer with solid or liquid desiccants.	Disable desiccant dehumidification components for testing.
Evaporative Pre-cooling of Air-cooled Condenser Intake Air.	Water is evaporated into the air entering the air-cooled condenser to lower the dry-bulb temperature and thereby increase efficiency of the refrigeration cycle.	Disconnect the unit from a water supply for testing i.e., operate without active evaporative cooling.
Fire/Smoke/Isolation Dampers.	A damper assembly including means to open and close the damper mounted at the supply or return duct opening of the equipment.	For any fire/smoke/isolation dampers that are factory-installed, set the dampers in the fully open position for testing. For any modular fire/smoke/isolation dampers shipped with the unit but not factory-installed, do not install the dampers for testing.
Fresh Air Dampers	An assembly with dampers and means to set the damper position in a closed and one open position to allow air to be drawn into the equipment when the indoor fan is operating.	For any fresh air dampers that are factory-installed, close and seal the dampers for testing. For any modular fresh air dampers shipped with the unit but not factory-installed, do not install the dampers for testing.
Hail Guards	A grille or similar structure mounted to the outside of the unit covering the outdoor coil to protect the coil from hail, flying debris and damage from large objects.	Remove hail guards for testing.
High-Effectiveness Indoor Air Filtration.	Indoor air filters with greater air filtration effectiveness than the filters used for testing.	Test with the standard filter.

TABLE 1—TEST PROVISIONS FOR SPECIFIC COMPONENTS—Continued

Component	Description	Test provisions
Power Correction Capacitors	A capacitor that increases the power factor measured at the line connection to the equipment.	Remove power correction capacitors for testing.
Process Heat recovery/Reclaim Coils/Thermal Storage.	A heat exchanger located inside the unit that conditions the equipment's supply air using energy transferred from an external source using a vapor, gas, or liquid.	Disconnect the heat exchanger from its heat source for testing.
Refrigerant Reheat Coils	A heat exchanger located downstream of the indoor coil that heats the supply air during cooling operation using high pressure refrigerant in order to increase the ratio of moisture removal to cooling capacity provided by the equipment.	De-activate refrigerant reheat coils for testing so as to provide the minimum (none if possible) reheat achievable by the system controls.
Steam/Hydronic Heat Coils ..	Coils used to provide supplemental heating	Test with steam/hydronic heat coils in place but providing no heat.
UV Lights	A lighting fixture and lamp mounted so that it shines light on the indoor coil, that emits ultraviolet light to inhibit growth of organisms on the indoor coil surfaces, the condensate drip pan, and/other locations within the equipment.	Turn off UV lights for testing.
Ventilation Energy Recovery System (VERS).	An assembly that preconditions outdoor air entering the equipment through direct or indirect thermal and/or moisture exchange with the exhaust air, which is defined as the building air being exhausted to the outside from the equipment.	For any VERS that is factory-installed, place the VERS in the 100% return position and close and seal the outside air dampers and exhaust air dampers for testing, and do not energize any VERS subcomponents (*e.g.,* energy recovery wheel motors). For any VERS module shipped with the unit but not factory-installed, do not install the VERS for testing.

■ 14. Add appendix A1 to subpart F of part 431 to read as follows:

Appendix A1 to Subpart F of Part 431—Uniform Test Method for the Measurement of Energy Consumption of Commercial Unitary Air Conditioners and Heat Pumps (Excluding Air-Cooled Equipment With a Cooling Capacity Less Than 65,000 Btu/h)

Note: Prior to [*Date 360 days after date of publication of the final rule in the* **Federal Register**] representations with respect to the energy use or efficiency of commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h), including compliance certifications, must be based on testing conducted in accordance with:

(a) The applicable provisions (Appendix A for air-cooled equipment, and Table 1 to § 431.96 for water-cooled and evaporatively-cooled equipment) as it appeared in subpart F of this part, in the 10 CFR parts 200 through 499 edition revised as of January 1, 2023; or

(b) Appendix A to this subpart.

Beginning [*Date* 360 *days after date of publication of the final rule in the* **Federal Register**], and prior to the compliance date of amended standards for commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h) based on integrated ventilation, economizing, and cooling (IVEC)) and integrated ventilation and heating efficiency (IVHE), representations with respect to energy use or efficiency of commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h), including compliance certifications, must be based on testing conducted in accordance with appendix A to this subpart.

Beginning on the compliance date of amended standards for commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h) based on IVEC and IVHE, representations with respect to energy use or efficiency of commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h), 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 commercial unitary air conditioners and heat pumps (excluding air-cooled equipment with a cooling capacity less than 65,000 Btu/h) based on IVEC or IVHE 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

DOE incorporated by reference in § 431.95, the entire standard for AHRI 1340–202X Draft and ANSI/ASHRAE 37–2009. However, certain enumerated provisions of AHRI 1340–202X Draft and ANSI/ASHRAE 37–2009, as listed in this section 1 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 1340–202X Draft:

(a) Section 1 Purpose is inapplicable,

(b) Section 2 Scope is inapplicable,

(c) The following subsections of section 3 Definitions: 3.3 (Basic Model), 3.5 (Commercial and Industrial Unitary Air-conditioning Equipment), 3.6 (Commercial and Industrial Unitary Heat Pump), 3.12 (Double-duct System), 3.14.3 (Standard Energy Efficiency Ratio), 3.18 (Heating Coefficient of Performance 2), 3.21 (Integrated Ventilation, Economizing, and Cooling Efficiency), 3.22 (Integrated Ventilation and Heating Efficiency), 3.29 (Published Rating), 3.32 (Single Package Air-Conditioners), 3.33 (Single Package Heat Pumps), 3.34 (Split System Air-conditioners), 3.35 (Split System Heat Pump), 3.41 (Year Round Single Package Air-conditioners) are inapplicable,

(d) The following subsections of section 6 Rating Requirements are inapplicable: 6.4 (Rating Values), 6.5 (Uncertainty), and 6.6 (Verification Testing),

(e) Section 7 Minimum Data Requirements for Published Ratings is inapplicable

(f) Section 8 Operating Requirements is inapplicable,

(g) Section 9 Marking and Nameplate Data is inapplicable,

(h) Section 10 Conformance Conditions is inapplicable,

(i) Appendix B References—Informative is inapplicable, and

(j) Sections D1 (Purpose), D2 (Configuration Requirements), and D3 (Optional System Features) of Appendix D Unit Configuration For Standard Efficiency Determination—Normative are 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.

2. General

For air conditioners and heat pumps, determine IVEC and IVHE (as applicable). Representations of energy efficiency ratio 2 (EER2) and $IVHE_C$ may optionally be made. Representations of coefficient of performance 2 (COP2) at 5 °F, 17 °F, and 47 °F may optionally be made.

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 by AHRI 1340–202X Draft, followed by ANSI/ASHRAE 37–2009. 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. Test Conditions

The following conditions specified in AHRI 1340–202X Draft apply when testing to certify to the energy conservation standards in § 431.97. For cooling mode, use the rating conditions in Table 7 of AHRI 1340–202X Draft. For heat pump heating mode tests, use the rating conditions in Table 26 of AHRI 1340–202X Draft and the IVHE U.S. Average building load profile in Table 25 of AHRI 1340–202X Draft.

Representations of EER2 made using the ''Cooling Bin A'' conditions in Table 7 of AHRI 1340–202X Draft are optional. Representations of $IVHE_C$ made using the $IVHE_C$ Cold Average building load profile in Table 25 of AHRI 1340–202X Draft are optional. Representations of $COP2_{47}$ made using the H47H test, $COP2_{17}$ made using the H17H test, and $COP2_5$ made using the H5H test in Table 26 of AHRI 1340–202X Draft are optional.

4. Set-Up and Test Provisions for Specific Components

When testing equipment that includes any of the features listed in Table 1 of this appendix, test in accordance with the set-up and test provisions specified in Table 1 of this appendix.

TABLE 1—TEST PROVISIONS FOR SPECIFIC COMPONENTS

Component	Description	Test provisions
Air Economizers	An automatic system that enables a cooling system to supply outdoor air to reduce or eliminate the need for mechanical cooling during mid or cold weather.	For any air economizer that is factory-installed, place the economizer in the 100% return position and close and seal the outside air dampers for testing. For any modular air economizer shipped with the unit but not factory-installed, do not install the economizer for testing.
Barometric Relief Dampers	An assembly with dampers and means to automatically set the damper position in a closed position and one or more open positions to allow venting directly to the outside a portion of the building air that is returning to the unit, rather than allowing it to recirculate to the indoor coil and back to the building.	For any barometric relief dampers that are factory-installed, close and seal the dampers for testing. For any modular barometric relief dampers shipped with the unit but not factory-installed, do not install the dampers for testing.
Desiccant Dehumidification Components.	An assembly that reduces the moisture content of the supply air through moisture transfer with solid or liquid desiccants.	Disable desiccant dehumidification components for testing.
Evaporative Pre-cooling of Air-cooled Condenser Intake Air.	Water is evaporated into the air entering the air-cooled condenser to lower the dry-bulb temperature and thereby increase efficiency of the refrigeration cycle.	Disconnect the unit from a water supply for testing *i.e.,* operate without active evaporative cooling.
Fire/Smoke/Isolation Dampers.	A damper assembly including means to open and close the damper mounted at the supply or return duct opening of the equipment.	For any fire/smoke/isolation dampers that are factory-installed, set the dampers in the fully open position for testing. For any modular fire/smoke/isolation dampers shipped with the unit but not factory-installed, do not install the dampers for testing.
Fresh Air Dampers	An assembly with dampers and means to set the damper position in a closed and one open position to allow air to be drawn into the equipment when the indoor fan is operating.	For any fresh air dampers that are factory-installed, close and seal the dampers for testing. For any modular fresh air dampers shipped with the unit but not factory-installed, do not install the dampers for testing.
Hail Guards	A grille or similar structure mounted to the outside of the unit covering the outdoor coil to protect the coil from hail, flying debris and damage from large objects.	Remove hail guards for testing.
High-Effectiveness Indoor Air Filtration.	Indoor air filters with greater air filtration effectiveness than the filters used for testing.	Test with the standard filter.
Power Correction Capacitors	A capacitor that increases the power factor measured at the line connection to the equipment.	Remove power correction capacitors for testing.
Process Heat recovery/Reclaim Coils/Thermal Storage.	A heat exchanger located inside the unit that conditions the equipment's supply air using energy transferred from an external source using a vapor, gas, or liquid.	Disconnect the heat exchanger from its heat source for testing.
Refrigerant Reheat Coils	A heat exchanger located downstream of the indoor coil that heats the supply air during cooling operation using high pressure refrigerant in order to increase the ratio of moisture removal to cooling capacity provided by the equipment.	De-activate refrigerant reheat coils for testing so as to provide the minimum (none if possible) reheat achievable by the system controls.
Steam/Hydronic Heat Coils	Coils used to provide supplemental heating	Test with steam/hydronic heat coils in place but providing no heat.
UV Lights	A lighting fixture and lamp mounted so that it shines light on the indoor coil, that emits ultraviolet light to inhibit growth of organisms on the indoor coil surfaces, the condensate drip pan, and/other locations within the equipment.	Turn off UV lights for testing.

TABLE 1—TEST PROVISIONS FOR SPECIFIC COMPONENTS—Continued

Component	Description	Test provisions
Ventilation Energy Recovery System (VERS).	An assembly that preconditions outdoor air entering the equipment through direct or indirect thermal and/or moisture exchange with the exhaust air, which is defined as the building air being exhausted to the outside from the equipment.	For any VERS that is factory-installed, place the VERS in the 100% return position and close and seal the outside air dampers and exhaust air dampers for testing, and do not energize any VERS subcomponents (*e.g.,* energy recovery wheel motors). For any VERS module shipped with the unit but not factory-installed, do not install the VERS for testing.

5. Test Provisions for Coil-Only Systems

5.1. When testing coil-only systems, follow the applicable provisions in sections 5.17.4, 5.18.4, 6.2.4.2, and 6.3.6 of the AHRI 1340–202X Draft, as modified by the following instructions.

5.2. For tests using the full-load cooling airflow, use the applicable airflow capacity adjustment and fan power adjustment specified for full-load tests in Table 8 of AHRI 1340–202X Draft.

5.3. For tests with a manufacturer-specified airflow that is lower than the full-load cooling airflow, set airflow using a target airflow rate that is the higher of: (1) the manufacturer-specified airflow for the test; or (2) 67 percent of the airflow measured for the full-load cooling test. Calculate the capacity adjustment and fan power adjustment using the following equations.

$$DFPC_{adj} = DFPC_{PL} + \frac{(DFPC_{FL} - DFPC_{PL}) * (\%FL\ Airflow - 67\%)}{100\% - 67\%}$$

$$DCA_{adj} = DCA_{PL} + \frac{(DCA_{FL} - DCA_{PL}) * (\%FL\ Airflow - 67\%)}{100\% - 67\%}$$

Where:

$DFPC_{adj}$ = adjusted default fan power coefficient for test using airflow lower than full-load cooling airflow

$DFPC_{FL}$ = default fan power coefficient specified for full-load tests in Table 8 of the AHRI 1340–202X Draft

$DFPC_{PL}$ = default fan power coefficient specified for part-load tests in Table 8 of the AHRI 1340–202X Draft

%FL Airflow = airflow measured for the test divided by the measured airflow for the full-load cooling test

DCA_{adj} = adjusted default capacity adjustment for test using airflow lower than full-load cooling airflow

DCA_{FL} = default capacity adjustment specified for full-load tests in Table 8 of the AHRI 1340–202X DraftDCA_{PL} = default capacity adjustment specified for part-load tests in Table 8 of the AHRI 1340–202X Draft

Appendix F to Subpart F of Part 431 [Amended]

■ 15. Amend appendix F to subpart F of part 431 by:

■ a. In the appendix heading, removing the words ''Small Commercial Package Air Conditioning and Heating Equipment'', and adding in their place, the words ''Commercial Unitary Air Conditioners and Heat Pumps''; and

■ b. In the appendix note, and paragraph 2.1, by removing the words ''small commercial package air conditioning and heating equipment'', and adding in their place, the words ''commercial unitary air conditioners and heat pumps''.

Appendix F1 to Subpart F of Part 431 [Amended]

■ 16. Amend appendix F1 to subpart F of part 431 by:

■ a. In the appendix heading by removing the words ''Small Commercial Package Air Conditioning and Heating Equipment'', and adding in their place, the words ''Commercial Unitary Air Conditioners and Heat Pumps''; and

■ b. In the appendix note by removing the words ''small commercial package air conditioning and heating equipment'', and adding in their place, the words ''commercial unitary air conditioners and heat pumps''.

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