

**DEPARTMENT OF ENERGY****10 CFR Parts 429 and 431**

[EERE-2017-BT-TP-0020]

RIN 1904-AD94

**Energy Conservation Program: Test Procedure for Single Package Vertical Air Conditioners and Single Package Vertical 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 its test procedures for single package vertical air conditioners and single package vertical heat pumps. DOE is proposing to incorporate by reference the most recent version of the relevant industry test standard, AHRI 390–2021, and to amend certain provisions for representations for the subject equipment. DOE is also proposing definitions for “single-phase single package vertical air conditioners with cooling capacity less than 65,000 Btu/h” and for “single-phase single package vertical heat pumps with cooling capacity less than 65,000 Btu/h.” The proposed definitions would explicitly define this equipment as subsets of the broader single package vertical air conditioner and single package vertical heat pump equipment categories, and further distinguish such equipment from certain residential central air conditioners and heat pumps. DOE seeks comment from interested parties on this proposal.

**DATES:**

*Comments:* DOE will accept comments, data, and information regarding this proposal no later than March 15, 2022. See section V, “Public Participation,” for details.

*Meeting:* DOE will hold a webinar on Wednesday, February 9th, 2022, from 1:00 p.m. to 3:00 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](http://www.regulations.gov). Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE-2017-BT-TP-0020, by any of the following methods:

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

2. *Email:* To [SPVACandHeatPumps2017TP0020@ee.doe.gov](mailto:SPVACandHeatPumps2017TP0020@ee.doe.gov). Include docket number EERE-2017-BT-TP-0020 in the subject line of the message.

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

Although DOE has routinely accepted public comment submissions through a variety of mechanisms, including postal mail and hand delivery/courier, the Department has found it necessary to make temporary modifications to the comment submission process in light of the ongoing COVID-19 pandemic. DOE is currently suspending receipt of public comments via postal mail and hand delivery/courier. If a commenter finds that this change poses an undue hardship, please contact Appliance Standards Program staff at (202) 586-1445 to discuss the need for alternative arrangements. Once the COVID-19 pandemic health emergency is resolved, DOE anticipates resuming all of its regular options for public comment submission, including postal mail and hand delivery/courier.

*Docket:* The docket, which includes **Federal Register** notices, public meeting/webinar attendee lists and transcripts, comments, and other supporting documents/materials, is available for review at [www.regulations.gov](http://www.regulations.gov). All documents in the docket are listed in the [www.regulations.gov](http://www.regulations.gov) index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available. The docket web page can be found at [www.regulations.gov/docket?D=EERE-2017-BT-TP-0020](http://www.regulations.gov/docket?D=EERE-2017-BT-TP-0020). 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](http://www.regulations.gov).

**FOR FURTHER INFORMATION CONTACT:**

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

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

AHRI Standard 390–2021 “Performance Rating of Single Package Vertical Air-Conditioners and Heat Pumps,” dated 2021.

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 Standard 41.2–1987 (RA 92), “Standard Methods For Laboratory Airflow Measurement,” ASHRAE approved October 1, 1987.

Copies of AHRI Standard 390–2021 can be obtained from the Air-conditioning, Heating, and Refrigeration Institute (AHRI), 2311 Wilson Blvd., Suite 400, Arlington, VA 22201, (703) 524-8800, or by going to [www.ahrinet.org/search-standards.aspx](http://www.ahrinet.org/search-standards.aspx).

Copies of ANSI/ASHRAE Standard 37–2009 and ANSI/ASHRAE Standard 41.2–1987 (RA 92) can be obtained from the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), 180 Technology Parkway NW, Peachtree Corners, GA 30092, (404) 636-8400, or by going to <https://www.ashrae.org/>.

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

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## I. Authority and Background

Single package vertical air conditioners (“SPVACs”) and single package vertical heat pumps (“SPVHPs”), collectively referred to as single package vertical units (“SPVUs”), are a category of small, large, and very large commercial package air conditioning and heating equipment. Accordingly, SPVUs 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)) DOE’s energy conservation standards and test procedures for SPVUs are currently prescribed at title 10 of the Code of Federal Regulations (“CFR”) section 97 to subpart F of part 431 and section 96 to subpart F of part 431, respectively. The following sections discuss DOE’s authority to establish test procedures for SPVUs and relevant background information regarding DOE’s consideration of test procedures for SPVUs.

### A. Authority

The Energy Policy and Conservation Act, as amended (“EPCA”),<sup>1</sup> 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<sup>2</sup> of EPCA, added by Public Law 95–619, Title IV, section 441(a), established the Energy Conservation Program for Certain Industrial Equipment, which sets forth a variety of provisions designed to improve energy efficiency. This equipment includes small, large, and very large commercial package air conditioning and heating equipment, including SPVUs. (42 U.S.C. 6311(1)(B)–(D))

The energy conservation program under EPCA consists essentially of four parts: (1) Testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42 U.S.C. 6291; 42 U.S.C. 6311), test procedures (42 U.S.C. 6293; 42 U.S.C. 6314), labeling provisions (42 U.S.C. 6294; 42 U.S.C. 6315), energy conservation standards (42 U.S.C. 6295; 42 U.S.C. 6313), and the authority to require information and reports from manufacturers. (42 U.S.C. 6296; 42 U.S.C. 6316)

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)). DOE also 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 for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA. (42 U.S.C. 6297(d); 42 U.S.C. 6316(b)(2)(D))

Under 42 U.S.C. 6314, EPCA sets forth the criteria and procedures DOE must

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

As discussed earlier in this document, SPVUs are a category of 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 the Air-Conditioning, Heating, and Refrigeration Institute (“AHRI”) or by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (“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 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 7 years, DOE must evaluate the test procedures for each type of covered equipment, including SPVUs, 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)(A))

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

<sup>1</sup> 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).

<sup>2</sup> For editorial reasons, upon codification in the U.S. Code, Part C was redesignated Part A–1.

DOE is publishing this NOPR in satisfaction of its obligations under EPCA. (42 U.S.C. 6314(a)(4)(B); 42 U.S.C. 6314(a)(1)(A))

**B. Background**

DOE’s existing test procedures for SPVUs are set forth at 10 CFR 431.96. The Federal test procedure currently incorporates ANSI/AHRI Standard 390–2003 (“ANSI/AHRI 390–2003”), “Performance Rating of Single Package Vertical Air-Conditioners and Heat Pumps,” (omitting section 6.4), and it also includes additional provisions in paragraphs (c) and (e) of 10 CFR 431.96 that provide for an optional break-in period and additional provisions for equipment set-up, respectively. DOE established its test procedure for SPVUs

in a final rule for commercial heating, air conditioning, and water heating equipment published in the **Federal Register** on May 16, 2012. 77 FR 28928, 28932. ANSI/AHRI 390–2003 was the SPVU test standard referenced in the edition of ASHRAE Standard 90.1 current at that time.

On July 20, 2018, DOE published a request for information (“RFI”) in the **Federal Register** to collect information and data to consider amendments to DOE’s test procedures for SPVUs. 83 FR 34499 (“July 2018 RFI”). As part of the July 2018 RFI, DOE identified and requested comment on several issues associated with the currently applicable Federal test procedures, in particular concerning incorporation by reference of the most recent version of the

relevant industry standard; efficiency metrics and calculations; and clarification of test methods. *Id.* at 83 FR 3449. DOE also sought 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 test procedures’ accuracy. *Id.*

DOE received a number of comments from interested parties in response to the July 2018 RFI. Table I–1 lists each commenter and the abbreviation for each used in this document. DOE considered these comments in the preparation of this NOPR. Discussion of the relevant comments, as well as DOE’s responses, are provided in the appropriate sections of this document.

TABLE I–1—INTERESTED PARTIES PROVIDING COMMENT ON THE JULY 2018 RFI

Commenter(s)	Abbreviation	Commenter type
Air-Conditioning, Heating, and Refrigeration Institute .....	AHRI .....	IR.
Appliance Standards Awareness Project, Natural Resources Defense Council, American Council for an Energy-Efficient Economy.	ASAP, NRDC, and ACEEE.	EA.
GE Appliances, a Haier Company .....	GE .....	M.
Lennox International Inc .....	Lennox .....	M.
Northwest Energy Efficiency Alliance, and Northwest Power and Conservation Council .....	NEEA and NWPCC .....	EA and Interstate Compact Agency.
Pacific Gas and Electric Company (PG&E), San Diego Gas and Electric (SDG&E), and Southern California Edison (SCE); collectively the California Investor-Owned Utilities.	CA IOUs .....	U.

EA: Efficiency/Environmental Advocate; IR: Industry Representative; M: Manufacturer; U: Utility.

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.<sup>3</sup>

On June 24, 2021, AHRI published updates to its test procedure for SPVUs as AHRI Standard 390–2021, “Performance Rating of Single Package Vertical Air-Conditioners and Heat Pumps” (“AHRI 390–2021”). Among other things, AHRI 390–2021 maintains the existing efficiency metrics—energy efficiency ratio (“EER”) for cooling mode and coefficient of performance (“COP”) for heating mode—but it also added a seasonal metric that includes part-load cooling performance—the integrated energy efficiency ratio (“IEER”) metric. AHRI 390–2021 also includes additional specifications regarding the test methods and conditions.

**II. Synopsis of the Notice of Proposed Rulemaking**

In this NOPR, DOE is proposing to amend the test procedures for SPVUs to incorporate by reference AHRI 390–2021. DOE proposes to add a new appendix G, “Uniform test method for measuring the energy consumption of

single package vertical air conditioners and single package vertical heat pumps,” (“appendix G”) that would include the relevant test procedure requirements for SPVUs for measuring the existing efficiency metrics: (1) EER for cooling mode and (2) COP for heating mode. DOE is also proposing add a new appendix G1 that would include the relevant test procedure requirements for SPVUs for measuring with updated efficiency metrics: (1) IEER for cooling mode and (2) COP for heating mode. Appendix G1 would provide the test procedure for representations based on IEER and would be mandatory only at such time as compliance is required with amended energy conservation standards based on IEER, should DOE adopt standards using such metrics.

Additionally, DOE is proposing to define “single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h” and “single-phase single package vertical heat pump with cooling capacity less than 65,000 Btu/h” as subsets of the broader SPVAC and SPVHP equipment category, in order to clarify what kind

of single-phase equipment with cooling capacity less than 65,000 Btu/h was contemplated in the broader definitions of SPVAC and SPVHP established by Congress. Single-phase equipment meeting these definitions would be subject to the applicable commercial equipment energy conservation standards for SPVACs and SPVHPs, while single-phase products not meeting these definitions would properly be classified as CAC and subject to the applicable consumer products energy conservation standards.

DOE is proposing to establish appendices for the relevant test procedures for SPVUs to better differentiate the specific testing requirements. Currently, the test requirements for all types of commercial air conditioners and heat pumps, including SPVUs, are codified at 10 CFR 431.96. In conjunction, DOE proposes to amend Table 1 to 10 CFR 431.96 to identify the newly added Appendices G and G1 as the applicable test procedures for testing SPVUs.

DOE’s proposed actions are summarized in Table II–1 and addressed in detail in section III of this document.

<sup>3</sup> The parenthetical reference provides a reference for information located in the docket of DOE’s rulemaking to amend the test procedures for SPVUs

(Docket No. EERE–2017–BT–TP–0020, which is maintained at [www.regulations.gov/#/docketDetail;D=EERE-2017-BT-TP-0020](http://www.regulations.gov/#/docketDetail;D=EERE-2017-BT-TP-0020)). The

references are arranged as follows: (Commenter name, comment docket ID number, page of that document).

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

Current DOE TP	Proposed TP	Attribution
Incorporates by reference ANSI/AHRI 390–2003 (excluding section 6.4).	Incorporates by reference AHRI 390–2021, which includes the following changes ..... <ul style="list-style-type: none"> <li>—Includes a new energy efficiency descriptor, IEER, which incorporates part-load performance.</li> <li>—Provides direction and accompanying definitions for determining whether a unit is tested as a ducted or non-ducted unit.</li> <li>—Directs that the outdoor air-side attachments used for testing must be specified by the manufacturer in the supplemental testing instructions.</li> <li>—Includes refrigerant charging instructions for cases where they are not provided by the manufacturer.</li> <li>—Specifies tolerances for achieving the rated airflow and/or minimum external static pressure (“ESP”) during testing and specifies how to set indoor airflow if airflow and ESP tolerances cannot be simultaneously met.</li> <li>—Incorporates specifications for measuring outdoor air conditions.</li> <li>—Requires data be recorded at equal intervals of 5 minutes or less over a 30-minute measurement period.</li> <li>—Clarifies that test results for outdoor air enthalpy method are based on results without test apparatus connected.</li> <li>—Defines the term “manufacturer’s installation instructions” and includes hierarchy of precedence if multiple instructions are included.</li> </ul>	Adopt industry test procedure.
Only includes definitions for the equipment categories: “Single Package Vertical Air Conditioner” and “Single Package Vertical Heat Pump”.	Includes additional definitions: “single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h” and “single-phase single package vertical heat pump with cooling capacity less than 65,000 Btu/h”.	Explicitly delineate SPVUs from other covered products.
Does not include provisions for certain components.	Includes provisions for testing when certain components are present .....	Establish provisions for testing with certain components.

DOE has tentatively determined that the proposed amendments would not be unduly burdensome. Furthermore, DOE has tentatively determined that the proposed amendments described in section III of this NOPR would not alter the measured efficiency of SPVUs or require retesting solely as a result of DOE’s adoption of the proposed amendments to the test procedure, if made final. Use of the updated industry test procedure provisions as proposed in Appendix G1 and the related proposed amendments to representation requirements in 10 CFR 429.43 would not be required until the compliance date of any amended standards denominated in terms of IEER. Additionally, DOE has tentatively determined that the proposed amendments, if made final, would not increase the cost of testing. Discussion of DOE’s proposed actions are addressed in detail in section III of this NOPR.

**III. Discussion**

*A. Scope of Applicability*

EPCA, as amended by the Energy Independence and Security Act of 2007 (“EISA 2007”), Public Law 110–140 (Dec. 19, 2007), defines “single package vertical air conditioner” and “single package vertical heat pump” at 42 U.S.C. 6311(22) and (23), respectively. In particular, these units can be single- or three-phase; must have major components arranged vertically; must be an encased combination of components; and must be intended for exterior mounting on, adjacent interior to, or through an outside wall. DOE codified

the statutory definitions into its regulations at 10 CFR 431.92. Additionally, EPCA established initial equipment classes for SPVUs with a capacity less than 65,000 Btu/h based on phase. (42 U.S.C. 6313(a)(10)(A)(i)–(ii) and (v)–(vi))

DOE currently defines an SPVAC as air-cooled commercial package air conditioning and heating equipment that: (1) Is factory-assembled as a single package that: (i) Has major components that are arranged vertically; (ii) is an encased combination of cooling and optional heating components; and (iii) is intended for exterior mounting on, adjacent interior to, or through an outside wall; (2) is powered by a single- or 3-phase current; (3) may contain 1 or more separate indoor grilles, outdoor louvers, various ventilation options, indoor free air discharges, ductwork, well plenum, or sleeves; and (4) has heating components that may include electrical resistance, steam, hot water, or gas, but may not include reverse cycle refrigeration as a heating means. 10 CFR 431.92. Additionally, DOE defines an SPVHP as a single package vertical air conditioner that: (1) Uses reverse cycle refrigeration as its primary heat source; and (2) may include secondary supplemental heating by means of electrical resistance, steam, hot water, or gas. *Id.* The Federal test procedures are applicable to SPVUs with a cooling capacity less than 760,000 Btu/h. (42 U.S.C. 6311(8)(D))

DOE is proposing to add specific definitions for “single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h”

and “single-phase single package vertical heat pump with cooling capacity less than 65,000 Btu/h” to explicitly delineate such equipment from certain covered consumer products, such as central air conditioners, based on design characteristics. On April 24, 2020, DOE published in the **Federal Register** a request for information (“RFI”) with regards to SPVU energy conservation standards (85 FR 22958). In response to this RFI, Lennox commented that misunderstanding the distinction between CACs and SPVUs remains an outstanding issue on which DOE should take action. (Docket No. EERE–2019–BT–STD–0033–0008 at pp. 1–2))

EPCA defines a “central air conditioner” as a product, other than a packaged terminal air conditioner,<sup>4</sup> which is powered by single-phase electric current, air-cooled, rated below 65,000 Btu per hour, is not contained within the same cabinet as a furnace with a rated capacity above 225,000 Btu per hour, and is a heat pump or a cooling only unit. (42 U.S.C. 6291(21)) DOE has incorporated this definition in 10 CFR 430.2.

Reading the two definitions of SPVUs and CACs in isolation, certain single-phase air conditioners and heat pumps with cooling capacity less than 65,000

<sup>4</sup> “Packaged terminal air conditioner” is defined in 10 CFR 430.92 as a wall sleeve and a separate un-encased combination of heating and cooling assemblies specified by the builder and intended for mounting through the wall, and that is industrial equipment. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability by builder’s choice of hot water, steam, or electricity.

Btu/h and with their components arranged vertically could be understood to be SPVUs, as opposed to CACs. DOE has previously explained that the definitions of SPVUs and CACs must be read in the context of DOE's authority to regulate certain consumer products (*i.e.*, covered products) and certain industrial equipment (*i.e.*, covered equipment). 79 FR 78614, 78625 (April 11, 2014). Industrial equipment under EPCA generally excludes "covered products." (42 U.S.C. 6311(2)(A)(iii)) "Covered products" are certain consumer products explicitly set forth in the statute, as well as consumer products which have been classified as a covered product under 42 U.S.C. 6292(b). EPCA defines "consumer product," in part, as an article which, to any significant extent, is distributed in commerce for personal use or consumption by individuals. (42 U.S.C. 6291(1)(B)) CACs are covered products. A product can only be classified as an SPVU, and, therefore, industrial equipment under EPCA, if it does not meet the definition of any covered product, including CACs. 79 FR 78614, 78625 (April 11, 2014).

To clarify the distinction between SPVUs as industrial equipment and CACs as covered consumer products, DOE proposes to define in 10 CFR 431.92 "single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h" and "single-phase single package vertical heat pump with cooling capacity less than 65,000 Btu/h." The current definitions of SPVAC and SPVHP at 10 CFR 431.92 allow for both wall-mounted and floor-mounted units, and either may use single-phase or three-phase power. DOE proposes to include certain characteristics as part of these definitions that will evidence that these equipment would likely not be distributed to any significant extent in commerce for personal use or consumption by individuals. These characteristics would distinguish SPVU equipment from CACs, which are consumer products.

DOE has identified specific technical features that differentiate floor-mounted, single-phase units intended only for commercial applications (*i.e.*, meaning they are SPVUs) from ones intended for consumer applications, such as multi-family type floor-mounted, single-phase units (*i.e.*, meaning they are CACs). DOE has preliminarily determined that, in order to meet commercial building ventilation requirements<sup>5</sup> (an indication that a unit

is industrial equipment and not a consumer product), floor-mounted, single-phase units on the market have the ability for outdoor air intake. This is evidenced by the existence of outdoor air intake dampers and associated controls. These ventilation air provisions make the unit capable of drawing in and conditioning outdoor air for delivery to the conditioned space (with or without first mixing the outdoor air with return air). Technical specifications for these floor-mounted, single-phase units detail both the incremental and maximum outdoor air flow rates available to meet the specific indoor air quality needs of building occupants. Of the maximum outdoor air flow rates that DOE identified for each unit on the market, the unit with the lowest maximum outdoor air flow rate identified was capable of providing a maximum of 400 cubic feet per minute ("CFM") of outdoor air, with the same drive kit and motor settings used to determine the certified efficiency rating of the equipment (as required for submittal to DOE by 10 CFR 429.43(b)(4)(xi)).

Conversely, DOE preliminarily has found that the multi-family type floor-mounted, single-phase units that are consumer products because they are distributed in commerce for personal use or consumption by individuals (*i.e.*, CACs) have little to no ability to provide outdoor air to the conditioned space. Based on DOE's review of manufacturer literature, for those consumer products that do provide outdoor air, none could provide more than 120 CFM of outdoor air to the conditioned space. Building ventilation codes may require specific levels of outdoor air flow for multi-family type structures, but the outdoor ventilation airflow requirements for such living spaces are substantially lower than those for the spaces generally served by the market for floor-

spaces, including educational spaces, which are the primary market for floor-mounted, single-phase SPVUs. Specifically, for standard classrooms occupied with persons between the ages of 5 and 8, 10 CFM of outdoor air flow per person is required at a default occupancy of 25 individuals per 1,000 square feet. This translates to a requirement of 250 CFM per 1,000 square feet under default occupancy. For standard classrooms occupied by persons 9 years and older, 10 CFM of outdoor air per person is required at a default occupancy of 35 individuals per 1,000 square feet. This translates to a requirement of 350 CFM per 1,000 square feet under default occupancy. For specialty classrooms (lecture rooms, art, science, college laboratories, wood/metal shops, computer labs, media centers, music/theater/dance), specific outdoor air requirements range from 250 CFM to 350 CFM per 1,000 square feet under default occupancy. (For further details, see ANSI/ASHRAE Standard 62.1–2019, Table 6–1.)

mounted, single-phase SPVUs.<sup>6</sup> Thus, DOE initially has determined that, at the present time and in most cases, these outdoor ventilation airflow requirements are adequately met using ventilation techniques other than the outdoor air provisions incorporated in single-package units.<sup>7</sup> In addition, DOE notes that in other applications in areas where ventilation standards exist specifically for residences, the required outdoor air flow levels for these structures are similar to those for multi-family type structures.<sup>8</sup>

Based on the discussion in the prior paragraphs, DOE has preliminarily determined that a key physical characteristic demonstrating that floor-mounted, single-phase SPVUs are not "of a type" distributed in commerce for personal use or consumption by individuals is the ability to provide outdoor air sufficient for commercial applications. Equipment with the ability to provide 400 CFM or greater of outdoor air, which significantly exceeds the outdoor air requirements for residences and multi-family applications, would likely not be distributed to any significant extent in commerce for personal use or consumption by individuals and, therefore, is not a consumer product. (See 42 U.S.C. 6291(1))

DOE's review of the market for wall-mounted configurations did not find that there was a threshold capability of providing outdoor air to distinguish between wall-mounted, single-phase units for use in commercial applications

<sup>6</sup> For the multi-family applications of hotels, motels, resorts, and dormitories, ASHRAE Standard 62.1–2019 requires outdoor air flow rates of 5 CFM per person at a default occupancy of 10 individuals per 1,000 square feet. This translates to a requirement of 50 CFM per 1,000 square feet under default occupancy. (For further details, see ANSI/ASHRAE Standard 62.1–2019, Table 6–1.)

<sup>7</sup> Ventilation in high-rise multi-family apartment buildings is typically achieved using a combination of natural and mechanical ventilation. The preferred mechanical ventilation method is a central system, which uses ventilation ducts oriented vertically through stacks of apartments, with make-up air sourced from air conditioning/heating units located on the roof and supplied via vertical ducts. For more information see: *A Guide to Energy Efficient Ventilation in Apartment Buildings*. U.S. Department of Energy (DOE/EE–0196). 1999 (Available at: [eetd.lbl.gov/node/50537](http://eetd.lbl.gov/node/50537)).

<sup>8</sup> Table N1104.2 of the "Minnesota Rules, Chapter 1322 Residential Energy Code" specifies ventilation rates for residences based on a range of square footages and numbers of bedrooms. For residences with a conditioned space between 1,000 and 1,500 square feet in area, ventilation rates are similar to those listed in ASHRAE Standard 62.1–2013 per 1,000 square feet for the multi-family applications of hotels, motels, resorts, and dormitories. Specifically, for residences with a conditioned space between 1,000 and 1,500 square feet in area, total ventilation rates range from 60 CFM (for a single-bedroom residence) to 135 CFM (for a six-bedroom residence).

<sup>5</sup> ASHRAE Standard 62.1–2019 details ventilation standards for a variety of commercial building

(SPVUs) and multi-family-type floor-mounted, single-phase units (CACs). However, based on DOE's review, all wall-mounted units marketed for commercial applications identified by DOE were weatherized (*i.e.*, designed for outdoor use) and denoted on their nameplate that they are for "Outdoor Use" or "Suitable for Outdoor Use." Conversely, all units marketed for multi-family-type floor-mounted applications identified by DOE were non-weatherized units. Based on this review, DOE also proposes that whether a model is weatherized or non-weatherized is a criterion for distinguishing between single-phase SPVUs and consumer CACs.

Therefore, DOE proposes to define in 10 CFR 431.92 "single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h" and "single-phase single package vertical heat pump with cooling capacity less than 65,000 Btu/h" as SPVACs and SPVHPs, respectively, that are either (1) weatherized, or (2) non-weatherized and have the ability to provide a minimum of 400 CFM of outdoor air. Single-phase single package products with cooling capacity less than 65,000 Btu/h not meeting these definitions would be properly classified as CACs, not SPVUs.

DOE recognizes that the confusion with the appropriate classification of CACs and SPVUs may have been compounded by DOE's definition of "space-constrained" CACs and ASHRAE Standard 90.1's definition of "nonweatherized space constrained single-package vertical unit." Nonetheless, because a space-constrained product is a central air conditioner or heat pump, it is properly classified as a consumer product. In 10 CFR 430.2, DOE defines "space constrained product" as a central air conditioner or heat pump with certain characteristics including rated cooling capacity no greater than 30,000 Btu/hr and an outdoor or indoor unit with dimensions or displacement substantially smaller than those of other units and that if increased would increase installation cost or reduce utility, and which was available for purchase in the United States as of December 1, 2000. As with CACs more broadly, if a unit meets DOE's definition of "space constrained product," it is not an SPVU.

In contrast, ASHRAE Standard 90.1–2013 created a new equipment class for SPVACs and SPVHPs used in space-constrained applications, with a definition for "nonweatherized space constrained single-package vertical unit" and specified efficiency standards

for the associated equipment class. In a Notice of Data Availability addressing energy conservation standards for certain commercial heating, air conditioning, and water heating equipment, including SPVUs, published in the **Federal Register** on April 11, 2014, DOE explicitly addressed "nonweatherized space constrained single-package vertical units" and tentatively concluded that there was no need to establish a separate space-constrained class for SPVUs. 79 FR 20114, 20123. In that document, DOE stated that certain models currently listed by manufacturers as SPVUs, most of which would have met the ASHRAE space-constrained definition, were being misclassified and should be classified as central air conditioners (in most cases, space-constrained central air conditioners). *Id.* DOE reaffirmed this position in a NOPR addressing energy conservation standards for SPVUs, published in the **Federal Register** on December 30, 2014, emphasizing that a product can only be considered commercial/industrial equipment under EPCA if it does not meet the definition of a consumer product. 79 FR 78614, 78625. In the subsequent final rule addressing energy conservation standards for SPVUs, DOE did not adopt definitions in response to this issue and stated it would consider the matter in a subsequent rulemaking. 80 FR 57438, 57448 (Sept. 23, 2015).

DOE has now tentatively determined that the characteristics included in the proposed definitions earlier in this section of "single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h" and "single-phase single package vertical heat pump with cooling capacity less than 65,000 Btu/h" appropriately distinguish such equipment from consumer products and address any potential confusion as to the application of the DOE definition of "space constrained products" to SPVUs.

In regard to determining if a unit is capable of providing 400 CFM of outdoor air, DOE is proposing to include provisions in 10 CFR 429.134 that specify the method of measurement of the maximum outdoor ventilation airflow rate. DOE is proposing to specify that the outdoor ventilation airflow rate should be set up and measured in accordance with ASHRAE 41.2–1987, "Standard Methods for Laboratory Airflow Measurement," and Section 6.4 of ASHRAE 37–2009. DOE notes that the proposed method for measuring outdoor ventilation airflow is generally consistent with the test methods specified in AHRI 390–2021 (*i.e.*, AHRI 390–2021 incorporates by reference

ASHRAE 37–2009, including Section 6.4, which in turn incorporates by reference ASHRAE 41.2–1987, which specify the method of airflow measurement.) DOE is proposing additional specifications in this NOPR to clarify how these provisions are applied to measure the outdoor ventilation airflow rate. First, DOE is proposing to specify that all references to the inlet in ASHRAE 41.2–1987 and Section 6.4 of ASHRAE 37–2009 refer to the outdoor air inlet. Second, DOE is proposing to specify that the measurement should take place at the conditions specified for Full Load Standard Rating Capacity Test, Cooling in Table 3 of AHRI 390–2021, except for the minimum external static pressure (ESP). The minimum ESP for all validations shall be 0.00 in. H<sub>2</sub>O measured from inlet to outlet, with a tolerance of –0.00/+0.05 in. H<sub>2</sub>O. Finally, DOE is proposing that the outdoor air inlet pressure shall be 0.00 in. H<sub>2</sub>O, with a tolerance of –0.00/+0.05 in. H<sub>2</sub>O when measured against the room ambient. These additional provisions would improve the representativeness, repeatability, and reproducibility of the test methods for validating the outdoor ventilation airflow rate.

*Issue 1:* DOE requests comment on its proposal to define "single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h" and "single-phase single package vertical heat pump with cooling capacity less than 65,000 Btu/h" as subsets of the broader SPVAC and SPVHP equipment category. DOE requests feedback on the proposed characteristics that would distinguish this equipment as SPVUs (*i.e.*, "weatherized" or capable of utilizing a maximum of 400 CFM of outdoor air). Additionally, DOE requests comment on the proposed method to validate that a unit is capable of providing 400 CFM of outdoor air.

#### B. Updates to Industry Standards

##### 1. Updates to AHRI 390

As described in section I.A of this NOPR, with respect to SPVUs, EPCA directs DOE to use industry test methods developed or recognized by AHRI or ASHRAE, as referenced in ASHRAE Standard 90.1. (42 U.S.C. 6314(a)(4)(A)) If such an industry test procedure is amended, EPCA requires that DOE amend its test procedure as necessary to be consistent with the amended industry test method unless DOE determines, by rule published in the **Federal Register** and supported by clear and convincing evidence, that the

amended test procedure would be unduly burdensome to conduct or would not produce test results that reflect the energy efficiency, energy use, and estimated operating costs of that equipment during a representative average use cycle. (42 U.S.C. 6314(a)(4)(B))

As mentioned, the DOE test procedure at 10 CFR 431.96 references ANSI/AHRI 390–2003 (excluding Section 6.4) for testing SPVUs, and ASHRAE Standard 90.1 references this same industry test standard. In response to the July 2018 RFI, GE commented that DOE should continue to incorporate by reference the ASHRAE, ANSI, and AHRI test procedures for SPVUs, including new editions when published by the standards-setting bodies. (GE, No. 3 at p. 1)<sup>9</sup> AHRI and Lennox encouraged DOE's continued participation in the process to revise AHRI 390. (AHRI, No. 5 at p. 2; Lennox, No. 6 at pp. 1–2) AHRI and Lennox recommended that DOE adopt the revised industry test standard as the DOE test procedure. (AHRI, No. 5 at p. 2; Lennox, No. 6 at p. 1)

On June 24, 2021, AHRI published AHRI 390–2021, which supersedes ANSI/AHRI 390–2003. AHRI 390–2021, which was developed as part of an industry consensus process, includes revisions that DOE has initially determined improve the representativeness, repeatability, and reproducibility of the test methods. These revisions include, among other things, the following: (1) A new energy efficiency descriptor, IEER, which incorporates part-load cooling performance; (2) additional specification to the testing requirements for ducted and non-ducted units; (3) refrigerant charging instructions for cases where they are not provided by the manufacturer; (4) additional specification for setting the airflow rates and external static pressure for testing; (5) additional specification for the measurement of air conditions; (6) additional specification for the secondary capacity measurement using the outdoor air enthalpy method; (7) guidance on the filter to be used during test; (8) specification of a maximum compressor break-in period; (9) further specificity for atmospheric pressure measurement requirements; (10) additional detail regarding the installation of outdoor air-side attachments; (11) additional direction

on the use of applicable manufacturer instructions; and (12) a list of components that must be present for testing. DOE carefully reviewed the changes in AHRI 390–2021 in consideration of this NOPR. In this NOPR, DOE proposes to incorporate by reference the latest version of the industry test procedure for SPVUs, AHRI 390–2021, per 42 U.S.C. 6314(a)(4)(A) and (B).

## 2. ASHRAE 37

ANSI/ASHRAE 37–2009, a method of test for many categories of air conditioning and heating equipment, is referenced by AHRI 390–2021 for testing SPVUs. In particular, Appendix E of AHRI 390–2021 specifies the method of test for SPVUs, including the use of specified provisions of ANSI/ASHRAE 37–2009. Consistent with AHRI 390–2021, DOE is proposing to incorporate by reference ANSI/ASHRAE 37–2009 in its test procedure for SPVUs. Specifically, in Section 1.2 of the proposed test procedure for SPVUs in the proposed Appendices G and G1 of subpart F of 10 CFR part 431, DOE is proposing to utilize the applicable sections of ANSI/ASHRAE 37–2009—all sections except sections 1, 2 and 4. DOE also is proposing that in the event of any conflicts between the DOE test procedure, AHRI 390–2021 and ASHRAE 37–2009, the DOE test procedure takes highest precedence, followed by AHRI 390–2021, followed by ASHRAE 37–2009.

### C. Proposed Organization of the SPVU Test Procedure

DOE is proposing to relocate and centralize the current test procedure for SPVUs to a new Appendix G to subpart F of part 431. Appendix G will incorporate by reference AHRI 390–2021, but DOE will exclude from use those sections pertaining to the calculation of IEER (section 6.2). Correspondingly, DOE is proposing to update the existing incorporation by reference of ANSI/AHRI 390–2003 at 10 CFR 431.95 so that the incorporation by reference applies to Appendix G rather than 10 CFR 431.96. As proposed, SPVUs would be tested according to Appendix G unless and until DOE adopts an amended energy conservation standard that relies on the IEER metric.

DOE also is proposing to amend the test procedure for SPVUs by adopting the updated version of AHRI 390–2021, including use of the sections pertaining to IEER (section 6.2) in a new Appendix G1 to subpart F of part 431, as discussed in the following sections. As proposed, SPVUs would not be required to test according to the test procedure in

proposed Appendix G1 unless and until DOE adopts an amended energy conservation standard that relies on the IEER metric.

### D. Energy Efficiency Descriptor

For SPVUs, DOE currently prescribes EER as the cooling mode metric and COP as the heating mode metric. 10 CFR 431.96. These energy efficiency descriptors are consistent with those included in ASHRAE 90.1–2019 for SPVUs. EER is the ratio of the produced cooling effect of the SPVU to its net work input, expressed in Btu/watt-hour and measured at standard rating conditions. COP is the ratio of the produced heating effect of the SPVU to its net work input, expressed in W/W, and measured at standard rating conditions.

#### 1. Efficiency Metrics

EER measures efficiency at full-load conditions. DOE's current test procedure for SPVUs does not include a seasonal metric that measures part-load performance. A seasonal metric is a weighted average of the performance of cooling or heating systems at different rating points intended to represent average efficiency over a full cooling or heating season.

DOE noted in the July 2018 RFI that several other categories of commercial package air conditioning and heating equipment are rated using a seasonal metric, such as IEER for air-cooled commercial unitary air conditioners ("CUACs"), as presented in Section 6.2 of AHRI 340/360–2019, "Performance Rating of Commercial and Industrial Unitary Air-conditioning and Heat Pump Equipment." 83 FR 34499, 34503 (July 20, 2018). IEER is a weighted average of efficiency at the four load levels representing 100, 75, 50, and 25 percent of full-load capacity, each measured at an outdoor air condition representative of field operation at the given load level.

DOE noted in the July 2018 RFI that ANSI/AHRI 390–2003 includes a seasonal part-load metric for SPVUs (*i.e.*, integrated part-load value ("IPLV")). 83 FR 34499, 34503 (July 20, 2018). IPLV integrates unit performance at each capacity step provided by the refrigeration system. The IPLV tests are conducted at constant outdoor air conditions of 80 °F dry-bulb temperature and 67 °F wet-bulb temperature. *Id.* DOE is aware that some manufacturers make representations of part-load performance of SPVUs in product literature using IPLV. DOE has noted that IPLV was formerly used for rating CUACs but has since been removed from AHRI 340/360 in favor of IEER. *Id.*

<sup>9</sup> A notation in the form "GE, No. 3 at p. 1" identifies a written comment: (1) Made by GE; (2) recorded in document number 3 that is filed in the docket of the SPVU test procedure rulemaking (Docket No. EERE–2017–BT–TP–0020) and available for review at [www.regulations.gov](http://www.regulations.gov); and (3) that appears on page 1 of document number 3.

As part of the July 2018 RFI, DOE requested comment on whether it should consider adopting for SPVUs a cooling-mode metric that integrates part-load performance to better represent full-season efficiency, and whether a part-load metric such as IEER or IPLV would be appropriate for SPVUs. 83 FR 34499, 34503 (July 20, 2018).

AHRI and GE both commented that DOE should not consider adopting a part-load cooling metric at this time, stating that doing so would increase test burden for a specialized product sold in a comparatively small market. (AHRI, No. 5 at p. 6; GE, No. 3 at p. 2) GE noted that for SPVUs with single-speed compressors, the EER test method requires only a single test with an average of 8 hours to complete and validate test data, whereas an IEER test method would require four tests, which entails additional testing time and cost. (GE, No. 3 at p. 2) GE stated that for dual-voltage units, the IEER test method would increase test time to approximately 64 hours per unit, and that the time to test 3 units for a given model would increase testing time from 48 hours to 192 hours under the IEER test method. *Id.*

AHRI commented that a part-load metric may be appropriate for some equipment, such as two-stage or variable-capacity SPVUs, but only for certain applications. (AHRI, No. 5 at p. 6) AHRI and Lennox commented that as part of the revisions to AHRI 390, industry is assessing whether IEER or IPLV would better represent part-load performance for units other than single-stage products. (AHRI, No. 5 at p. 6; Lennox, No. 6 at p. 5) Lennox commented that while a part-load metric may be a favorable option for SPVUs in the long term, there was not sufficient data at that time to evaluate the impacts on performance and the increase in test burden versus potential consumer benefits of optimized part-load performance. (Lennox, No. 6 at p. 5)

The CA IOUs commented that the IEER metric was developed for CUACs with greater than 65,000 Btu/h cooling capacity using office, retail, and larger permanent school space loads as the basis for the part-load weighting factors. (CA IOUs, No. 2 at p. 3) They noted that SPVUs are generally used in smaller settings, such as electronic sheds and relatively small relocatable classrooms. *Id.* The CA IOUs stated that, while there may be some shortcomings with the IEER metric, it results in ratings more reflective of annual energy efficiency than those produced by IPLV. *Id.* The CA IOUs commented that IPLV, on the

other hand, has a strong potential to misrepresent efficiency ratings because it does not rate all units at identical capacity points, leading to a difference in the weighting factors used for various equipment. *Id.* In addition, the CA IOUs commented that all part-load ratings are measured at an ambient outdoor temperature of 80 °F. *Id.* The CA IOUs asserted that these two factors often cause tested units with fewer capacity reduction stages to have higher measured efficiencies than those with more stages, whereas in reality, units with more stages tend to be more efficient. *Id.*

The CA IOUs stated that while the IEER metric provides a valuable measure of annual efficiency, the EER metric is important for achieving reductions in peak loads. (CA IOUs, No. 2 at p. 3) The CA IOUs stated that because the IEER metric uses a low weighting (*i.e.*, 2 percent) of the full-load condition, a standard based only on the IEER metric would incentive manufacturers to optimize equipment at the part-load conditions and could potentially result in equipment that is designed with lower full-load EERs than the current standards for this equipment. *Id.* The CA IOUs supported using both the IEER metric that measures part-load efficiencies in conjunction with the currently regulated full-load EER metric as a means to prevent poor equipment performance at full-load conditions. *Id.*

ASAP, NRDC, and ACEEE commented that DOE should develop a new cooling efficiency metric for SPVUs that reflects annual energy consumption, including part-load operation. (ASAP, NRDC, and ACEEE, No. 4 at p. 1–2) They stated that the current EER metric reflects only full-load, steady-state operation, but that SPVUs rarely operate at full-load in the field. *Id.* at 1. In addition, ASAP, NRDC, and ACEEE stated that the current metric is not able to demonstrate potential improved efficiency of SPVUs with variable-speed or thermostatic and electronic expansion valve technologies. *Id.*

ASAP, NRDC, and ACEEE also commented that the IEER metric is not representative of locations and usage patterns for SPVUs and encouraged DOE to investigate a part-load performance metric that better reflects SPVU usage. (ASAP, NRDC, and ACEEE, No. 4 at pp. 1–2) They commented that DOE should consider its analysis from the most recent SPVU standards rulemaking, which included building simulation models for modular classrooms, modular offices, and telecommunication shelters, to inform the development of

load points and weightings for a part-load metric. *Id.* at 2.

In response, DOE recognizes that SPVUs often operate at part-load (*i.e.*, less than designed full-load capacity) in the field, depending on the application and location. As discussed in section III.B, AHRI 390–2021 includes a new part-load cooling metric, IEER. To the extent that AHRI expressed concerns regarding the IEER test method in response to the July 2018 TP RFI, DOE presumes that AHRI's original position on this issue changed during the course of developing AHRI 390–2021. The test conditions and weighting factors for this IEER metric in AHRI 390–2021 were developed specifically for SPVUs based on an annual building load analysis and temperature data for buildings representative of SPVU installations, including modular classrooms, modular offices, and telecommunication shelters.<sup>10</sup> The test conditions and weighting factors for the four load levels representing 100, 75, 50, and 25 percent of full-load capacity are different than those used in the IEER metric in AHRI 340/360–2019, which were developed based on CUAC building types. As a result, DOE considers the IEER metric representative of the cooling efficiency for SPVUs on an annual basis, and more representative than the current EER metric.

In this NOPR, DOE is proposing to incorporate by reference AHRI 390–2021, which maintains the existing full-load cooling mode metric, EER, and adds the IEER metric for SPVUs. More specifically, DOE is proposing to add a new Appendix G that would include the relevant test procedure requirements for SPVUs for measuring efficiency using the existing efficiency metrics (*i.e.*, EER for cooling mode and COP for heating mode) and to add a new Appendix G1 that would incorporate the provisions for measuring efficiency using IEER and COP.

*Issue 2:* DOE requests comment on its proposal to adopt the test methods specified in AHRI 390–2021 for calculating IEER for SPVUs.

As discussed, DOE's current standards for SPVUs at 10 CFR 431.97 specify minimum efficiency requirements based on the full-load cooling metric, EER, and the heating metric, COP. The current DOE standards levels are the same as those specified in the current version of ASHRAE Standard 90.1 (ASHRAE 90.1–2019).

<sup>10</sup> Based on EnergyPlus analysis developed for the previous energy conservation standards rulemaking for SPVUs. 80 FR 57438, 57462 (Sept. 23, 2015). EnergyPlus is a whole building energy simulation program (Available at: <http://apps1.eere.energy.gov/buildings/energyplus/>).



Any future energy conservation standards based on IEER would evaluate differences in the measured energy efficiency based on the IEER metric relative to EER (*i.e.*, by developing an appropriate “crosswalk,” as necessary), and would consider data and/or analysis that compares the ratings of SPVUs under the two metrics.

*Issue 3:* DOE requests comment and data on ratings under the current EER metric specified in 10 CFR 431.97 and ASHRAE 90.1–2019 based on ANSI/AHRI 390–2003, as compared to ratings using the IEER metric under AHRI 390–2021.

ASAP, NRDC, and ACEEE, as well as NEEA and NWPCC, commented in response to the July 2018 RFI that DOE should consider a dynamic, load-based test procedure to measure both cooling and heating efficiency of SPVUs, similar to the test procedure for residential central air conditioners developed by the Canadian Standards Association (“CSA”) Group. (ASAP, NRDC, and ACEEE, No. 4 at p. 2; NEEA and NWPCC, No. 7 at p. 3) NEEA and NWPCC commented that a load-based test procedure, such as the CSA test procedure, could measure energy use of the equipment at 25, 50, 75 and 100-percent load without overriding equipment controls, as opposed to the current IEER test specified in AHRI 340/360 for CUACs that locks equipment controls to 25, 50, 75 and 100 percent of capacity. (NEEA and NWPCC, No. 7 at p. 3) They commented that a load-based test would allow manufacturers to design equipment controls and thermostats that would reduce unnecessary cycling and improve humidity control. *Id.* According to NEEA and NWPCC, the current IEER test method specified in AHRI 340/360 uses an artificially low maximum cycling loss that does not provide incentive for manufacturers to reduce cycling losses. *Id.* ASAP, NRDC, and ACEEE, as well as NEEA and NWPCC, commented that a load-based test would better capture how SPVUs perform in the field under varying loads, including capturing the impact of cycling losses, the potential benefits of variable-speed operation, and the importance of control strategies. (ASAP, NRDC, and ACEEE, No. 4 at p. 2; NEEA and NWPCC, No. 7 at p. 3)

DOE is currently not aware of data showing that any dynamic load-based test procedure produces repeatable and reproducible test results. Furthermore, DOE is not aware of data showing that the CSA test procedure recommended by NEEA and NWPCC produces repeatable and reproducible results for central air conditioners (“CACs”) and

heat pumps, and that procedure has not yet been evaluated for SPVUs.

Therefore, DOE is not proposing any dynamic load-based test procedures at this time.

## 2. Test Conditions Used for Efficiency Metrics

Under 42 U.S.C. 6314(d)(1), EPCA requires that representations with respect to the energy consumption of SPVUs must be based on the DOE test procedure. DOE notes that the heating mode test used to calculate COP and determine compliance with standards for SPVHPs is conducted at 47 °F outdoor air dry-bulb temperature and 43 °F outdoor air wet-bulb temperature, and is designated as the “Full Load Standard Rating Capacity Test, Heating” in Table 3 of AHRI 390–2021. DOE is proposing to also utilize Table 3 of AHRI 390–2021, which includes an optional “Low Temperature Operation” heating application rating test that manufacturers may use to make representations of energy consumption for SPVUs. That test is based on an outdoor air dry-bulb temperature of 17 °F and outdoor air wet-bulb temperature of 15 °F.

To allow manufacturers to make voluntary representations at the lower temperature condition, DOE is proposing to specify in Appendices G and G1 that the low temperature operation heating mode test conditions specified in Table 3 of AHRI 390–2021 are optional. This would clarify that additional representations for SPVHPs at a lower temperature condition are optional, but that if such representations are made, they must be based on testing conducted in accordance with the DOE test procedure using the specified low temperature operation heating mode test conditions in addition to those made at the full-load standard heating conditions.

*Issue 4:* DOE requests comment on its proposal to clarify that COP representations using the “Low Temperature Operation, Heating” conditions in Table 3 of AHRI 390–2021 are optional.

## 3. Fan Energy Use

As part of the July 2018 RFI, DOE requested comment on whether changes to the SPVU test procedure are needed to properly characterize a representative average use cycle, including changes to more accurately represent fan energy use in field applications. 83 FR 34499, 34503 (July 20, 2018). DOE also requested information as to the extent that accounting for the energy use of fans in commercial equipment such as SPVUs would be additive of other

existing accountings of fan energy use. *Id.* The Appliance Standards and Rulemaking Federal Advisory Committee (“ASRAC”) Commercial and Industrial Fans and Blowers Working Group (“Working Group”) had earlier provided recommendations regarding the energy conservation standards, test procedures, and efficiency metrics for commercial and industrial fans and blowers in a term sheet. (Docket No. EERE–2013–BT–STD–0006–0179 at p. 1) Specifically, recommendation #3 discussed the need for DOE’s test procedures and related efficiency metrics to account more fully for the energy consumption of fan use in regulated commercial air-conditioning equipment. (Docket No. EERE–2013–BT–STD–0006–0179 at pp. 3–4) The Working Group recommended that DOE consider revising efficiency metrics that include energy use of supply and condenser fans in order to include the energy consumption during all relevant operating modes, including ventilation and part-load operation, in the next round of test procedure rulemakings. The Working Group included SPVUs in its list of regulated equipment for which fan energy use should be considered. (Docket No. EERE–2013–BT–STD–0006–0179 at pp. 3–4, 16)

In response to the 2018 RFI, ASAP, NRDC, and ACEEE, as well as NEEA and NWPCC, commented that DOE should amend the test procedure to account for fan energy use outside of mechanical cooling and heating for fans in regulated equipment to more fully capture fan energy use. (ASAP, NRDC, and ACEEE, No. 4 at p. 1; NEEA and NWPCC, No. 7 at pp. 1–3) ASAP, NRDC, and ACEEE asserted that by failing to capture fan operation for economizing, ventilation, and other functions outside of cooling mode, the test procedure may be significantly underestimating fan energy consumption. (ASAP, NRDC, and ACEEE, No. 4 at p. 1) NEEA and NWPCC added that these amendments would encourage the adoption of features such as variable-speed fans, which provide additional control and flexibility for building owners and operators in addition to reducing energy waste. (NEEA and NWPCC, No. 7 at p. 2)

NEEA and NWPCC commented that the commercial prototype building models used in the analysis in support of ASHRAE Standard 90.1 include information on the operation of fans in ventilation mode and economizer mode, and these models could be used to develop national average fan operating hours outside of heating and cooling modes. (NEEA and NWPCC, No. 7 at p. 4) NEEA and NWPCC commented that the vast majority of SPVUs are

installed in commercial buildings requiring a building permit and that the ASHRAE Standard 90.1 requirements are reflective of building code requirements. *Id.* NEEA and NWPCC stated that, as a result, the energy models used in support of ASHRAE Standard 90.1 are representative of how the equipment is installed and used across the United States. *Id.*

NEEA and NWPCC commented that one potential approach to represent fan energy use in regulated equipment more accurately would be to use IEER to assess the efficiency of the refrigeration cycle of SPVUs, and to use an alternative metric to assess the performance of embedded fans in SPVUs. (NEEA and NWPCC, No. 7 at pp. 3–4) NEEA and NWPCC suggested that ANSI/AMCA 208–18, “Calculation of the Fan Energy Index,” provides a potential way to measure embedded fan performance in SPVUs by using the fan energy index (“FEI”). *Id.* NEEA and NWPCC stated that DOE could, therefore, develop a revised IEER-type metric that weights together cooling performance based on the traditional IEER test and an FEI-based metric for fan efficiency. *Id.* NEEA and NWPCC stated that accounting for the energy use of fan operation in SPVUs does not need to alter measured efficiency, and that DOE could align the FEI and IEER metrics such that manufacturers would have multiple viable design option pathways to achieve the minimum IEER efficiency standard without improving the embedded fan efficiency above the minimum FEI efficiency standard. *Id.*

AHRI and Lennox commented that the current metrics for SPVUs (EER and COP) account for fan power and that there is no need to double count fan contribution, asserting that standards based on these metrics will likely already require the need for improved fan motor efficiency. (AHRI, No. 5 at pp. 6, 7; Lennox, No. 6 at p. 6) AHRI commented that adding a requirement to measure fan energy use during economizing or electric heating would increase testing burden. (AHRI, No. 5 at p. 6)

AHRI and Lennox further commented that while most SPVUs can provide some level of ventilation, their primary function is cooling and heating. (AHRI, No. 5 at p. 7; Lennox, No. 6 at p. 6) AHRI asserted that DOE is limited to one metric per covered product, and, therefore, the representative average use cycle for SPVUs should concentrate on the bulk of energy used during cooling and heating, rather than the occasional and ancillary fan-only ventilation utility. (AHRI, No. 5 at p. 7) In addition, AHRI asserted that a key goal in

prohibiting separate component standards was to allow the manufacturer to innovate to meet energy use standards. *Id.*

AHRI commented that DOE has the authority to include certain fans and blowers, by rule, as “covered equipment” if such products meet all the requirements of 42 U.S.C. 6311(2), but the commenter stated that it would not be appropriate to apply such standard to fans embedded in regulated equipment. (AHRI, No. 5 at p. 8) AHRI asserted that 42 U.S.C. 6312 limits DOE’s authority to regulate as covered industrial equipment certain articles that are also components of consumer products. *Id.* AHRI commented that because the fans in SPVUs are built only for the product and cannot be purchased on the open market and applied as “stand alone fans,” the fans in SPVUs are protected from double-regulation under EPCA. *Id.* AHRI also commented that DOE’s authority under 42 U.S.C. 6312(b) and (c) to regulate components is based on necessity, and that adding a fan metric to the current EER requirement is not necessary because SPVUs already have an overall energy efficiency requirement. *Id.* AHRI and Lennox commented that the fact that Congress was compelled to grant a specific provision of authority for a consumer furnace ventilation metric affirms that DOE lacks general authority to create overlapping ventilation requirements for other regulated products. (AHRI, No. 5 at pp. 8–9; Lennox, No. 6 at p. 6)

In response to these comments, DOE does not have sufficient information at this time regarding the operation of fans outside of mechanical heating and cooling during an average use cycle (e.g., economizing, ventilation) specific to SPVU installations as would allow it to consider changing the existing efficiency metric(s) to include this aspect of energy use. DOE recognizes that the current metrics for SPVUs do not include fan energy use during all relevant operation modes. Provisions to measure fan energy use when there is no heating or cooling being provided, and when performing ancillary functions (e.g., economizing, ventilation, filtration, and auxiliary heat), are not included in ANSI/AHRI 390–2003 and have not been included in the updated industry consensus standard, AHRI 390–2021. Further, DOE lacks sufficient information on the number of units capable of operating in these modes, total energy use in these operating modes, and information regarding the frequency of operation of these modes during field conditions, which the Department would need to determine

whether such testing would be appropriate for SPVUs and/or to develop a metric representing the national average fan operating hours for SPVUs. DOE notes further that the commercial prototype building models used in the analysis in support of ASHRAE Standard 90.1 that NEEA and NWPCC recommended do not include information on building types typical to SPVU installations (i.e., modular and telecommunications). If additional information becomes available as would allow DOE to consider incorporation of fan energy use during other relevant SPVU operating modes for all relevant building types into the test method and metric for SPVUs, DOE may consider such information in a subsequent rulemaking proceeding. With regards to comments concerning fan energy use metrics and regulation of fan energy use being double-counting, DOE will consider its authority under EPCA when and if developing such test procedures.

#### E. Test Method

This section discusses the various issues that DOE identified in the test methods for SPVUs, including those raised in the July 2018 RFI and considered as part of DOE’s review of AHRI 390–2021. These issues include: (1) Provisions for testing ducted and non-ducted units; (2) outdoor air-side airflow rate; (3) refrigerant charging instructions; (4) voltage requirements; (5) filter requirements; (6) airflow and external static pressure requirements; (7) air temperature measurements; (8) defrost energy use; and (9) provisions for the outdoor air enthalpy method.

In addition, in DOE’s existing regulations, Table 1 to 10 CFR 431.96 specifies the applicable industry test procedure for each category of commercial package air conditioning and heating equipment, and it identifies additional testing requirements that also apply. In this NOPR, DOE is proposing to reorganize subpart F to 10 CFR part 431 so that the test procedure requirements for SPVUs are included in separate appendices (Appendix G and G1). DOE proposes that Table 1 to 10 CFR 431.96 identify only the applicable appendix to use for testing SPVUs (Appendix G or G1) and that 10 CFR 431.96 would no longer include any additional test requirements for SPVUs.

#### 1. Unit Set-Up

##### a. Testing Ducted and Non-Ducted Units

DOE noted in the July 2018 RFI that ANSI/AHRI 390–2003 specifies different ESP requirements for ducted and non-ducted units. 83 FR 34499, 34501 (July 20, 2018). Specifically, Section 5.2.2 of

ANSI/AHRI 390–2003 requires that non-ducted units be tested at zero ESP, and it specifies ESP requirements in Table 4 of ANSI/AHRI 390–2003 for ducted equipment. However, whether an SPVU is ducted may depend on the installation rather than the model. A given SPVU model could be installed either with or without a duct, thereby resulting in its status as ducted or non-ducted being determined in the field. In the July 2018 RFI, DOE stated that it is not aware of physical characteristics that would readily distinguish SPVUs as either ducted or non-ducted models and that several models advertise the capability for use in both ducted and non-ducted installations. DOE noted that ANSI/AHRI 390–2003 does not specify how to determine whether an SPVU model is to be tested using the ducted or non-ducted provisions. As part of the July 2018 RFI, DOE requested comment on characteristics for determining whether SPVU models would be installed as ducted or non-ducted and on how equipment sold for both configurations are currently tested. 83 FR 34499, 34501 (July 20, 2018).

AHRI commented that many, if not all, SPVUs on the market allow for installation with or without a duct, and that it is standard practice to test all SPVUs in the ducted configuration. (AHRI, No. 5 at pp. 2) AHRI stated that the (then-draft) revised version of AHRI 390 sought to standardize industry practice by defining a non-ducted unit as an air conditioner or heat pump that is not designed and marketed to deliver conditioned air to the indoor space through a duct(s), and that a factory-installed wall sleeve(s) would not be considered as a duct. (AHRI, No. 5 at pp. 2–3) AHRI also noted that the draft version of AHRI 390 specified that if a duct cannot be attached and the unit is marketed as non-ducted only, then testing would be performed in the non-ducted configuration, and that all other units would be tested as ducted. *Id.* Lennox commented that any model marketed for ducted applications should be tested in a ducted configuration, and that testing in a non-ducted configuration would be appropriate if a model does not provide provisions for duct attachment and the unit is marketed as non-ducted only. (Lennox, No. 6 at p. 2)

DOE notes that the draft definition and provisions referenced by AHRI are included in AHRI 390–2021, along with a definition for ducted units. DOE preliminarily agrees that the definition of a non-ducted unit and associated provisions included in AHRI 390–2021 provide additional specification for testing ducted and non-ducted SPVUs.

DOE understands that these definitions and provisions are consistent with how units are currently classified by industry and tested, as indicated by AHRI's comments and the inclusion in AHRI 390–2021. DOE is proposing to adopt these definitions found in Sections 3.4 and 3.10 of AHRI 390–2021 and associated provisions specified in section 5.7 of AHRI 390–2021, as enumerated in section 0 of the proposed Appendix G and in section 0 of the proposed Appendix G1.

#### b. Outdoor Air-Side Airflow Rate

The current DOE test procedure for SPVUs requires that the unit be set up for test in accordance with the manufacturer installation and operation manuals. 10 CFR 431.96(e). In addition, Section 5.2.3 of ANSI/AHRI 390–2003 specifies that for SPVUs with an outdoor air-side fan drive that is adjustable, standard ratings are determined at the outdoor-side airflow rate specified by the manufacturer. Section 5.2.3 of ANSI/AHRI 390–2003 also specifies that, where the outdoor air-side fan drive is non-adjustable, standard ratings are determined at the outdoor airflow rate inherent to the equipment when operated with all of the resistance elements associated with inlets, louvers, and any ductwork and attachments considered by the manufacturer as normal installation practice.

However, Section 5.2.3 of ANSI/AHRI 390–2003 does not further specify what attachments the manufacturer considers “normal installation practice.” For externally-mounted SPVUs, provisions for transferring outdoor air through an external wall are not necessary, but it may be possible that alternative “resistance elements” could be offered as options (*i.e.*, louvers instead of grills). Furthermore, for internally-mounted SPVUs, there may be multiple options for the specific geometry for external wall pass-through, as well as the option for louvers instead of grills.

As part of the July 2018 RFI, DOE requested comments on the variations in outdoor air-side attachments (*e.g.*, grills, louvers, wall sleeve) that could affect performance during testing and test procedure provisions to standardize outdoor air flow for both externally and internally mounted SPVUs. 83 FR 34499, 34501 (July 20, 2018). On this topic, ASAP, NRDC, and ACEEE commented that DOE should standardize which resistive elements should be present for testing to ensure that the test is representative of field installations and to improve repeatability and reproducibility of test results. (ASAP, NRDC, and ACEEE, No.

4 at p. 3) AHRI stated that options for different outdoor air-side attachments do exist and could impact the performance during testing. (AHRI, No. 5 at p. 3) AHRI and Lennox commented that, to mitigate this issue, the attachments to be used for testing should be specified by the manufacturer in the supplemental testing instructions submitted to DOE. (AHRI, No. 5 at p. 3; Lennox, No. 6 at p. 2) AHRI added that information regarding the installation of plenums, grills, or other outdoor air-side attachments is provided by manufacturers for testing conducted as part of the AHRI certification program. (AHRI, No. 5 at p. 3)

DOE notes that Section 5.8.4 of AHRI 390–2021 explicitly specifies use of the outdoor air-side attachments specified in the manufacturer's supplemental testing instructions. DOE expects this practice would improve the representativeness in that the unit is tested in a configuration more similar to that of the unit as installed in the field.<sup>11</sup> DOE also expects that the more specific test set-up instruction would improve the reproducibility of test results by reducing potential variation in the configuration of the unit when tested. DOE understands that some equipment may be offered for sale with multiple outdoor air-side attachment options, including an option to ship the unit without any attachments. Based on its review of manufacturer materials, DOE has found that in such cases most manufacturer's instructions or marketing materials indicate that use of outdoor air-side attachments are recommended or necessary for installation. Based on the manufacturer instructions, use of outdoor air-side attachments is standard practice in field use for units for which they are offered for sale.

AHRI 390–2021 states that if a unit includes multiple outdoor air-side attachment options, including an option for the unit to ship without any attachments, an outdoor air-side attachment must be specified in the supplemental testing instructions. DOE would expect that this instruction helps ensure testing is representative of how a unit would be installed and operated in the field. DOE is proposing to adopt these provisions regarding the outdoor air-side attachments, as specified in Section 5.8.4 of AHRI 390–2021,

<sup>11</sup> Section 3.8.2 of AHRI 390–2021 specifies that the supplemental testing instructions shall include no instructions that deviate from the manufacturer's installation instructions unless necessary to comply with steady-state requirements (in which case the steady operation must match, to the extent possible, the average performance obtained without deviating from the manufacturer's installation instructions).

enumerated in section 0 of the proposed Appendix G and section 0 of the proposed Appendix G1.

### c. Refrigerant Charging Instructions

The amount of refrigerant can have a significant impact on the system performance of air conditioners and heat pumps. DOE's current test procedures for commercial package air conditioners and heat pumps, including the test procedures for SPVUs, require that units be set up for test in accordance with the manufacturer installation and operation manuals. 10 CFR 431.96(e). In addition, the current DOE test procedures state that if the manufacturer specifies a range of superheat, sub-cooling, and/or refrigerant pressures in the installation and operation manual, any value within that range may be used to determine refrigerant charge, unless the manufacturer clearly specifies a rating value in its installation or operation manual, in which case the specified value shall be used. 10 CFR 431.96(e)(1). However, the current DOE test procedures do not provide charging instructions to be used if the manufacturer does not provide instructions in the manual that is shipped with the unit or if the provided instructions are unclear or incomplete.

DOE noted in the July 2018 RFI that ANSI/AHRI 390–2003 does not provide any specific guidance on setting and verifying the refrigerant charge of a unit. 83 FR 34499, 34501 (July 20, 2018). DOE also noted in the July 2018 RFI that the test procedure final rule for central air conditioners and heat pumps (“CAC/HPs”) published in the *Federal Register* on June 8, 2016 (81 FR 36992; “June 2016 CAC TP final rule”) established a comprehensive approach for refrigerant charging to improve test reproducibility. *Id.* The approach specifies which set of installation instructions to use for charging, explains what to do if there are no instructions, specifies that target values of parameters are the centers of the ranges allowed by installation instructions, and specifies tolerances for the measured values. 10 CFR part 430, subpart B, appendix M, section 2.2.5. This approach also requires that refrigerant line pressure gauges be installed for single-package units, unless otherwise specified in manufacturer instructions. *Id.*

As part of the July 2018 RFI, DOE sought comment on whether it would be appropriate to adopt an approach for charging requirements for SPVUs similar to the approach adopted in the June 2016 CAC TP final rule. 83 FR 34499, 34501 (July 20, 2018). DOE also requested data demonstrating how

sensitive the performance of an SPVU is to changes in the various charge indicators used for different charging methods, specifically the method based on sub-cooling. *Id.*

ASAP, NRDC, and ACEEE commented that while most manufacturers appear to ship SPVUs with the refrigerant already charged, DOE should still develop consistent and comprehensive charging instructions to ensure repeatable and reproducible test results, and to account for the possibility of products offering different charging instructions in the future. (ASAP, NRDC, and ACEEE, No. 4 at p. 3) NEEA and NWPCCC commented that DOE should review how often SPVUs are charged with refrigerant at the site when installed, and that if refrigerant charge is often modified at installation, they support adopting charging requirements consistent with the June 2016 CAC TP final rule. (NEEA, NWPCCC, No. 7 at p. 2)

AHRI commented that the charging requirements adopted in the June 2016 CAC TP final rule are not appropriate for SPVUs. (AHRI, No. 5 at p. 3) AHRI stated that SPVUs are shipped charged with refrigerant and no charging should be required. *Id.* AHRI added that many units do not have service ports, and those that do are charged by weight to the specification on the unit's nameplate. *Id.* Lennox stated that all of its models are shipped with a full refrigerant charge, and no further charge adjustments are required. (Lennox, No. 6 at p. 3) Lennox also stated that if there is any discrepancy regarding charge quantity, the unit should be charged by weight to the specification on the unit nameplate. *Id.* Similarly, the CA IOUs commented that because SPVUs are factory-sealed, package units, many charging requirements that were adopted in the June 2016 CAC TP final rule would not apply to SPVUs. (CA IOUs, No. 2 at p. 1) The CA IOUs did state that some language from the June 2016 CAC TP final rule would be beneficial to adopt; in particular, provisions related to pressure gauges for single-package units and language banning refrigerant charge adjustment during testing. (*Id.* at pp. 1–2)

Based on a review of equipment available on the market, DOE finds that SPVUs are typically shipped from the factory charged with refrigerant, consistent with comments received. DOE observed that while the majority of units are charged by weight, at least one manufacturer's instructions specified that if the refrigerant charge needs to be adjusted (e.g., due to leaks), the charge should be adjusted based on the

manufacturer's specified values for sub-cooling and superheat.

Section 5.6 of AHRI 390–2021 includes instructions for charging to be used if sufficient information is not provided in the manufacturer's installation instructions, similar to the provisions for CACs adopted in the June 2016 CAC TP final rule. Specifically, AHRI 390–2021 directs that charging be performed at the conditions specified in the manufacturer's installation instructions or, if not specified, at the full-load cooling Standard Rating Conditions. AHRI 390–2021 directs that if the manufacturer's installation instructions specify a range for superheat, sub-cooling, or refrigerant pressure, the average of the range is used to determine the refrigerant charge. AHRI 390–2021 also specifies a hierarchy of charging parameters to follow (with charge weight being the highest priority) if different requirements provided in the manufacturer's installation instructions cannot be simultaneously met. DOE proposes to adopt section 5.6 in AHRI 390–2021 for refrigerant charging, as enumerated in section 0 of the proposed Appendix G and in section 0 of the proposed Appendix G1.

The proposed refrigerant charging instructions provide additional specification to the Federal test method that would produce more repeatable and reproducible results. DOE notes that as proposed, these refrigerant charging provisions would only apply if the manufacturer installation instructions do not provide sufficient guidance regarding refrigerant charging. As a result, these provisions would not restrict the flexibility that manufacturers currently have in providing refrigerant charging instructions, so long as the provided instructions are sufficient.

### d. Voltage Requirements

In the July 2018 RFI, DOE noted that Section 5.2.1 of ANSI/AHRI 390–2003 requires that, for units rated with 208/230 dual nameplate voltages, the test be performed at 230 volts (V). 83 FR 34499, 34501 (July 20, 2018). For all other dual nameplate voltage units, the test standard requires that the test be performed at both voltages, or at the lower voltage if only a single rating is to be published. *Id.* DOE also noted that voltage can affect the measured efficiency of air conditioners, and requested data demonstrating the effect of voltage on air conditioning equipment. *Id.* DOE requested comment on whether certain voltages within common dual nameplate voltage ratings (e.g., 208/230 V) are more representative of a typical field installation. *Id.*

Lennox commented that the voltage requirements specified in ANSI/AHRI 390–2003 are consistent with other similar industry test procedures and are appropriate for this equipment. (Lennox, No. 6 at p. 3) AHRI acknowledged that voltage can affect the measured efficiency of air conditioners, but it stated that these variations tend to be insignificant and do not correlate to a specific voltage. (AHRI, No. 5 at pp. 2–3) AHRI also commented that the majority of SPVUs are applied at 230 V, and, therefore, the current test procedure is appropriate. *Id.*

In response, DOE first points out that Section 5.8.1 of AHRI 390–2021 maintains the same voltage requirements for SPVUs as specified in the current DOE test procedure and in ANSI/AHRI 390–2003. DOE notes that these voltage requirements are generally consistent with industry test procedures for other commercial air conditioning and heat pump equipment. Accordingly, DOE is proposing to adopt the voltage requirements in Section 5.8.1 AHRI 390–2021, consistent with the existing voltage requirements, as enumerated in section 0 of the proposed Appendix G and in section 0 of the proposed Appendix G1.

#### e. Filter Requirements

DOE noted in the July 2018 RFI that Section 5.2.2.a of ANSI/AHRI 390–2003 requires that non-filtered ducted equipment be tested at the minimum ESP specified in Table 4 of ANSI/AHRI 390–2003 plus an additional 0.08 inches of water column (“in H<sub>2</sub>O”) of ESP. 83 FR 34499, 34501 (July 20, 2018). DOE further noted that ANSI/AHRI 390–2003 does not define “non-filtered equipment.” *Id.* As part of the July 2018 RFI, DOE requested comment on whether any SPVUs are designed to be installed without a filter. *Id.* at 83 FR 34499, 34502. DOE also requested comment on the typical effectiveness (*i.e.*, minimum efficiency reporting value (“MERV”) rating) of filters provided with SPVUs. *Id.* DOE requested comment on whether non-ducted SPVUs intended for installation with a filter are ever tested without a filter installed and, if so, how such testing has accounted for the filter pressure drop to better represent actual performance. *Id.*

AHRI and Lennox commented that all SPVUs on the market are designed to be installed with a filter, are shipped with a filter, and should be tested with the supplied filter. (AHRI, No. 5 at p. 4; Lennox, No. 6 at p. 3) AHRI added that the effectiveness of the filter can vary based on application. (AHRI, No. 5 at p. 4) AHRI also stated that all SPVUs on

the market are tested with a filter. *Id.* NEEA and NWPCCC commented that SPVUs are used primarily in commercial buildings, and that ASHRAE Standard 52.2, “Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size,” recommends MERV 8 filters for commercial buildings. Consequently, NEEA and NWPCCC recommended that SPVUs be tested with a MERV 8 filter rating to be representative of equipment use in the field. (NEEA, NWPCCC, No. 7 at p. 2) GE commented that any test procedure change requiring the addition of a filter would increase test burden and product development cost. (GE, No. 3 at p. 2) GE stated that filter types, sometimes specified by local or State requirements, differ and that there is a risk of unintended test variation depending upon the filter specified. *Id.* GE stated that such variation could result in erroneous enforcement test results. *Id.* GE also commented that it opposes any test procedure change that potentially could dictate product design requirements, such as filter selection. *Id.*

Section 3.19 of AHRI 390–2021 includes a definition for the term “Standard Filter” and requires that an SPVU must be tested with the filter designated by the manufacturer in the marketing materials for the model as the “default” or “standard” filter in Table 2, and does not allow for testing without a filter. Section 5.7.3.1 of AHRI 390–2021 states that if the manufacturer does not specify a “default” or “standard” filter option, then the Standard Filter is the filter with the lowest level of filtration, as specified in the marketing materials for the model. If the marketing materials do not specify a Standard Filter, or do not specify which filter option has the lowest filtration level, then the Standard Filter is any filter shipped by the manufacturer for that model.

In light of the above, DOE preliminarily concludes that a 0.08 in H<sub>2</sub>O increase in the minimum ESP for units tested without a filter is not necessary in the SPVU test procedure because, based on a review of equipment on the market and supported by the comments from AHRI and Lennox, DOE finds that all SPVUs are designed to be installed with a filter, are shipped with a filter, and are tested with a filter. In response to NEEA and NWPCCC, DOE identified many SPVUs that offered filters with lower filtration than MERV 8 filters, so requiring them may not be representative of all field applications. In addition, based on a review of equipment on the market, different manufacturers might specify

different filters as “standard” (*i.e.*, there is not a single filter type recognized as “standard” by the industry).

Manufacturers might also market an SPVU with multiple filter options from which the consumer can choose.

DOE has, therefore, initially determined that the requirement to test with a filter and the provisions on filter selection would provide more representative results by testing with a filter that is more likely to be used by a consumer in the field and is consistent with how manufacturers are currently testing. In this NOPR, DOE proposes to adopt the provisions in Section 3.19 and Table 2 in AHRI 390–2021 for testing with the Standard Filter, as enumerated in section 0 of the proposed Appendix G and section 0 of the proposed Appendix G1.

#### f. External Static Pressure and Airflow Requirements

SPVUs include fans that circulate indoor air over a heat exchanger and provides heating or cooling either through ductwork or directly to the conditioned space. To deliver sufficient conditioned air to the intended space, the airflow provided by the unit must overcome pressure losses throughout duct work (if present), and to a smaller degree, within the unit itself. Pressure losses are the result of directional changes in the ductwork, friction between the moving air and surfaces of the ductwork, and possible appurtenances in the airflow path. Further, different modes of operation may require different amounts of airflow. Therefore, indoor fan speed is typically adjustable to assure that the provided airflow rate is appropriate for the field-installed ductwork system serving the building in which the unit is installed. The performance of an SPVU can be significantly affected by variation in ESP or operation with an indoor airflow that is different from the intended or designed airflow. To ensure that a test procedure provides results that are representative of an average-use cycle, appropriate airflow settings for testing and ESP requirements are needed to reflect the typical pressure losses. Such specifications would also contribute to the repeatability of the test procedure.

#### i. External Static Pressure

As part of the July 2018 RFI, DOE noted that Table 4 of ANSI/AHRI 390–2003 specifies the minimum ESP required for testing ducted SPVUs based on capacity range. DOE sought comments on whether the minimum ESP requirements in ANSI/AHRI 390–2003 are representative of field

operation for ducted SPVUs, and if not, comment and data on what representative minimum ESP levels would be. 83 FR 34499, 34502 (July 20, 2018).

The CA IOUs, as well as ASAP, NRDC, and ACEEE, commented that the minimum ESP requirements in the test procedure may be significantly lower than typical ESPs in the field, which would significantly underestimate fan power consumption. (CA IOUs, No. 2 at pp. 2–3; ASAP, NRDC, and ACEEE, No. 4 at p. 3) ASAP, NRDC, and ACEEE commented that DOE should ensure that the minimum ESP requirements specified in the SPVU test procedure adequately reflect conditions in the field. (ASAP, NRDC, and ACEEE, No. 4 at p. 3) NEEA and NWPC added that the ASRAC Working Group for commercial package air conditioners recommended that DOE develop minimum ESP requirements for SPVUs that adequately represent performance in the field and that provide accurate information to consumers to make purchasing decisions. (NEEA and NWPC, No. 7 at pp. 1–2)

NEEA and NWPC stated that for CUACs, there is inconsistency between the range of ESPs specified in the test procedure (0.2 to 0.75 in H<sub>2</sub>O) compared to the range of ESPs used for the analysis for the standards rulemaking (0.75 and 1.25 in H<sub>2</sub>O). (NEEA and NWPC, No. 7 at p. 2) NEEA and NWPC stated that if the ESP requirements in the test procedure are lower than those typically found in the field, the ratings of SPVUs will provide neither an adequate representation of actual efficiency nor accurate information to consumers. *Id.* NEEA and NWPC added that the ESP requirements should have no impact on test burden since there would be no change to how the test is conducted. *Id.*

The CA IOUs referenced the minimum ESP requirement of 0.5 in H<sub>2</sub>O for residential central air conditioners and heat pumps with capacities less than 65,000 Btu/h, as specified in 10 CFR part 430, subpart B, appendix M1, “Uniform Test Method for Measuring the Energy Consumption of Central Air Conditioners and Heat Pumps,” and commented that DOE should align all other heating, ventilating, and air conditioning (“HVAC”) equipment, including SPVUs, with the values specified in Appendix M1, which increase in ESP based on corresponding increases in cooling capacity. (CA IOUs, No. 2 at pp. 2–3)

AHRI commented that based on conversations with company application engineers, the minimum ESP requirements specified in ANSI/

AHRI 390–2003 are representative of field operation for ducted SPVUs installed with 10 feet of ductwork or less. (AHRI, No. 5 at p. 4) Lennox also stated that the current ESP requirements are representative of field operation for ducted SPVUs. (Lennox, No. 6 at p. 4) No commenter provided data as to the ESPs experienced in field operation.

In response, DOE notes the range of comments received as to the appropriate ESP for testing. AHRI 390–2021 maintained the same minimum ESP requirements as specified in ANSI/AHRI 390–2003. DOE does not have data indicating that these minimum ESP requirements are unrepresentative of field operation for ducted SPVUs. DOE also recognizes that SPVUs are typically installed in smaller modular buildings with different duct configurations. As a result, DOE notes that minimum ESP requirements for other equipment (*e.g.*, CACs, CUACs) may not be relevant for SPVUs. DOE also notes that in the previous standards rulemaking the ESP values were aligned with the values used in the test procedure. As a result, DOE does not expect there to be inconsistency between the test procedure and the analysis conducted for the standards rulemaking. Based on this, DOE is tentatively not proposing to revise the ESP requirements in the DOE test procedure for SPVUs but to instead remain consistent with AHRI 390–2021.

*Issue 5:* DOE welcomes data and information on ESP conditions experienced in field operation of ducted SPVUs.

#### ii. Airflow Rate

##### Full-Load Cooling Test

DOE noted in the July 2018 RFI that ANSI/AHRI 390–2003 does not specify tolerances on achieving the rated airflow or the minimum ESP during testing. As discussed previously, the performance of an air conditioner or heat pump can be affected by variations in airflow and ESP. In the July 2018 RFI, DOE noted that the current DOE test procedure for CUACs requires that the indoor airflow for the full-load cooling test be within  $\pm 3$  percent of the rated airflow and specifies a tolerance of  $-0.00/+0.05$  in H<sub>2</sub>O for the ESP requirements. 83 FR 34499, 34502 (July 20, 2018). DOE also noted that in DOE’s test procedure for CAC/HPs, the method for setting indoor air volume rate for ducted units without variable-speed constant-air-volume-rate indoor fans is a multi-step process that addresses the discrete-step fan speed control of these units. *Id.* In this method, (a) the air volume rate during testing may not be higher than the certified air volume rate,

but may be up to 10 percent less, and (b) the ESP during testing may not be lower than the minimum specified ESP, but may be higher than the minimum if this is required to avoid having the air volume rate overshoot its certified value. 10 CFR part 430, subpart B, appendix M, section 3.1.4.2.a. As part of the July 2018 RFI, DOE requested information on the different types of indoor air fan drive systems that are used for SPVUs and information on appropriate tolerances for setting airflow and ESP. 83 FR 34499, 34502 (July 20, 2018).

On this topic, AHRI stated that SPVUs use permanent split-capacitor motors with discrete speed settings or electronically-commutated motors with variable speed settings; and that in either case, the unit leaves the factory with the fan and motor set at a specific speed to provide the rated performance. (AHRI, No. 5 at p. 4) Lennox commented that its equipment uses motors and controls with speed/airflow settings developed for each specific product and mode of operation, which are factory pre-set to optimize performance. (Lennox, No. 6 at p. 4) Lennox stated that for its equipment, the manufacturer-specified airflow setting should allow the ability to set the airflow to the specified value while meeting the ESP requirements for testing. *Id.* Lennox further commented that the manufacturer settings should be used for testing. *Id.* Lennox stated that if the minimum ESP cannot be maintained, the airflow should be set to the maximum airflow while maintaining the required ESP. *Id.*

AHRI commented that the then-draft version of AHRI 390 directed use of the manufacturer-specified fan control settings for all tests for which they are provided. (AHRI, No. 5 at p. 4) AHRI also commented that the draft version of AHRI 390 directed use of the full-load cooling fan control settings specified by the manufacturer for all tests for which fan control settings are specified, and if there are no specified fan control settings for any tests, use the as-shipped fan control settings for all tests. *Id.* AHRI added that for testing, the priority is setting the correct airflow speed, and the ESP is adjusted to match the required airflow. *Id.* AHRI noted that the draft version of AHRI 390 provided that the airflow-measuring apparatus should be adjusted to maintain ESP within  $-0/+0.05$  in H<sub>2</sub>O of the required minimum ESP and to maintain the airflow within  $\pm 3$  percent of the manufacturer-specified full-load cooling airflow. *Id.*

DOE notes that AHRI 390–2021 specifies an airflow tolerance of  $\pm 3$

percent of the full-load cooling airflow. This would be consistent with the test procedure for other commercial air conditioning and heat pump equipment, and it would ensure that the rated airflow remains representative of field use during testing. Therefore, DOE has tentatively concluded that the  $\pm 3$  percent airflow tolerance included in AHRI 390–2021 is appropriate for testing SPVUs. Accordingly, DOE proposes to adopt the full-load cooling airflow tolerance specified in Section 5.7 of AHRI 390–2021.

AHRI 390–2021 also includes additional instructions for how to set indoor airflow if the airflow and ESP tolerances cannot be maintained simultaneously. For non-ducted units, ducting is not installed in the field; therefore, increasing ESP (which simulates the resistance to airflow from longer duct length in the field) beyond the specified tolerance of  $-0/+0.05$  in H<sub>2</sub>O during testing would not be representative of field application. Consequently, if both the ESP and airflow cannot be maintained within tolerance during the test, Section 5.7.3.3.4 of AHRI 390–2021 specifies that the ESP be maintained within the required tolerance and an airflow as close to the certified value as possible be used.

For ducted units, if ESP and/or airflow are higher than the tolerance range at the lowest fan control setting (e.g., lowest fan speed), maintaining airflow within tolerance should take precedence over maintaining ESP within tolerance. This is because operating with an airflow higher than the certified value would likely result in an airflow (and thus measured efficiency) that is unrepresentative of field operation. Section 5.7.3.4.1.2 of AHRI 390–2021 specifies that the airflow-measuring apparatus be adjusted to maintain airflow within tolerance and to operate with the lowest possible ESP that meets the minimum requirement. If ESP or airflow are lower than the tolerance range at the maximum fan control setting (e.g., highest fan speed), maintaining ESP at or above the minimum value should take precedence over maintaining airflow within tolerance because operating with an ESP lower than the minimum value does not reflect typical duct lengths (or measured efficiency) in field application. In such a case, Section 5.7.3.4.1.3 of AHRI 390–2021 specifies that the airflow-measuring apparatus be adjusted to maintain ESP within tolerance and to operate with an airflow as close as possible to the certified value.

DOE understands the provisions regarding tolerances and priority for

adjustment of fan speed and ESP in AHRI 390–2021 are consistent with the methodology in the draft version of AHRI 390, as evidenced by the excerpt provided in AHRI's comments (AHRI, No. 5 at p. 5). DOE preliminarily finds that these provisions would not conflict with any provisions in the current DOE test procedure, and would improve test repeatability and provide test conditions that are more representative of those during operation in the field. Based on this, DOE is proposing to adopt the provisions specified in Section 5.7.3 of AHRI 390–2021 for setting indoor airflow if the airflow and ESP tolerances cannot be maintained simultaneously, as enumerated in section 0 of the proposed Appendix G and section 0 of the proposed Appendix G1.

#### Heating Test

DOE noted in the July 2018 RFI that ANSI/AHRI 390–2003 does not distinguish between cooling and heating airflow rates required for testing. 83 FR 34499, 34502 (July 20, 2018). For SPVHPs with multiple-speed or variable-speed indoor fans, the indoor airflow rate in heating operation could be different from that in cooling operation. *Id.* Different airflow rates may be used for heating and cooling operation because of different indoor comfort needs in the heating season, and there may be a minimum heating airflow rate for electrical resistance heating safety that exceeds the cooling airflow rate. *Id.* DOE also noted in the July 2018 RFI that, for CUAC heat pumps, DOE's current test procedure requires that indoor airflow and ESP first be established within required tolerances for the full-load cooling test condition by adjusting both the unit under test and the test facility's airflow-measuring apparatus (*see* 10 CFR part 431, subpart F, appendix A, section 6(ii)). 83 FR 34499, 34502 (July 20, 2018)) The CUAC test procedure further provides that, unless the unit is designed to operate at different airflow rates for cooling and heating modes, if necessary, the airflow-measuring apparatus (but not the unit under test) may be adjusted to achieve an airflow in heating mode equal to the cooling full-load airflow rate within the specified tolerance, without regard to changes in ESP (*see* 10 CFR part 431, subpart F, appendix A, section 6(ii)). 83 FR 34499, 34502 (July 20, 2018).

As part of the July 2018 RFI, DOE requested comment on whether provisions similar to those required for CUACs would be appropriate for determining airflow rate and minimum ESP for heating mode tests for SPVHPs. 83 FR 34499, 34502 (July 20, 2018).

NEEA and NWPC commented that if SPVHPs operate at different airflow speeds for heating and cooling, then SPVUs should be tested similar to CUACs, for which the heating efficiency is evaluated at the unique heating airflow rate. (NEEA and NWPC, No. 7 at p. 3) Lennox commented that SPVHP airflow rates for heating and cooling are generally the same, but that the test procedure should not preclude using different airflow rates that could provide benefits in performance. (Lennox, No. 6 at p. 4) AHRI added that the draft version of AHRI 390 included procedures that provide for a difference in the manufacturer-specified heating airflow and full-load cooling airflow. (AHRI, No. 5 at pp. 4–5)

In response, DOE notes that AHRI 390–2021 includes provisions for setting the heating airflow rate that are consistent with the excerpt of the draft version of AHRI 390 provided in AHRI's comments, (AHRI, No. 5 at p. 5), which allows for testing with a manufacturer-specified heating airflow that is different than the full-load cooling airflow. These provisions reflect that units may be designed to operate in the field at a different heating airflow rate as compared to the cooling airflow rate. Therefore, DOE is proposing to adopt Sections 5.7.2.3 and 5.7.3.4.2 of AHRI 390–2021 with regards to setting the airflow and ESP for heating tests (as applicable), as enumerated in section 0 of the proposed Appendix G and section 0 of proposed Appendix G1.

#### 2. Air Temperature Measurements

Measurement of air conditions is a critical aspect of performance testing for air-conditioning and heat pump equipment generally. The air conditions affect performance (both capacity and power input), and the primary methods for determination of capacity rely on measurements of air temperature and humidity. ANSI/ASHRAE 390–2003 references ANSI/ASHRAE Standard 37–1988, “Methods of Testing for Rating Unitary Air-Conditioning and Heat Pump Equipment” (“ANSI/ASHRAE 37–1988”) for methods of testing SPVUs. As relevant here, ANSI/ASHRAE 37–1988 provides specifications for temperature sensors (section 5.1), as well as for ensuring measurement uniformity (section 8.5).

DOE noted in the July 2018 RFI that, for air-cooled and evaporatively-cooled CUACs, AHRI 340/360–2015 provides more extensive direction for condenser air temperature measurement in its Appendix C, including specifications to use air sampling trees and psychrometers, temperature measurement accuracy requirements,

and other specifications to ensure that the measured conditions are representative of average condenser air inlet conditions. 83 FR 34499, 34503 (July 20, 2018). In the July 2018 RFI, DOE requested comment on whether requirements similar to AHRI 340/360–2015 should be adopted for testing SPVUs. *Id.*

DOE also noted in the July 2018 RFI that while Appendix C of AHRI 340/360–2015 provides detailed direction for measurement of entering outdoor air temperature, it provides no such direction for measurement of entering indoor air temperature, indoor leaving air temperature, or outdoor leaving air temperature. 83 FR 34499, 34503 (July 20, 2018). However, these parameters have a significant impact on performance of an SPVU as measured by the indoor air enthalpy method and the outdoor air enthalpy method. *Id.* Therefore, in the July 2018 RFI, DOE also requested comment on whether the requirements contained in Appendix C of AHRI 340/360–2015 would be appropriate for measurement of these parameters when testing SPVUs. *Id.*

The CA IOUs, NEEA and NWPCC supported using provisions similar to Appendix C of AHRI 340/360–2015 to measure indoor air entering and leaving temperatures, as well as outdoor air entering and leaving temperatures. (CA IOUs, No. 2 at p. 2; NEEA and NWPCC, No. 7 at p. 3) NEEA and NWPCC added that this would result in the most accurate and repeatable test measurement. (NEEA and NWPCC, No. 7 at p. 3) AHRI commented that adding measurement requirements for indoor air entering and leaving temperatures, as well as outdoor air entering and leaving temperatures for water slinger systems (*i.e.*, units that use condensate from the evaporator to enhance condenser cooling), similar to those in Appendix C of AHRI Standard 340/360–2015 would be appropriate. (AHRI, No. 5 at p. 6) Lennox commented that further evaluation of various SPVU configurations is needed to determine appropriateness of the provisions in Appendix C of AHRI 340/360–2015. (Lennox, No. 6 at p. 5)

In the interim, AHRI 390–2021 has addressed this issue. Specifically, Appendix D of AHRI 390–2021 includes a comprehensive set of provisions to measure air temperatures, including the measurement of entering indoor temperature, indoor leaving temperature, entering outdoor temperature, and outdoor leaving temperature. DOE notes that these additional requirements were also included in the revised AHRI 340/360–

2019. Specifically, AHRI 390–2021 includes the following requirements:

- Measurements of indoor and outdoor air entering dry-bulb temperatures and water vapor conditions. In addition, measurement of the indoor air leaving dry-bulb temperatures and water vapor conditions if the indoor air enthalpy method is used, and outdoor air leaving dry-bulb temperatures and water vapor conditions if the outdoor air enthalpy method is used;
- Temperature measurement accuracies and display resolutions for dry-bulb and wet-bulb temperatures, as well as thermopile temperatures;
- Methods of water vapor measurement using either an aspirating psychrometer or a dew point hygrometer;
- Air sampling tree specifications, including construction provisions, hole density requirements, average air velocity of the flow area, and thermopile arrangement;
- Description of the test set-up for air sampling trees, which includes defining the arrangement of the face area, the number of aspirating psychrometers per unit side, the location of the air sampling trees and their coverage of the entrance to the unit, and the number of sampling trees per aspirating psychrometer;
- Dry-bulb temperature measurement using psychrometer dry-bulb sensors;
- Wet-bulb or dew point temperature measurements to determine air water vapor content using psychrometers or hygrometers;
- Measurements of temperature change and pressure drop across the conduit used to transfer air from air samplers to psychrometers and, if certain thresholds are exceeded, provisions for determining dry-bulb temperature and atmospheric pressure (used to calculate humidity ratio);
- Specifications for dry-bulb and wet-bulb temperature uniformity;
- Additional specifications for measuring air conditions entering the indoor coil, including provisions for returning sampled air to the room, conditions for temperature uniformity specifications, and directions if air is sampled within a duct; and
- Additional specifications for measuring both indoor coil and outdoor coil leaving air conditions, including conditions for temperature uniformity requirements, provisions for returning sampled air to the duct leaving the coil, provisions if the coil has a blow-through fan, and additional requirements for the air sampling tree.

DOE has tentatively determined that the air measurement provisions of AHRI

390–2021 in Appendix D address the lack of specificity in the current DOE test procedure for SPVUs, improve temperature uniformity and ensure accurate and repeatable temperature measurements for SPVUs, and ensure that representative conditions are maintained during testing. Therefore, DOE is proposing to adopt the provisions for measurement of air conditions in Appendix D of AHRI 390–2021 both into section 1 of the proposed Appendix G and into section 1 of the proposed Appendix G1. Inclusion in AHRI 390–2021 and AHRI's comments in support indicate that the proposed air measurement specifications are considered best practice by industry and reflect current industry practice. As such, DOE would expect that adoption of the air measurement specifications in AHRI 390–2021 would present minimal, if any, increase in test burden for manufacturers.

### 3. Defrost Energy Use

In the July 2018 RFI, DOE noted that SPVHPs generally include a defrost cycle to periodically defrost the outdoor coil when operating in outdoor ambient conditions in which frost collects on it during heating operation. 83 FR 34499, 34504 (July 20, 2018). Based on preliminary DOE review of product literature, the time between defrost cycles can be between 30 and 90 minutes, and typical defrost cycle duration is approximately 10 minutes. *Id.* During the defrost cycle, the SPVHP is consuming energy but is not providing heat to the conditioned space, unless it also energizes auxiliary heat during defrost. *Id.*

The current Federal test procedure for SPVUs is based on testing in outdoor air conditions for which defrost is not necessary (*i.e.*, 47 °F outdoor air dry-bulb temperature). This means that any differences in defrost cycle performance between different SPVHP models is not reflected in the heating mode metric (*i.e.*, COP). DOE noted in the July 2018 RFI that the DOE test procedure for CACs/HPs includes measurement of average delivered heat and total energy use (including for defrost cycles) during operation in outdoor conditions for which frost forms on the outdoor coil. *Id.* In contrast, DOE's test procedures for commercial heat pumps do not include consideration of defrost. *Id.* In the July 2018 RFI, DOE requested information regarding the types of buildings most commonly served by SPVHPs, as well as the annual heating and cooling loads for such buildings. *Id.* DOE also requested information on the impact on heating mode efficiency associated with the defrost cycle for SPVHPs, including



impacts associated with the potential use of resistance heating during defrost. *Id.*

On this topic, the CA IOUs stated that relocatable classrooms commonly utilize SPVUs. The CA IOUs suggested that DOE should consider the CA Public Utilities Commission building prototype for relocatable classrooms.<sup>12</sup> This prototype provides typical dimensions, plug loads, lighting, occupancy schedule, envelope characteristics, and thermostat set points of relocatable classrooms which allows for the modeling of annual cooling and heating loads. (CA IOUs, No. 2 at p. 4) The CA IOUs stated that this building prototype was based on the Lawrence Berkeley National Laboratory study titled “High-Performance Commercial Buildings Project” from 2003.<sup>13</sup> *Id.*

ASAP, NRDC, and ACEEE commented that DOE should incorporate defrost and performance at lower ambient temperatures in the heating efficiency metric. (ASAP, NRDC, and ACEEE, No. 4 at p. 2) ASAP, NRDC, and ACEEE stated that incorporating defrost would allow the test procedure to better reflect actual heating capacity and efficiency in the field, thereby providing better information to consumers and encouraging manufacturers to develop innovative defrost strategies. *Id.* ASAP, NRDC, and ACEEE also encouraged DOE to incorporate performance at lower ambient temperatures into the metric for heating efficiency. *Id.* SPVHPs typically include back-up electric resistance heating, which is used when the heat pump cannot meet the heating load. ASAP, NRDC, and ACEEE stated that because the test procedure only requires testing SPVHPs at 47 °F outdoor air dry-bulb temperature for heating mode, it does not differentiate the ability of equipment to maintain good heating capacity using the heat pump cycle at low ambient temperatures, as opposed to shutting the heat pump cycle off and switching to electric resistance heating. *Id.* According to ASAP, NRDC, and ACEEE, incorporating performance at lower ambient temperatures in the heating efficiency metric would encourage equipment designs that maintain efficiency performance at low

ambient temperatures, which will ultimately benefit consumers. *Id.*

NEEA and NWPCC commented that the frequency of defrost cycles varies between manufacturers and that the defrost cycle typically stays on for approximately 10 minutes. (NEEA and NWPCC, No. 7 at p. 4) NEEA and NWPCC recommended decreasing the efficiency rating by a given increment based on average annual defrost energy use for the default defrost cycle frequency setting. *Id.* NEEA and NWPCC stated that this would likely lead to manufacturers reducing the frequency of their default defrost cycles, which would result in energy savings for building applications that do not need frequent defrost cycles. *Id.*

AHRI and Lennox commented that they respectively estimated that fewer than 30 and 20 percent of SPVUs are heat pumps, and they argued that DOE’s proposal to include provisions to measure the average delivered heat and total energy use, including for defrost cycles, during operation in outdoor conditions for which frost forms on the outdoor coil is not necessary for this equipment. (AHRI, No. 5 at p. 9; Lennox, No. 6 at p. 6) AHRI added that the electric heat used during defrost is small in comparison to electric heat use when the heat pump cannot keep up to meet the heating load. (AHRI, No. 5 at p. 9)

DOE notes that AHRI 390–2021 does not include provisions for measuring defrost energy for SPVHPs. Consistent with ANSI/AHRI 390–2003, AHRI 390–2021, and DOE’s test procedures for other commercial heat pumps, DOE is not proposing to include provisions for including the defrost energy of SPVHPs. DOE notes that the study the CA IOUs cited only monitored relocatable classrooms within the State of California and does not encompass the different types of SPVU installations or operating conditions. At this time, DOE lacks sufficient information on the number of SPVHP installations by building type and geographical region, as well as information regarding the frequency of operation of defrost cycles or representative low ambient conditions during field use and the annual heating and cooling loads in those installations, which would be needed to determine whether such testing conditions would be appropriate for SPVUs and to develop a metric representing the national average for SPVUs.

*Issue 6:* DOE requests comment and data on the number of SPVHP installations by building type and geographical region and the annual heating and cooling loads for such buildings. DOE also requests data on the

frequency of operation of defrost cycles and representative low ambient conditions for those buildings and installations.

#### 4. Outdoor Air Enthalpy Method

As discussed previously, the current DOE test procedure, which incorporates by reference ANSI/AHRI 390–2003, also references ANSI/ASHRAE 37–1988 for methods of testing SPVUs. Section 7.2 of ANSI/ASHRAE 37–1988 specifies primary and secondary capacity measurements for equipment with cooling capacities less than 135,000 Btu/h. Specifically, the indoor air enthalpy method must be used as the primary method for capacity measurement, and Table 3 of ANSI/ASHRAE 37–1988 specifies the applicable options for selecting a secondary method. The two test methods must agree within 6 percent (*see* Section 10.1.2 of ANSI/ASHRAE 37–1988).

DOE noted in the July 2018 RFI that the outdoor air enthalpy test method is commonly used as the secondary test method for determining capacity for SPVUs. 83 FR 34499, 34502–34503 (July 20, 2018). The outdoor air enthalpy method specified in ANSI/ASHRAE 37–1988 specified the use of an air-side test apparatus that is connected to the unit under test. However, the airflow and operating conditions achieved with the outdoor air-side test apparatus connected may differ from those achieved without the apparatus connected. Therefore, Section 8.5 of ANSI/ASHRAE 37–1988 (which is referenced by ANSI/AHRI 390–2003) specifies testing both with and without the air-side test apparatus connected. *Id.* at 83 FR 34503. ANSI/ASHRAE 37–1988 specifies first conducting a one-hour preliminary test without the outdoor air-side test apparatus connected, followed by a second one-hour test with the outdoor air-side test apparatus connected. *Id.* The second test (with the outdoor air-side test apparatus connected) serves as the official test. *Id.* ANSI/ASHRAE 37–1988 further provides that there must be agreement of the evaporating and condensing temperatures between the two tests for a valid test. *Id.*

DOE further noted in the July 2018 RFI that in a test procedure final rule for CACs/HPs (82 FR 1426 (Jan. 5, 2017)), DOE amended its test procedure requirements for use of the outdoor air enthalpy method as the secondary test method for capacity measurement for CAC/HPs. 83 FR 34499, 34503 (July 20, 2018). DOE’s test procedure for CAC/HPs had previously included provisions similar to those in ANSI/ASHRAE 37–

<sup>12</sup> The CA Public Utilities Commission (CPUC) building prototype for relocation classrooms is available as part of the CPUC’s Database for Energy Efficiency Resources, available at: <http://www.deeresources.com/>.

<sup>13</sup> Selkowitz, Stephen, *High Performance Commercial Building Systems*. Prepared by the Lawrence Berkeley National Laboratory for the California Energy Commission. LBNL–53538 (October 2003) (Available at: <https://www.osti.gov/servlets/purl/821762>).

1988: The preliminary test was conducted without the outdoor air-side test apparatus connected, and the official test was conducted with the outdoor air-side test apparatus connected, with a requirement to achieve agreement of the evaporating and condensing temperatures between the two tests. For CAC/HPs, DOE determined that testing with the outdoor air-side test apparatus connected introduced more variability to the test results when compared to testing without the apparatus connected, and that test variability could be reduced by shifting to an approach in which the official test is the one without the apparatus connected. See 82 FR 1426, 1508–1509 (Jan. 5, 2017). As part of the July 2018 RFI, DOE requested comment on whether modifications to the requirements for using the outdoor air enthalpy method as the secondary method for testing SPVUs (similar to those made for CAC/HPs) would be appropriate, including that the official test be conducted without the outdoor air-side test apparatus connected. 83 FR 34499, 34503 (July 20, 2018).

The CA IOUs commented that the outdoor air enthalpy method should be used as the secondary method for testing SPVUs and agreed that the official test should be conducted without the outdoor air-side test apparatus connected. (CA IOUs, No. 2 at p. 2) AHRI commented that the AHRI 390 committee was reviewing the secondary capacity measurement methods. (AHRI, No. 5 at p. 6) AHRI stated that after that evaluation is complete, it would recommend conducting the official test without the outdoor air-side test apparatus connected. *Id.* Lennox commented that further evaluation of the secondary capacity measurements is needed, but it stated that secondary methods using refrigerant flow require altering the system to place the flowmeter into the refrigerant system and, therefore, could significantly alter performance. (Lennox, No. 6 at p. 5)

Since the time of the July 2018 RFI, AHRI 390–2021 was adopted, and that test method includes provisions in Section E5 consistent with those adopted in the January 2017 CAC/HP TP final rule. More specifically, AHRI 390–2021 requires that the official test be the one in which the outdoor air side test apparatus is not connected. For the same reasons DOE presented in the January 2017 CAC/HP TP final rule and discussed previously, DOE has preliminarily determined that the provisions in AHRI 390–2021 would better represent field use of SPVUs and improve test repeatability and

reproducibility. For these reasons, DOE proposes to adopt the capacity measurements specified in Section E5 of AHRI 390–2021, into section 1 of the proposed Appendix G and into section 1 of the proposed Appendix G1. DOE has tentatively determined that this proposal would impose only minimal additional burden to manufacturers and would not require retesting of units because the existing test results contain the data necessary for the capacity measurements as specified in Section E5 of AHRI 390–2021.

#### F. Configuration of Unit Under Test

##### 1. Specific Components

An ASRAC working group for certain commercial heating, ventilating, and air conditioning (“HVAC”) equipment (“Commercial HVAC Working Group”),<sup>14</sup> which included SPVUs, submitted a term sheet (“Commercial HVAC Term Sheet”) providing the Commercial HVAC Working Group’s recommendations. (Docket No. EERE–2013–BT–NOC–0023, No. 52)<sup>15</sup> 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 Departmental 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 Departmental testing. These features were listed under the heading “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 Departmental testing of commercial HVAC equipment. (See [www.energy.gov/gc/downloads/commercial-equipment-testing-](http://www.energy.gov/gc/downloads/commercial-equipment-testing-)

<sup>14</sup> In 2013, ASRAC formed the Commercial HVAC Working Group to engage in a negotiated rulemaking effort regarding the certification of certain commercial HVAC equipment, including SPVUs. The Commercial HVAC Working Group’s recommendations are available at [www.regulations.gov](http://www.regulations.gov) under Docket No. EERE–2013–BT–NOC–0023–0052.

<sup>15</sup> Available at [www.regulations.gov/document/EERE-2013-BT-NOC-0023-0052](http://www.regulations.gov/document/EERE-2013-BT-NOC-0023-0052).

*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 one of the optional features. (*Id.* 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, meaning that each basic model includes either a model without the optional feature(s) or a model with the optional features that is eligible for testing. *Id.* The features in the Commercial HVAC Enforcement Policy for SPVUs (*Id.* at pp. 3–4) align with the Commercial HVAC Term Sheet’s list designated “Equipment Features Subject to Enforcement Policy.”

AHRI 390–2021 includes Appendix F, “Unit Configuration for Standard Efficiency Determination—Informative.” Section F1.3 of AHRI 390–2021 includes a list of features that are optional for testing. Section F1.3 of AHRI 390–2021 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 F1.3 of AHRI 390–2021.
- For each optional feature, Section F1.3 of AHRI 390–2021 includes explicit instructions on how to conduct testing for equipment with the optional feature present.

The optional features provisions in AHRI 390–2021 are generally consistent with DOE’s Commercial HVAC Enforcement Policy, but the optional features in Section F1.3 of AHRI 390–2021 do not entirely align with the list of features included for SPVUs in the Commercial HVAC Enforcement Policy. The list of optional features in section F1.3 includes five features that are not present in the Commercial HVAC Enforcement Policy for SPVUs: (1) Fresh air dampers; (2) barometric relief dampers; (3) power correction capacitors; (4) hail guards, and (5) UV lights. All five of these features in Section F1.3 are included for SPVUs in the “Equipment Features Requiring Test Procedure Action” section of the Commercial HVAC Term Sheet. Therefore, DOE has tentatively concluded that their inclusion as

optional features for SPVUs is appropriate.

DOE notes that the list of features and provisions in Section F1.3 of Appendix F of AHRI 390–2021 conflates features that can be addressed by testing provisions with features that warrant enforcement relief (*i.e.*, features 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. Further, provisions more explicit than included in Section F1.3 of AHRI 390–2021 are warranted to clarify the differences between how specific components must be treated when manufacturers are making representations as opposed to when DOE is conducting enforcement testing.

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 F of AHRI 390–2021 and instead is proposing related provisions in 10 CFR 429.43, 10 CFR 429.134, and 10 CFR part 431, subpart F, Appendix G1. Specifically, in Appendix G1, DOE proposes test provisions for specific components, including all of the components listed in Section F1.3 which there is a neutralizing test procedure action (*i.e.*, test procedure provisions specific to the component that are not addressed by general provisions in AHRI 390–2021 that negates the components impact on performance).<sup>16</sup> These provisions would specify how to test a unit with such a component—*i.e.*, for a unit with hail guards, remove hail guards for testing. These proposed test provisions are consistent with the provision in Section F1.3 of AHRI 390–2021, 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).

<sup>16</sup> For the following components listed in Section F1.3 of AHRI 390–2021, DOE has tentatively concluded that there is not a neutralizing test procedure action specified in Section F1.3 of AHRI 390–2021 for testing a unit with the component present, and is, therefore, not proposing to include test procedure actions specific to these components in Appendix G1: Powered Exhaust/Powered Return Air Fans and Hot Gas Bypass.

Consistent with the Commercial HVAC Term Sheet and the Commercial HVAC Enforcement Policy, DOE is proposing provisions that would allow determination of represented values of a model equipped with a particular component to be based on an individual model distributed in commerce without the component in specific cases. The provisions apply to certain components for which the test provisions for testing a unit with the component may result in differences in ratings compared to testing a unit without the component.<sup>17</sup> For these such components, DOE proposes in 10 CFR 429.43(a)(4) that:

- If a basic model includes only individual models distributed in commerce with a specific component, or does not include any otherwise identical individual models without the specific component, the manufacturer must determine represented values for the basic model based on performance of an individual model with the component present (and consistent with any relevant proposed test procedure provisions in Appendix G1).
- If a basic model includes both individual models distributed in commerce with a specific component and otherwise identical individual models without the specific component, the manufacturer may determine represented values for the basic model based on performance of an individual model either with the component present (and consistent with any relevant proposed test procedure provisions in Appendix G1) or without the component present.

DOE notes that in some cases, individual models may include more than one of the specified components (*i.e.*, both an economizer and dehumidification components) or there may be individual models within a basic model that include various dehumidification components that result in more or less energy use. In these cases, the represented values of performance must be representative of the lowest efficiency found within the basic model.

Also consistent with the Commercial HVAC Term Sheet and the Commercial HVAC Enforcement Policy, DOE is proposing provisions in 10 CFR 429.134(s)(1) regarding how DOE would assess compliance for basic models that

include individual models distributed in commerce with air economizers or dehumidification components. Specifically:

- If a basic model includes only individual models distributed in commerce with a specific component, or does not include any otherwise identical individual models without the specific component, DOE may assess compliance for the basic model based on testing an individual model with the component present (and consistent with any relevant proposed test procedure provisions in Appendix G1).
- If a basic model includes both individual models distributed in commerce with a specific component and otherwise identical individual models without the specific component, DOE will assess compliance for the basic model based on testing of an otherwise identical model within the basic model that does not include the component; except if DOE is not able to obtain such a model for testing. In such a case, DOE will assess compliance for the basic model based on testing of an individual model with the specific component present (and consistent with any relevant proposed test procedure provisions in Appendix G1).

Were DOE to adopt the provisions in 10 CFR 429.43, 10 CFR 429.134, and 10 CFR part 431, subpart F, appendix G1 as proposed, DOE would rescind the Commercial HVAC Enforcement Policy to the extent it is applicable to SPVUs. In a separate certification rulemaking, DOE may consider certification reporting requirements such that manufacturers would be required to certify which otherwise identical models are used for making representations of basic models that include individual models with specific components.

*Issue 7:* DOE requests comment on its proposal regarding specific components in 10 CFR 429.43, 10 CFR 429.134, and 10 CFR part 431, subpart F, Appendices G and G1.

### G. Represented Values

#### 1. Multiple Refrigerants

DOE recognizes that some commercial package air conditioning and heating equipment may be sold with more than one refrigerant option (*e.g.*, R–410A or R–407C). Typically, manufacturers specify a single refrigerant in their literature for each unique model, but in its review, DOE has identified at least one commercial package air conditioning and heating equipment manufacturer that provides two refrigerant options under the same model number. The refrigerant chosen

<sup>17</sup> DOE has tentatively concluded that for the following features included in Section F1.3 of AHRI 390–2021, testing a unit with these components in accordance with the proposed test provisions would not result in differences in ratings compared to testing a unit without these components; therefore, DOE is not proposing to include these features in 10 CFR 429.43(a)(4): UV lights, Power Correction Capacitors, Hail Guards, Barometric Relief Dampers, and Fresh Air Dampers.

by the customer in the field installation may impact the energy efficiency of a unit. For this reason, DOE is proposing representation requirements specific for models approved for use with multiple refrigerants. So that the proposals in this NOPR would only require manufacturers to update representations once, DOE proposes to align the compliance date for these representation requirements with the proposed metric change (*i.e.*, these proposals would only be required when certifying to amended standards denominated in terms of IEER, if adopted).

Use of a refrigerant (such as R-407C as compared to R-410A) that requires different hardware (*i.e.*, compressors, heat exchangers, or air moving systems that are not the same or comparably performing) would represent a different basic model, and according to the current CFR, separate representations of energy efficiency are required for each basic model. 10 CFR 429.43(a). On the other hand, some refrigerants (such as R-422D and R-427A) would not require different hardware, and a manufacturer may consider them to be the same basic model, per DOE's current definition for "basic model at 10 CFR 431.92. In the latter case of an SPVU with multiple refrigerant options that do not require different hardware, DOE proposes that a manufacturer determine the represented values (for example, IEER, COP, and cooling capacity) based on the refrigerant(s)—among all refrigerants listed on the unit's nameplate—that results in the lowest cooling efficiency. These represented values would apply to the basic model with the use of all refrigerants specified by the manufacturer.

*Issue 8:* DOE requests comment on its proposal regarding representations for SPVU models approved for use with multiple refrigerants.

## 2. Cooling Capacity

For SPVUs, cooling capacity determines equipment class, which in turn determines the applicable energy conservation standard. 10 CFR 431.97. While cooling capacity is a required represented value for SPVUs, DOE does not currently specify provisions for SPVUs regarding how close the represented value of cooling capacity must be to the tested or alternative energy-efficiency determination method ("AEDM") simulated cooling capacity, or whether DOE will use measured or certified cooling capacity to determine equipment class for enforcement testing. In contrast, at paragraphs (a)(1)(iv) and (a)(2)(ii) of 10 CFR 429.43 and paragraph (g) of 10 CFR 429.134, DOE specifies such provisions regarding the

cooling capacity for air-cooled CUACs. Again, because energy conservation standards for SPVUs are dependent on cooling capacity, inconsistent approaches to the application of cooling capacity between basic models could result in inconsistent determinations of equipment class and, in turn, inconsistent applications of the energy conservation standards.

For these reasons, DOE is proposing to add to its regulations the following provisions regarding cooling capacity for SPVUs: (1) A requirement that the represented cooling capacity be between 95 percent and 100 percent of the tested or AEDM-simulated cooling capacity; and (2) an enforcement provision stating that DOE would use the mean of measured cooling capacity values from testing, rather than the certified cooling capacity, to determine the applicable standards.

First, DOE proposes to require in 10 CFR 429.43(a)(3)(v)(B) that the represented value of cooling capacity must be between 95 percent and 100 percent of the mean of the cooling capacity values measured for the units in the sample (if determined through testing), or between 95 percent and 100 percent of the cooling capacity output simulated by an AEDM. This tolerance would help to ensure that equipment is capable of performing at the cooling capacity for which it is represented to commercial consumers, while also enabling manufacturers to conservatively rate the cooling capacity to allow for minor variations in the capacity measurements from different units tested at different laboratories.

Second, DOE is proposing in its product-specific enforcement provisions at 10 CFR 429.134(s)(1) that the cooling capacity of each tested unit of the basic model will be measured pursuant to the test requirements of part 431 and that the mean of the measurement(s) will be used to determine the applicable standard with which the model must comply.

As discussed in this section, applicable energy conservation standards for SPVUs are dependent on the rated cooling capacity. DOE has tentatively concluded that these proposals would result in more accurate ratings of cooling capacity, and ensure appropriate application of the energy conservation standards, while still providing flexibility for manufacturers to conservatively rate cooling capacity so that they can be confident the equipment is capable of delivering the cooling capacity represented to commercial consumers.

*Issue 9:* DOE requests comment on its proposals related to represented values

and verification testing of cooling capacity for SPVUs.

## H. Test Procedure Costs and Impact

As stated, EPCA requires that the test procedures for commercial package air conditioning and heating equipment, which includes SPVUs, 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))

In this NOPR, DOE proposes to amend the existing test procedure for SPVUs by: (1) Incorporating by reference the updated version of the applicable industry test method, AHRI 390-2021, including the energy efficiency descriptors; (2) adding definitions for "single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h" and "single-phase single package vertical heat pump with cooling capacity less than 65,000 Btu/h" to clarify which single-phase equipment with cooling capacity less than 65,000 Btu/h are properly classified as SPVU rather than CAC; (3) specifying provisions for specific components; and (4) further specifying the requirements for determination of represented values for cooling capacity and for models approved for use with multiple refrigerants.

DOE has tentatively determined that these proposed amended test procedures would be representative of an average use cycle and would not be unduly burdensome for manufacturers to conduct. Based on review of AHRI 390-2021, DOE expects that the proposed test procedure in Appendix G for measuring EER and COP would not increase testing costs per unit compared to the current DOE test procedure, which DOE estimates to be \$3,100 for SPVACs and \$3,700 for SPVHPs per unit for third-party lab testing. DOE estimates that the cost for third-party lab testing according to the proposed Appendix G1 for measuring IEER and COP to be \$4,900 for SPVACs and \$5,500 for SPVHPs per unit.

DOE further notes that manufacturers are not required to perform laboratory testing on all basic models. In

accordance with 10 CFR 429.70 of DOE's regulations, SPVU 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 reduce the burden and cost associated with testing. DOE estimates the per-manufacturer cost to develop and validate an AEDM for SPVU equipment to be \$15,800. DOE estimates an additional cost of approximately \$50 per basic model<sup>18</sup> for determining energy efficiency using the validated AEDM.

As discussed in section II of this NOPR, the proposed test procedure provisions regarding IEER would not be mandatory unless and until DOE adopts energy conservation standards that specify IEER as the regulatory metric and compliance with such standards is required. Given that most SPVU manufacturers are AHRI members and that DOE is referencing the prevailing industry test procedure that was established for use in AHRI's certification program (which DOE presumes will be updated to include IEER), DOE expects that manufacturers will already be testing using the IEER test method. Based on this, DOE has tentatively determined that the proposed test procedure amendments would not be expected to increase the testing burden on most SPVU manufacturers. Additionally, DOE has tentatively determined that the test procedure amendments, if finalized, would not require manufacturers to redesign any of the covered equipment, would not require changes to how the equipment is manufactured, and would not impact the utility of the equipment.

*Issue 10:* DOE requests comment on its understanding of the impact of the test procedure proposals in this NOPR, specifically DOE's initial conclusion that the proposed DOE test procedure amendments, if finalized, would not increase testing burden on SPVU manufacturers, as compared to current

industry practice indicated by AHRI 390–2021.

#### *I. Reserved Appendices for Test Procedures for Commercial Air Conditioning and Heating Equipment*

DOE proposes to amend its test procedures for SPVUs and to relocate those test procedures to new Appendix G and Appendix G1 to 10 CFR part 431, subpart F. This proposed reorganization of the SPVU test procedures would be consistent with the organization of the test procedures for other covered equipment and covered products. DOE has tentatively concluded that providing the test procedures for specific equipment in a designated appendix would improve the readability of the test procedure. Further, DOE proposes to make the provisions currently in 10 CFR 431.96(c) and (e) specific to SPVUs in 10 CFR part 431, subpart F, Appendices G and G1, thereby eliminating the references to test procedures for other equipment. To provide for future consideration of a similar reorganization for other commercial package air conditioning and heating equipment test procedures, DOE is proposing to reserve Appendices B through F under 10 CFR part 431, subpart F. The reserved appendices are presented to facilitate any future reorganization of the regulations and are not an indication of any substantive changes to the respective test procedures at this time. Any such reorganization of test procedures for the equipment identified in the proposed reserved appendices would be addressed in separate rulemakings.

#### *J. Compliance Dates*

EPCA prescribes that, if DOE amends its test procedure for covered commercial package air-conditioning and heating equipment (including SPVUs), 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))

### **IV. Procedural Issues and Regulatory Review**

#### *A. Review Under Executive Order 12866*

The Office of Management and Budget (“OMB”) has determined that this test procedure rulemaking does not constitute “significant regulatory actions” under section 3(f) of Executive Order (“E.O.”) 12866, Regulatory Planning and Review, 58 FR 51735 (Oct.

4, 1993). Accordingly, this action was not subject to review under the Executive order by the Office of Information and Regulatory Affairs (“OIRA”) in OMB.

#### *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](http://www.energy.gov/gc/office-general-counsel). DOE reviewed this proposed rule to amend the test procedures for SPVUs under the provisions of the Regulatory Flexibility Act and the policies and procedures published on February 19, 2003.

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

#### 1. Description of Reasons Why Action Is Being Considered

DOE is proposing to amend the existing DOE test procedures for SPVUs. DOE must update the Federal test procedures to be consistent with the updated industry consensus test procedure, unless DOE determines by rule published in the **Federal Register** and supported by clear and convincing evidence, that the industry update would not be representative of an average use cycle or would be unduly burdensome to conduct. (42 U.S.C. 6314(a)(4)(B))

#### 2. Objective of, and Legal Basis for, Rule

EPCA, as amended, requires that the test procedures for commercial package air conditioning and heating equipment, which includes SPVUs, 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,

<sup>18</sup> DOE estimated initial costs to validate an AEDM assuming 80 hours of general time to develop an AEDM based on existing simulation tools and 16 hours to validate two basic models within that AEDM at the cost of an engineering technician wage of \$50 per hour plus the cost of third-party physical testing of two units per validation class (as required in 10 CFR 429.70(c)(2)(iv)). DOE estimated the additional per basic model cost to determine efficiency using an AEDM assuming 1 hour per basic model at the cost of an engineering technician wage of \$50 per hour.

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 7 years, DOE must evaluate test procedures for each type of covered equipment including SPVUs, 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))

Once completed, the current rulemaking will satisfy both of these legal requirements of EPCA.

### 3. Description and Estimate of Small Entities Regulated

DOE uses the Small Business Administration (“SBA”) small business size standards to determine whether manufacturers qualify as “small businesses,” which are listed by the North American Industry Classification System (“NAICS”).<sup>19</sup> The SBA considers a business entity to be small business if, together with its affiliates, it employs less than a threshold number of workers specified in 13 CFR part 121.

SPVU manufacturers, who produce the equipment covered by this rule, are classified under NAICS code 333415, “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. This employee threshold includes all employees in a business’s parent company and any other subsidiaries.

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. The Department conducted a focused inquiry into small business manufacturers of the equipment covered by this rulemaking. DOE used publicly available information to identify potential small businesses that manufacture SPVUs domestically. DOE identified manufacturers using DOE’s Compliance Certification Database

(“CCD”),<sup>20</sup> the California Energy Commission’s Modernized Appliance Efficiency Database System (“MAEDbS”),<sup>21</sup> and prior rulemakings. Additionally, DOE used publicly-available information and subscription-based market research tools (*e.g.*, reports from Dun & Bradstreet<sup>22</sup>). As a result of this inquiry, DOE identified a total of eight companies that are manufacturers or private labelers of SPVUs in the United States. DOE screened out companies that do not meet the definition of a “small business” or are foreign-owned and operated. Of these eight SPVU manufacturers or private labelers, DOE identified three potential small businesses.

Two of the three small businesses are original equipment manufacturers (“OEM”) of the SPVUs each small business sells. The third small business is not an OEM of the SPVUs they sell. Instead, it rebrands its SPVU models which are supplied by a different OEM (*i.e.*, making the small business a private labeler). Of the two OEM small businesses, one is a member of AHRI and the other is not a member of AHRI. The private labeler small business is not a member of AHRI.

### 4. Description and Estimate of Compliance Requirements

DOE assumed each small business would have different potential regulatory costs depending on if they are an OEM and if they are a member of AHRI. DOE assumed all AHRI members, including small businesses, will be testing their SPVU models in accordance with AHRI 390–2021, the industry test procedure DOE is proposing to reference, and using AHRI’s certification program, which DOE presumes will be updated to include the IEER metric. Therefore, the proposed test procedure amendments would not add testing burden to SPVU manufacturers that are or will be using the AHRI 390–2021 test procedure for their SPVU models, including one of the identified small businesses.

DOE assumed the small business that is not an OEM of the SPVU models they sell (*i.e.*, the private labeler) does not pay for the testing costs for the rebranded SPVU models they sell because the test performance of the

rebranded SPVU models is identical to the SPVU models the OEM sells. Therefore, DOE does not anticipate that any non-OEMs, including this small business, incur any testing burden to sell rebranded SPVU models.

Lastly, while DOE assumed that all SPVU manufacturers will be using the industry test procedure, AHRI 390–2021, DOE estimated the potential testing costs for the small business that is an OEM but is not an AHRI member. This small business would only incur additional testing costs if that small business will not be using the AHRI 390–2021 to test their SPVU models. This one small business manufactures six SPVU basic models.

As previously stated in section III.H of this NOPR, DOE estimated that the cost for third-party lab testing according to the proposed appendix G1 for measuring IEER and COP to be \$4,900 for SPVACs and \$5,500 for SPVHPs per unit. If SPVU manufacturers conduct physical testing to certify a SPVU 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 SPVU manufacturers may elect to use AEDMs.<sup>23</sup> 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.

When developing cost estimates, DOE considered the cost to develop an AEDM, the costs to validate the AEDM through physical testing, and the cost per model to determine ratings using the AEDM. DOE estimated the cost to develop and validate an AEDM for SPVUs to be approximately \$15,800, which includes physical testing of two models per validation class.<sup>24</sup> Additionally, DOE estimated a cost of approximately \$50 per basic model for determining energy efficiency using the validated AEDM. In the case of the single small, non-AHRI member, the estimated cost to rate the remaining four basic models with the AEDM would be

<sup>20</sup> DOE’s Compliance Certification Database is available at: [www.regulations.doe.gov/ccms](http://www.regulations.doe.gov/ccms) (last accessed September 1, 2021).

<sup>21</sup> California Energy Commission’s MAEDbS is available at [cacertappliances.energy.ca.gov/Pages/ApplianceSearch.aspx](http://cacertappliances.energy.ca.gov/Pages/ApplianceSearch.aspx) (last accessed September 1, 2021).

<sup>22</sup> Dun & Bradstreet reports are available at: [app.dnbhoovers.com/l](http://app.dnbhoovers.com/l) (last access September 1, 2021).

<sup>23</sup> In accordance with 10 CFR 429.70.

<sup>24</sup> \$4,800 (AEDM development and validation costs) + \$5,500 (per-unit physical testing costs) × (units required for physical testing per validation class) = \$15,800. AEDM development and validation costs are based on 96 hours of development and testing using an engineering technician wage of \$50 per hour. This estimate utilizes the more costly SPVHP testing cost of \$5,500 per unit.

<sup>19</sup> Available at: [www.sba.gov/document/support-table-size-standards](http://www.sba.gov/document/support-table-size-standards).

\$200.<sup>25</sup> Based on these estimates, the small SPVU manufacturer that is an OEM and not a member of AHRI would incur \$16,000 to test and rate all six of its SPVU models.

Market research tools report that company's annual revenue to be approximately \$1.3 million. The cost to re-rate all model would be approximately 1.2 percent of annual revenue for that small manufacturer.<sup>26</sup>

*Issue 11:* DOE requests comment on the number of small businesses DOE identified. DOE also requests comment on the potential cost estimates for each small business identified, compared to current industry practice, as indicated by AHRI 390–2021.

#### 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.

#### 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 AEDMs is less costly than physical testing for SPVUs. Without AEDMs, the cost for the small, non-AHRI-member to rate all basic models would increase to \$66,000.<sup>27</sup>

Additionally, DOE considered alternative test methods and modifications to the AHRI 390–2021 test procedure for SPVUs. However, DOE has tentatively determined that there are no better alternatives than the existing industry 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 SPVUs through incorporation by reference of AHRI 390–2021.

Additional compliance flexibilities may be available through other means. Manufacturers subject to DOE's energy efficiency standards may apply to DOE's Office of Hearings and Appeals for exception relief under certain circumstances. Manufacturers should refer to 10 CFR part 1003 for additional details.

#### C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of SPVUs must certify to DOE that their products comply with

<sup>25</sup> \$50 (per-unit rating cost) × 4 (remaining units) = \$200.

<sup>26</sup> \$16,000 (costs) + \$1,300,000 (annual revenue) = 1.2% of annual revenue.

<sup>27</sup> \$5,500 (per-unit test cost) × 2 (units tested per model) × 6 (number of SPVU models) = \$66,000. This estimate utilizes the more costly SPVHP testing cost of \$5,500 per unit.

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

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

#### D. Review Under the National Environmental Policy Act of 1969

DOE is analyzing this proposed regulation in accordance with the National Environmental Policy Act of 1969 ("NEPA") and DOE's NEPA implementing regulations (10 CFR part 1021). DOE's regulations include a categorical exclusion for rulemakings interpreting or amending an existing rule or regulation that does not change the environmental effect of the rule or regulation being amended. 10 CFR part 1021, subpart D, appendix A5. DOE anticipates that this rulemaking qualifies for categorical exclusion A5 because it is an interpretive rulemaking that does not change the environmental effects of the rule and otherwise meets the requirements for application of a categorical exclusion. See 10 CFR 1021.410. DOE will complete its NEPA review before issuing the final rule.

#### E. Review Under Executive Order 13132

Executive Order 13132, "Federalism," 64 FR 43255 (August 10, 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. Public Law 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](http://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](http://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 SPVUs 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 amendments to the Federal test procedure for SPVUs are primarily in response to modifications to the applicable industry consensus test standards (*i.e.*, AHRI 390–2021 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 it was 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 test standard published by AHRI, titled “Performance Rating of Single Package Vertical Air-Conditioners and Heat Pumps,” AHRI Standard 390–2021. Specifically, the Federal test procedure proposed in this NOPR would adopt sections 3 (except 3.1, 3.2, 3.5, 3.12, and 3.15), 5 (except section 5.8.5), 6 (except 6.1.1, 6.2, 6.3, 6.4, and 6.5), Appendices A, D, and E of the industry test method. AHRI 390–2021 is an industry-accepted



test procedure for measuring the performance of SPVUs. AHRI Standard 390–2021 is available online at [www.ahrinet.org/search-standards.aspx](http://www.ahrinet.org/search-standards.aspx).

In this NOPR, DOE also proposes to incorporate by reference the test standard published by ASHRAE, titled “Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment,” ANSI/ASHRAE Standard 37–2009. ANSI/ASHRAE Standard 37–2009 is an industry-accepted test procedure for measuring the performance of electrically driven unitary air-conditioning and heat pump equipment. ANSI/ASHRAE Standard 37–2009 is available on ANSI’s website at <https://webstore.ansi.org/RecordDetail.aspx?sku=ANSI%2FASHRAE+Standard+37-2009>.

In this NOPR, DOE also proposes to incorporate by reference the test standard published by ASHRAE, titled “Standard Methods For Laboratory Airflow Measurement,” ANSI/ASHRAE Standard 41.2–1987 (RA 92). ANSI/ASHRAE Standard 41.2–1987 (RA 92) is an industry-accepted test procedure for consistent measurement procedures for use in the preparation of other ASHRAE standards. Procedures described are used in testing air-moving, air-handling, and air-distribution equipment and components. ANSI/ASHRAE Standard 41.2–1987 (RA 92) is available on ANSI’s website at <https://webstore.ansi.org/Standards/ASHRAE/ANSIASHRAE411987RA92>.

The following standards, which appear in the regulatory text, were previously approved for IBR and no changes are proposed: AHRI 210/240–2008, AHRI 340/360–2007, AHRI 1230–2010, ASHRAE 127–2007, and ISO Standard 13256–1 (1998).

## V. Public Participation

### A. Participation in the Webinar

The time and date of the webinar 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](http://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 notice, 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/public meeting. Such persons may submit requests to speak via email to the Appliance and Equipment Standards Program at: [ApplianceStandardsQuestions@ee.doe.gov](mailto: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/public meeting. 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/public meeting and may also use a professional facilitator to aid discussion. The meeting will not be a judicial or evidentiary-type public hearing, but DOE will conduct it in accordance with section 336 of EPCA (42 U.S.C. 6306). A court reporter will be present to record the proceedings and prepare a transcript. DOE reserves the right to schedule the order of presentations and to establish the procedures governing the conduct of the webinar/public meeting. 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/public meeting and until the end of the comment period, interested parties may submit further comments on the proceedings and any aspect of the rulemaking.

The webinar will be conducted in an informal, conference style. DOE will present summaries of comments received before the webinar/public meeting, allow time for prepared general statements by participants, and encourage all interested parties to share their views on issues affecting this rulemaking. Each participant will be allowed to make a general statement (within time limits determined by DOE), before the discussion of specific topics.

DOE will permit, as time permits, other participants to comment briefly on any general statements.

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

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

### D. Submission of Comments

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

DOE has historically provided a 75-day comment period for test procedure NOPRs pursuant to the North American Free Trade Agreement, U.S.-Canada-Mexico (“NAFTA”), Dec. 17, 1992, 32 I.L.M. 289 (1993); the North American Free Trade Agreement Implementation Act, Public Law 103–182, 107 Stat. 2057 (1993) (codified as amended at 10 U.S.C.A. 2576) (1993) (“NAFTA Implementation Act”); and Executive Order 12889, “Implementation of the North American Free Trade Agreement,” 58 FR 69681 (Dec. 30, 1993). However, on July 1, 2020, the Agreement between the United States of America, the United Mexican States, and the United Canadian States (“USMCA”), Nov. 30, 2018, 134 Stat. 11 (*i.e.*, the successor to NAFTA), went into effect, and Congress’s action in replacing NAFTA through the USMCA Implementation Act, 19 U.S.C. 4501 *et seq.* (2020), implies the repeal of E.O. 12889 and its 75-day comment period requirement for technical regulations. Thus, the controlling laws are EPCA and the USMCA Implementation Act. Consistent with EPCA’s public comment

period requirements for consumer products, the USMCA only requires a minimum comment period of 60 days. Consequently, DOE now provides a 60-day public comment period for test procedure NOPRs.

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

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

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

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

*Submitting comments via email.* Comments and documents submitted via email also will be posted to [www.regulations.gov](http://www.regulations.gov). If you do not want your personal contact information to be

publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information in a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments.

Include contact information each time you submit comments, data, documents, and other information to DOE. No telefacsimiles (faxes) will be accepted.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format. Provide documents that are not secured, written in English, and 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 requests comment on its proposal to define “single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h” and “single-phase single package

vertical heat pump with cooling capacity less than 65,000 Btu/h” as subsets of the broader SPVAC and SPVHP equipment category. DOE requests feedback on the proposed characteristics that would distinguish this equipment as SPVUs (*i.e.*, “weatherized” or capable of utilizing a maximum of 400 CFM of outdoor air). Additionally, DOE requests comment on the proposed method to validate that a unit is capable of providing 400 CFM of outdoor air.

Issue 2: DOE requests comment on its proposal to adopt the test methods specified in AHRI 390–2021 for calculating IEER for SPVUs.

Issue 3: DOE requests comment and data on ratings under the current EER metric specified in 10 CFR 431.97 and ASHRAE 90.1–2019 based on ANSI/AHRI 390–2003 as compared to ratings using the IEER metric under AHRI 390–2021.

Issue 4: DOE requests comment on its proposal to clarify that COP representations using the “Low Temperature Operation, Heating” conditions in Table 3 of AHRI 390–2021 are optional.

Issue 5: DOE welcomes data and information on ESP conditions experienced in field operation of ducted SPVUs.

Issue 6: DOE requests comment and data on the number of SPVHP installations by building type and geographical region and the annual heating and cooling loads for such buildings. DOE also requests data on the frequency of operation of defrost cycles and representative low ambient conditions for those buildings and installations.

Issue 7: DOE requests comment on its proposal regarding specific components in 10 CFR 429.43, 10 CFR 429.134, and 10 CFR part 431, subpart F, appendices G and G1.

Issue 8: DOE requests comment on its proposal regarding representations for SPVU models approved for use with multiple refrigerants.

Issue 9: DOE requests comment on its proposals related to represented values and verification testing of cooling capacity for SPVUs.

Issue 10: DOE requests comment on its understanding of the impact of the test procedure proposals in this NOPR, specifically DOE’s initial conclusion that the proposed DOE test procedure amendments, if finalized, would not increase testing burden on SPVU manufacturers, as compared to current industry practice indicated by AHRI 390–2021.

Issue 11: DOE requests comment on the number of small businesses DOE

identified. DOE also requests comment on the potential cost estimates for each small business identified, compared to current industry practice, as indicated by AHRI 390–2021.

DOE also seeks comment on any other matter concerning the proposed test procedures for SPVUs not already addressed by the specific areas identified in this document. DOE particularly seeks information that would ensure that the test procedure measures energy efficiency during a representative average use cycle, as well as information that would help DOE create a procedure that is not unduly burdensome to conduct.

## VI. Approval of the Office of the Secretary

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

### List of Subjects

#### 10 CFR Part 429

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

#### 10 CFR Part 431

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

### Signing Authority

This document of the Department of Energy was signed on December 28, 2021, by Kelly J. Speakes-Backman, Principal Deputy Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on December 30, 2021.

**Treena V. Garrett,**

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

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

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

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

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

- 2. Amend § 429.4 by:
  - a. Revising paragraph (a);
  - b. Redesignating paragraph (c)(2) as paragraph (c)(3);
  - c. Adding new paragraph (c)(2);
  - d. Redesignating paragraphs (d), (e), and (f) as paragraphs (e), (f), and (g); and
  - e. Adding new paragraph (d).

The revisions and additions read as follows.

#### § 429.4 Materials incorporated by reference.

(a) Certain material is incorporated by reference into this part with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, DOE must publish a document in the **Federal Register** and the material must be available to the public. All approved material is available for inspection at the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Sixth Floor, 950 L'Enfant Plaza SW, Washington, DC 20024, (202) 586–9127, [Buildings@ee.doe.gov](mailto:Buildings@ee.doe.gov), <https://www.energy.gov/eere/buildings/building-technologies-office>, and may be obtained from the other sources in this section. It is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email: [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov), or go to: [www.archives.gov/federal-register/cfr/ibr-locations.html](http://www.archives.gov/federal-register/cfr/ibr-locations.html).

\* \* \* \* \*

(c) \* \* \*  
(2) AHRI Standard 390–2021, (“AHRI 390–2021”), 2021 Standard for Performance Rating of Single Package Vertical Air-conditioners and Heat Pumps, IBR approved for § 429.134.

\* \* \* \* \*

(d) *ASHRAE*. The American Society of Heating, Refrigerating and Air-Conditioning Engineers. 180 Technology Parkway NW, Peachtree Corners, GA 30092, (404) 636–8400, <https://www.ashrae.org>.

(1) ANSI/ASHRAE 37–2009, “Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment”, ASHRAE approved June 24, 2009. IBR approved for § 429.134.

(2) ANSI/ASHRAE 41.2–1987 (RA 92), “Standard Methods For Laboratory Airflow Measurement”, ASHRAE approved October 1, 1987. IBR approved for § 429.134.

\* \* \* \* \*

■ 3. Amend § 429.43 by adding paragraphs (a)(3) and (4) to read as follows:

#### § 429.43 Commercial heating, ventilating, air conditioning (HVAC) equipment.

(a) \* \* \*

(3) *Product-specific provisions for determination of represented values.*

(i)–(vi) [Reserved]

(vii) *Single Package Vertical Units.*

When certifying to standards in terms of IEER, the following provisions apply.

(A) If a basic model is distributed in commerce and approved for use with multiple refrigerants, a manufacturer must determine all represented values for that basic model (for example, IEER, COP and cooling capacity) based on the refrigerant that results in the lowest cooling efficiency. A refrigerant is considered approved for use if it is listed on the nameplate of the outdoor unit. Per the definition of basic model in 10 CFR 431.92 of this chapter, use of a refrigerant that requires different hardware (*i.e.*, compressors, heat exchangers, or air moving systems that are not the same or comparably performing), would represent a different basic model, and separate representations would be required for each basic model.

(B) The represented value of cooling capacity must be between 95 percent and 100 percent of the mean of the 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 net sensible cooling capacity output simulated by the AEDM as described in paragraph (a)(2) of this section.

(C) Represented values must be based on performance (either through testing or by applying an AEDM) of individual models with components and features that are selected in accordance with section 3 of appendix G1 to subpart F of part 431 of this chapter.

(4) *Determination of represented values for individual models with specific components for SPVUs.*  
 (i) If a manufacturer distributes in commerce individual models with one of the components listed in the

following table, determination of represented values is dependent on the selected grouping of individual models into a basic model, as indicated in paragraphs (a)(4)(ii) through (a)(4)(v) of

this section. For the purposes of this paragraph, “otherwise identical” means differing only in the presence of specific components listed in table 1 to this paragraph (a)(4)(i).

TABLE 1—TO PARAGRAPH (a)(4)(i)

Component	Description
Desiccant Dehumidification Components .....	An assembly that reduces the moisture content of the supply air through moisture transfer with solid or liquid desiccants.
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.
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.
Steam/Hydronic Heat Coils .....	Coils used to provide supplemental heating.
Hot Gas Reheat .....	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.
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.
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.
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.
Hot Gas Bypass .....	A method to adjust the cooling delivered by the equipment in which some portion of the hot high-pressure refrigerant from the discharge of the compressor(s) is diverted from its normal flow to the outdoor coil and is instead allowed to enter the indoor coil to modulate the capacity of a refrigeration circuit or to prevent evaporator coil freezing.

(ii) If a basic model includes only individual models distributed in commerce without a specific component listed in paragraph (a)(4)(i) of this section, the manufacturer must determine represented values for the basic model based on performance of an individual model distributed in commerce without the component.

(iii) If a basic model includes only individual models distributed in commerce with a specific component listed in paragraph (a)(4)(i) of this section, the manufacturer must determine represented values for the basic model based on performance of an individual model with the component present (and consistent with any component-specific test provisions specified in section 3 of appendix G1 to subpart F of part 431 of this chapter).

(iv) If a basic model includes both individual models distributed in commerce with a specific component listed in paragraph (4)(i) of this section and individual models distributed in commerce without that specific component, and none of the individual models distributed in commerce without the specific component are otherwise identical to any individual model distributed in commerce with the specific component, the manufacturer

must consider the performance of individual models with the component present when determining represented values for the basic model (and consistent with any component-specific test provisions specified in section 3 of appendix G1 to subpart F of part 431 of this chapter).

(v) If a basic model includes both individual models distributed in commerce with a specific component listed in paragraph (a)(4)(i) of this section and individual models distributed in commerce without that specific component, and at least one of the individual models distributed in commerce without the specific component is otherwise identical to any given individual model distributed in commerce with the specific component, the manufacturer may determine represented values for the basic model either:

- (A) Based on performance of an individual model distributed in commerce without the specific component, or
- (B) Based on performance of an individual model with the specific component present (and consistent with any component-specific test provisions specified in section 3 of appendix G1 to subpart F of part 431 of this chapter).

(vi) In any of the cases specified in paragraphs (a)(4)(ii) through (a)(4)(v) of this section, the represented values for a basic model must be determined through either testing (paragraph (a)(1) of this section) or an AEDM (paragraph(a)(2) of this section).

\* \* \* \* \*

■ 4. Amend § 429.134 by adding paragraph (s) to read as follows:

**§ 429.134 Product-specific enforcement provisions.**

\* \* \* \* \*

(s) *Single package vertical air conditioners and heat pumps.* The following provisions apply for assessment and enforcement testing of models subject to standards in terms of IEER.

(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 G1 to subpart F of part 431 of this chapter. The mean of the measurement(s) will be used to determine the applicable standards for purposes of compliance.

(2) *Specific Components.* For basic models that include individual models distributed in commerce with any of the specific components listed at

§ 429.43(a)(4)(i), the following provisions apply. For the purposes of this paragraph, “otherwise identical” means differing only in the presence of specific components listed at § 429.43(a)(4)(i).

(i) If the basic model includes only individual models distributed in commerce with a specific component, or does not include any otherwise identical individual models without the specific component, DOE may assess compliance for the basic model based on testing of an individual model with the component present (and consistent with any component-specific test provisions specified in section 3 of appendix G1 to subpart F of part 431 of this chapter).

(ii) If the basic model includes both individual models distributed in commerce with a specific component and otherwise identical individual models without the specific component, DOE will assess compliance for the basic model based on testing an otherwise identical model within the basic model that does not include the component, unless DOE is not able to obtain an individual model for testing that does not include the component. In such a situation, DOE will assess compliance for the basic model based on testing of an individual model with the specific component present (and consistent with any component-specific test provisions specified in section 3 of appendix G1 to subpart F of part 431 of this chapter).

(3) *Validation of outdoor ventilation airflow rate.* The outdoor ventilation airflow rate in cubic feet per minute (“CFM”) of the basic model will be measured in accordance with ASHRAE 41.2–1987 (incorporated by reference, see § 429.4) and Section 6.4 of ASHRAE 37–2009. All references to the inlet shall be determined to mean the outdoor air inlet.

(i) The outdoor ventilation airflow rate validation shall be conducted at the conditions specified in Table 3 of AHRI 390–2021 (incorporated by reference, see § 429.4), Full Load Standard Rating Capacity Test, Cooling, except for the following:

(A) The outdoor ventilation airflow rate shall be determined at 0 in. H<sub>2</sub>O external static pressure with a tolerance of –0.00/+0.05 in. H<sub>2</sub>O.

(B) Reserved.

(ii) When validating the outdoor ventilation airflow rate, the outdoor air inlet pressure shall be 0.00 in. H<sub>2</sub>O, with a tolerance of –0.00/+0.05 in. H<sub>2</sub>O when measured against the room ambient pressure.

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

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

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

■ 6. Amend § 431.92 by:

■ a. Revising the definitions of “Single package vertical air conditioner” and “Single package vertical heat pump.”

■ b. Adding the definitions of “Single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h” and “Single-phase single package vertical heat pump with cooling capacity less than 65,000 Btu/h” in alphabetical order; and

The additions and revisions read as follows:

### § 431.92 Definitions concerning commercial air conditioners and heat pumps.

\* \* \* \* \*

*Single package vertical air conditioner* means:

(1) Air-cooled commercial package air conditioning and heating equipment that—

(i) Is factory-assembled as a single package that—

(A) Has major components that are arranged vertically;

(B) Is an encased combination of cooling and optional heating components; and

(C) Is intended for exterior mounting on, adjacent interior to, or through an outside wall;

(ii) Is powered by a single-or 3-phase current;

(iii) May contain 1 or more separate indoor grilles, outdoor louvers, various ventilation options, indoor free air discharges, ductwork, well plenum, or sleeves; and

(iv) Has heating components that may include electrical resistance, steam, hot water, or gas, but may not include reverse-cycle refrigeration as a heating means; and

(2) Includes single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h, as defined in this section.

*Single package vertical heat pump* means:

(1) A single package vertical air conditioner that—

(i) Uses reverse-cycle refrigeration as its primary heat source; and—

(ii) May include secondary supplemental heating by means of electrical resistance, steam, hot water, or gas;

(2) Includes single-phase single package vertical heat pump with cooling

capacity less than 65,000 Btu/h, as defined in this section.

*Single-phase single package vertical air conditioner with cooling capacity less than 65,000 Btu/h* means air-cooled commercial package air conditioning and heating equipment that meets the criteria in paragraphs (1)(i) through (iv) of the definition of a single package vertical air conditioner; that is single-phase; has a cooling capacity less than 65,000 Btu/h, and that:

(1) Is weatherized, determined by a model being denoted for “Outdoor Use” or marked as “Suitable for Outdoor Use” on the equipment nameplate; or

(2) Is non-weatherized and is a model that has optional ventilation air provisions available. When such ventilation air provisions are present on the unit, the unit must be capable of drawing in and conditioning outdoor air for delivery to the conditioned space at a rate of at least 400 cubic feet per minute, as determined in accordance with § 429.134(s)(3), while the equipment is operating with the same drive kit and motor settings used to determine the certified efficiency rating of the equipment (as required for submittal to DOE by § 429.43(b)(4)(xi)).

*Single-phase single package vertical heat pump with cooling capacity less than 65,000 Btu/h* means air-cooled commercial package air conditioning and heating equipment that meets the criteria in paragraphs (1)(i) through (ii) of the definition of a single package vertical heat pump; that is single-phase; has a cooling capacity less than 65,000 Btu/h, and that:

(1) Is weatherized, determined by a model being denoted for “Outdoor Use” or marked as “Suitable for Outdoor Use” on the equipment nameplate; or

(2) Is non-weatherized and is a model that has optional ventilation air provisions available. When such ventilation air provisions are present on the unit, the unit must be capable of drawing in and conditioning outdoor air for delivery to the conditioned space at a rate of at least 400 cubic feet per minute, as determined in accordance with § 429.134(s)(3), while the equipment is operating with the same drive kit and motor settings used to determine the certified efficiency rating of the equipment (as required for submittal to DOE by § 429.43(b)(4)(xii)).

\* \* \* \* \*

■ 7. Amend § 431.95 by revising paragraphs (a), (b)(5) and (c)(2) to read as follows:

### § 431.95 Materials incorporated by reference.

(a) Certain material is incorporated by reference into this part with the

approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, DOE must publish a document in the **Federal Register** and the material must be available to the public. All approved material is available for inspection at the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Sixth Floor, 950 L'Enfant Plaza SW, Washington, DC 20024, (202) 586-9127, [Buildings@ee.doe.gov](mailto:Buildings@ee.doe.gov), <https://www.energy.gov/eere/buildings/building-technologies-office>, and may be obtained from the other sources in this section. It is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email: [fr.inspection@nara.gov](mailto:fr.inspection@nara.gov), or go to: [www.archives.gov/federal-register/cfr/ibr-locations.html](http://www.archives.gov/federal-register/cfr/ibr-locations.html).

- (b) \* \* \*
  - (5) AHRI Standard 390-2021, "2021 Standard for Performance Rating of Single Package Vertical Air-Conditioners and Heat Pumps," dated 2021, (AHRI 390-2021), IBR approved for appendices G and G1 to this subpart.
- (c) \* \* \*
  - (2) ANSI/ASHRAE Standard 37-2009, ("ANSI/ASHRAE 37-2009"), "Methods of Testing for Rating Electrically Driven Unitary Air-Conditioning and Heat Pump Equipment," ASHRAE approved June 24, 2009, IBR approved for § 431.96 and appendices A, G, and G1 to this subpart.

■ 8. Amend § 431.96 by revising paragraph (b)(1), table 1 to § 431.96, and paragraph (c) to read as follows:

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

- \* \* \* \* \*
- (b) *Testing and calculations.* (1) Determine the energy efficiency and capacity of each category of covered equipment by conducting the test procedure(s) listed in Table 1 of this paragraph (b) along with any additional testing provisions set forth in paragraphs (c) through (g) of this section and appendices A through G1 to this subpart, that apply to the energy efficiency descriptor for that equipment, category, and cooling capacity. The omitted sections of the test procedures listed in Table 1 must not be used. For equipment with multiple appendices listed in Table 1, consult the notes at the beginning of those appendices to determine the applicable appendix to use for testing.
- (2) \* \* \*

TABLE 1 TO PARAGRAPH (b)(2)—TEST PROCEDURES FOR COMMERCIAL AIR CONDITIONERS AND HEAT PUMPS

Equipment type	Category	Cooling capacity	Energy efficiency descriptor	Use tests, conditions, and procedures <sup>1</sup> in	Additional test procedure provisions as indicated in the listed paragraphs of this section
Small Commercial Package Air-Conditioning and Heating Equipment.	Air-Cooled, 3-Phase, AC and HP.	<65,000 Btu/h .....	SEER and HSPF .....	AHRI 210/240-2008 (omit section 6.5).	Paragraphs (c) and (e).
	Air-Cooled AC and HP ...	≥65,000 Btu/h and <135,000 Btu/h.	EER, IEER, and COP ...	Appendix A to this subpart.	None.
	Water-Cooled and Evaporatively-Cooled AC.	<65,000 Btu/h .....	EER .....	AHRI 210/240-2008 (omit section 6.5).	Paragraphs (c) and (e).
		≥65,000 Btu/h and <135,000 Btu/h.	EER .....	AHRI 340/360-2007 (omit section 6.3).	Paragraphs (c) and (e).
Water-Source HP .....	<135,000 Btu/h .....	EER and COP .....	ISO Standard 13256-1 (1998).	Paragraph (e).	
Large Commercial Package Air-Conditioning and Heating Equipment.	Air-Cooled AC and HP ...	≥135,000 Btu/h and <240,000 Btu/h.	EER, IEER and COP .....	Appendix A to this subpart.	None.
	Water-Cooled and Evaporatively-Cooled AC.	≥135,000 Btu/h and <240,000 Btu/h.	EER .....	AHRI 340/360-2007 (omit section 6.3).	Paragraphs (c) and (e).
Very Large Commercial Package Air-Conditioning and Heating Equipment.	Air-Cooled AC and HP ...	≥240,000 Btu/h and <760,000 Btu/h.	EER, IEER and COP .....	Appendix A to this subpart.	None.
	Water-Cooled and Evaporatively-Cooled AC.	≥240,000 Btu/h and <760,000 Btu/h.	EER .....	AHRI 340/360-2007 (omit section 6.3).	Paragraphs (c) and (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 .....	<65,000 Btu/h .....	SCOP .....	ASHRAE 127-2007 (omit section 5.11).	Paragraphs (c) and (e).
		≥65,000 Btu/h and <760,000 Btu/h.	SCOP .....	ASHRAE 127-2007 (omit section 5.11).	Paragraphs (c) and (e).
Variable Refrigerant Flow Multi-split Systems.	AC .....	<65,000 Btu/h (3-phase)	SEER .....	AHRI 1230-2010 (omit sections 5.1.2 and 6.6).	Paragraphs (c), (d), (e), and (f).
		≥65,000 Btu/h and <760,000 Btu/h.	EER .....	AHRI 1230-2010 (omit sections 5.1.2 and 6.6).	Paragraphs (c), (d), (e), and (f).
Variable Refrigerant Flow Multi-split Systems, Air-cooled.	HP .....	<65,000 Btu/h (3-phase)	SEER and HSPF .....	AHRI 1230-2010 (omit sections 5.1.2 and 6.6).	Paragraphs (c), (d), (e), and (f).
		≥65,000 Btu/h and <760,000 Btu/h.	EER and COP .....	AHRI 1230-2010 (omit sections 5.1.2 and 6.6).	Paragraphs (c), (d), (e), and (f).
Variable Refrigerant Flow Multi-split Systems, Water-source.	HP .....	<760,000 Btu/h .....	EER and COP .....	AHRI 1230-2010 (omit sections 5.1.2 and 6.6).	Paragraphs (c), (d), (e), and (f).
		<760,000 Btu/h .....	EER and COP .....	Appendix G to this subpart <sup>2</sup> .	None.
Single Package Vertical Air Conditioners and Single Package Vertical Heat Pumps.	AC and HP .....	<760,000 Btu/h .....	EER and COP .....	Appendix G1 to this subpart <sup>2</sup> .	None.
			EER, IEER, and COP ...		

<sup>1</sup> Incorporated by reference; see § 431.95.

<sup>2</sup> For equipment with multiple appendices listed in Table 1, consult the notes at the beginning of those appendices to determine the applicable appendix to use for testing.

(c) Optional break-in period for tests conducted using AHRI 210/240–2008, AHRI 1230–2010, and ASHRAE 127–2007. Manufacturers may optionally specify a “break-in” period, not to exceed 20 hours, to operate the equipment under test prior to conducting the test method specified by AHRI 210/240–2008, AHRI 1230–2010, or ASHRAE 127–2007 (incorporated by reference; see § 431.95). A manufacturer who elects to use an optional compressor break-in period in its certification testing should record this information (including the duration) in the test data underlying the certified ratings that is required to be maintained under 10 CFR 429.71.

\* \* \* \* \*

#### **Appendix B to Subpart F of Part 431 [Reserved]**

■ 9. Add and reserve appendix B to subpart F of part 431.

#### **Appendix C to Subpart F of Part 431 [Reserved]**

■ 10. Add and reserve appendix C to subpart F of part 431.

#### **Appendix D to Subpart F of Part 431 [Reserved]**

■ 11. Add and reserve appendix D to subpart F of part 431.

#### **Appendix E to Subpart F of Part 431 [Reserved]**

■ 12. Add and reserve appendix E to subpart F of part 431.

#### **Appendix F to Subpart F of Part 431 [Reserved]**

■ 13. Add and reserve appendix F to subpart F of part 431.

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

#### **Appendix G to Subpart F of Part 431—Uniform Test Method for Measuring the Energy Consumption of Single Package Vertical Air Conditioners and Single Package Vertical Heat Pumps**

**Note:** Prior to [DATE 360 DAYS AFTER DATE OF PUBLICATION OF THE FINAL RULE IN THE FEDERAL REGISTER] manufacturers must use the results of testing under either this appendix or § 431.96 as it appeared in the 10 CFR parts 200–499 edition revised as of January 1, 2021, to determine compliance with the relevant standard from § 431.97 as that standard appeared in the January 1, 2021 edition of 10 CFR parts 200–499. On or after [date 360 days after date of publication of the final rule in the Federal Register] manufacturers must use the results of testing generated under this appendix to demonstrate compliance with the relevant standard from § 431.97 as that standard appeared in the January 1, 2021 edition of 10 CFR parts 200–499.

Beginning [DATE 360 DAYS AFTER DATE OF PUBLICATION OF THE FINAL RULE IN THE FEDERAL REGISTER], if manufacturers make voluntary representations with respect to the integrated energy efficiency ratio (IEER) of single packaged vertical air conditioners and single package vertical heat pumps, such representations must be based on testing conducted in accordance with appendix G1 of this subpart.

For any amended standards for single packaged vertical air conditioners and single package vertical heat pumps based on IEER published after January 1, 2021, manufacturers must use the results of testing under appendix G1 to determine compliance. Representations related to energy consumption must be made in accordance with the appropriate appendix that applies (*i.e.*, this appendix or appendix G1) when determining compliance with the relevant standard. Manufacturers may also use appendix G1 to certify compliance with any amended standards prior to the applicable compliance date for those standards.

0. DOE incorporated by reference the entire standard for AHRI 390–2021 and ASHRAE 37–2009 in § 431.95. However, only enumerated provisions of AHRI 390–2021 and ASHRAE 37–2009 apply to this appendix, as follows:

- 0.1 AHRI 390–2021:
- (a) Section 3—Definitions (omitting sections 3.1, 3.2, 3.5, 3.12, and 3.15)
  - (b) Section 5—Test Requirements (omitting section 5.8.5)
  - (c) Section 6—Rating Requirements (omitting sections 6.1.1 and 6.2 through 6.5)
  - (d) Appendix A. “References—Normative”
  - (e) Appendix D. “Indoor and Outdoor Air Condition Measurement—Normative”
  - (f) Appendix E. “Method of Testing Single Package Vertical Units—Normative”

0.2 All provisions of ANSI/ASHRAE 37–2009 apply except for the following provisions:

- (a) Section 1—Purpose
- (b) Section 2—Scope
- (c) Section 4—Classifications
  - 1. General.

Determine cooling capacity (Btu/h) and energy efficiency ratio (EER) for all single package vertical air conditioners and heat pumps and coefficient of performance (COP) for all single package vertical heat pumps, in accordance with the specified sections of AHRI 390–2021 “Performance Rating of Single Package Vertical Air-conditioners And Heat Pumps” and the specified sections of ANSI/ASHRAE 37–2009 “Methods of Testing for Rating Electronically Driven Unitary Air-Conditioning and Heat-Pump Equipment”. Only enumerated provisions of AHRI 390–2021 and ANSI/ASHRAE 37–2009 are applicable, as set forth in section 0 of this appendix.

In addition, the instructions in section 2 of this appendix apply to determining EER and COP. In cases where there is a conflict, the language of this appendix takes highest precedence, followed by AHRI 390–2021, followed by ANSI/ASHRAE 37–2009. Any subsequent amendment to a referenced document by a 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**.

2. **Test Conditions.** The “Standard Rating Full Load Capacity Test, Cooling” conditions for cooling mode tests and “Standard Rating Full Load Capacity Test, Heating” conditions for heat pump heating mode tests specified in Table 3 of AHRI 390–2021 shall be used.

2.1 **Optional Representations.** Representations of COP for single package vertical heat pumps made using the “Low Temperature Operation, Heating” condition specified in Table 3 of AHRI 390–2021 are optional and are determined according to the applicable provisions in section 1 of this appendix.

■ 15. Add appendix G1 to subpart F of part 431 to read as follows:

#### **Appendix G1 to Subpart F of Part 431—Uniform Test Method for Measuring the Energy Consumption of Single Package Vertical Air Conditioners and Single Package Vertical Heat Pumps**

**Note:** Beginning [DATE 360 DAYS AFTER DATE OF PUBLICATION OF THE FINAL RULE IN THE FEDERAL REGISTER], if manufacturers make voluntary representations with respect to the integrated energy efficiency ratio (IEER) of single packaged vertical air conditioners and single package vertical heat pumps, such representations must be based on testing conducted in accordance with this appendix.

Manufacturers must use the results of testing under this appendix to determine compliance with any amended standards for single packaged vertical air conditioners and single package vertical heat pumps based on IEER provided in § 431.97 that are published after January 1, 2021. Representations related to energy consumption must be made in accordance with the appropriate appendix that applies (*i.e.*, appendix G or this appendix) when determining compliance with the relevant standard. Manufacturers may also use this appendix to certify compliance with any amended standards prior to the applicable compliance date for those standards.

0. DOE incorporated by reference the entire standard for AHRI 390–2021 and ASHRAE 37–2009 in § 431.95. However, only enumerated provisions of AHRI 390–2021 and ASHRAE 37–2009 apply to this appendix, as follows:

- 0.1 AHRI 390–2021:
- (a) Section 3—Definitions (omitting sections 3.1, 3.2, 3.5, 3.12, and 3.15)
  - (b) Section 5—Test Requirements (omitting section 5.8.5)
  - (c) Section 6—Rating Requirements (omitting sections 6.1.1 and 6.3 through 6.5)
  - (d) Appendix A. “References—Normative”
  - (e) Appendix D. “Indoor and Outdoor Air Condition Measurement—Normative”
  - (f) Appendix E. “Method of Testing Single Package Vertical Units—Normative”

0.2 All provisions of ANSI/ASHRAE 37–2009 apply except for the following provisions:

- (a) Section 1—Purpose
- (b) Section 2—Scope
- (c) Section 4—Classifications

1. General.

Determine cooling capacity (Btu/h) and integrated energy efficiency ratio (IEER) for all single package vertical air conditioners and heat pumps and coefficient of performance (COP) for all single package vertical heat pumps, in accordance with the specified sections of AHRI 390–2021 “Performance Rating of Single Package Vertical Air-conditioners And Heat Pumps” and the specified sections of ANSI/ASHRAE 37–2009 “Methods of Testing for Rating Electronically Driven Unitary Air-Conditioning and Heat-Pump Equipment”. Only enumerated provisions of AHRI 390–

2021 and ANSI/ASHRAE 37–2009 are applicable, as set forth in section 0 of this appendix.

In addition, the instructions in section 2 of this appendix apply to determining IEER and COP. In cases where there is a conflict, the language of this appendix takes highest precedence, followed by AHRI 390–2021, followed by ANSI/ASHRAE 37–2009. Any subsequent amendment to a referenced document by a 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**.

2. *Test Conditions*. The “Part-Load Standard Rating Conditions” conditions for

cooling mode tests and “Standard Rating Full Load Capacity Test, Heating” conditions for heat pump heating mode tests specified in Table 3 of AHRI 390–2021 shall be used.

2.1 *Optional Representations*.

Representations of COP for single package vertical heat pumps made using the “Low Temperature Operation, Heating” condition specified in Table 3 of AHRI 390–2021 are optional and are determined according to the applicable provisions in section 1 of this appendix.

3. *Set-Up and Test Provisions for Specific Components*. When testing an SPVU that includes any of the features listed in Table 3.1 of this appendix, test in accordance with the set-up and test provisions specified in Table 3.1.

TABLE 3.1—TEST PROVISIONS FOR SPECIFIC COMPONENTS

Component	Description	Test provisions
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.
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.
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.
Power Correction Capacitors	A capacitor that increases the power factor measured at the line connection to the equipment.	Remove power correction capacitors 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.
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.
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.
Steam/Hydronic Heat Coils ..	Coils used to provide supplemental heating .....	Test with steam/hydronic heat coils in place but providing no heat.
Hot Gas Reheat .....	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.
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.	Removable sound traps/sound attenuators shall be removed for testing. Otherwise, test with sound traps/attenuators in place.



TABLE 3.1—TEST PROVISIONS FOR SPECIFIC COMPONENTS—Continued

Component	Description	Test provisions
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.

[FR Doc. 2021–28553 Filed 1–13–22; 8:45 am]

**BILLING CODE 6450–01–P**