[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 431

[EERE-2017-BT-TP-0020]

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: Request for information.

SUMMARY: The U.S. Department of Energy ("DOE") is initiating a data collection process through this request for information ("RFI") to consider whether to amend DOE's test procedure for single package vertical air conditioners ("SPVACs") and single package vertical heat pumps ("SPVHPs"), collectively referred to as single package vertical units ("SPVUs"). To inform interested parties and to facilitate the process, DOE has gathered data, identifying several issues associated with the currently applicable test procedure on which DOE is interested in receiving comment. The issues outlined in this document mainly concern: incorporation by reference of the applicable industry standard; efficiency metrics; clarification of test methods; and any additional topics that may inform DOE's decisions in a future test procedure rulemaking, including methods to reduce regulatory burden while ensuring the procedure's accuracy. DOE welcomes written comments from the public on any of subject within the scope of this document (including topics not raised in this RFI).

DATES: Written comments and information are requested and will be accepted on or before **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: Interested persons are encouraged to submit comments by any of the following methods:

1. *Federal eRulemaking Portal*: *http://www.regulations.gov*. Follow the instructions for submitting comments.
2. *E-mail*: *SPVACandHeatPumps2017TP0020@ee.doe.gov*. Include docket number EERE-2017-BT-TP-0020 in the subject line of the message.
3. *Postal Mail*: Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, Test Procedure RFI for Single Package Vertical Air Conditioners and Heat Pumps, Docket No. EERE-2017-BT-TP-0020, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. If possible, please submit all items on a compact disc ("CD"), in which case it is not necessary to include printed copies.
4. *Hand Delivery/Courier*: Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC, 20024. Telephone: (202) 287-1445. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

No telefacsimilies (faxes) will be accepted. For detailed instructions on submitting comments and additional information on the rulemaking process, see section III of this document.

Docket: The docket for this activity, which includes *Federal Register* notices, comments, and other supporting documents/materials, is available for review at *http://www.regulations.gov*. All documents in the docket are listed in the *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 webpage can be found at *https://www.regulations.gov/docket?D=EERE-2017-BT-TP-0020.* The docket webpage contains instructions on how to access all documents, including public comments, in the docket. See section III for information on how to submit comments through *http://www.regulations.gov*.

FOR FURTHER INFORMATION CONTACT: Ms. Catherine Rivest, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 586-7335. Email: *ApplianceStandardsQuestions@ee.doe.gov*.

Mr. Eric Stas, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue SW, Washington, D.C. 20585. Telephone: (202) 586-9507. Email: *Eric.Stas@hq.doe.gov*.

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

SUPPLEMENTARY INFORMATION:

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I. Introduction

SPVACs and SPVHPs are included in the list of "covered equipment" for which DOE is authorized to establish and amend energy efficiency standards and test procedures. (42 U.S.C. 6311(1)(B)-(D)) DOE's test procedure for SPVACs and SPVHPs is prescribed in title 10 of the Code of Federal Regulations ("CFR"), appendix A to subpart F of part 431. The following sections discuss DOE's authority to establish and amend test procedures for SPVACs and SPVHPs, as well as relevant background information regarding DOE's consideration of test procedures for this equipment.

A. Authority and Background

The Energy Policy and Conservation Act of 1975 ("EPCA" or "the Act"), [1] Public Law 94-163 (42 U.S.C. 6291-6317, as codified), among other things, authorizes DOE to regulate the energy efficiency of a number of consumer products and industrial equipment. Title III, Part C[2] of the Act, added by Public Law 95-619, Title IV, section 441(a), established the Energy

[1] All references to EPCA in this document refer to the statute as amended through the Energy Efficiency Improvement Act of 2015 (EEIA 2015), Public Law 114-11 (April 30, 2015).
[2] For editorial reasons, upon codification in the U.S. Code, Part C was redesignated Part A-1.

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, which includes the SPVACs and SPVHPs (referred to collectively as single package vertical units ("SPVUs")) that are the subject of this RFI. (42 U.S.C. 6311(1)(B)-(D))

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

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. 6316(b)(2)(D))

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

Under 42 U.S.C. 6314, EPCA sets forth the criteria and procedures DOE is required to follow when prescribing or amending test procedures for covered equipment. EPCA requires that any test procedures prescribed or amended under this section must be reasonably designed to produce test results which reflect energy efficiency, energy use, or estimated annual operating cost of covered equipment during a representative average use cycle or period of use and requires that test procedures not be unduly burdensome to conduct. (42 U.S.C. 6314(a)(2)) In addition, if DOE determines that a test procedure amendment is warranted, it must publish proposed test procedures and offer the public an opportunity to present oral and written comments on them. (42 U.S.C. 6314(b))

As discussed, 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 update its test procedure to be consistent with the amended test procedure, unless DOE determines, by rule published in the *Federal Register* and supported by clear and convincing evidence, that the amended test procedure would not meet the requirements in 42 U.S.C. 6314(a)(2) and (3) related to representative use and test burden. (42 U.S.C. 6314(a)(4)(B))

EPCA also requires that, at least once every 7 years, DOE 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. 6314(a)(1)) In addition, if DOE determines that a test procedure amendment is warranted, it must publish a proposed test procedures and offer the public an opportunity to present oral and written comments on them. (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. DOE is publishing this RFI to collect data and information to inform its decision in satisfaction of the 7-year review requirement specified in EPCA.

B. Rulemaking History

DOE's current test procedures for SPVUs with a cooling capacity less than 760,000 Btu/h are set forth at 10 CFR part 431, subpart F, appendix A ("Appendix A"). The test procedure currently incorporates by reference 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 includes additional provisions in paragraphs (c) and (e) of 10 CFR 431.96. ANSI/AHRI 390-2003 is the SPVU test standard referenced in ASHRAE Standard 90.1. Paragraph (c) of 10 CFR 431.96 provides the method for an optional break-in period. Paragraph (e) of 10 CFR 431.96 provides specifications for addressing key information typically found in the installation and operation manuals. DOE established its test procedure for SPVUs in a final

rule for commercial heating, air conditioning, and water heating equipment published on May 16, 2012. 77 FR 28928.

II. Request for Information

In the following sections, DOE has identified a variety of issues on which it seeks input to aid in the development of the technical and economic analyses regarding whether amended test procedures for SPVUs may be warranted. Specifically, DOE is requesting comment on any opportunities to streamline and simplify testing requirements for SPVUs.

Additionally, DOE welcomes comments on other issues relevant to the conduct of this process that may not specifically be identified in this document. In particular, DOE notes that under Executive Order 13771, "Reducing Regulation and Controlling Regulatory Costs," Executive Branch agencies such as DOE are directed to manage the costs associated with the imposition of expenditures required to comply with Federal regulations. See 82 FR 9339 (Feb. 3, 2017). Pursuant to that Executive Order, DOE encourages the public to provide input on measures DOE could take to lower the cost of its regulations applicable to SPVUs consistent with the requirements of EPCA.

A. Scope and Definitions

DOE 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.

B. Test Procedure

1. Test Set-up

ANSI/AHRI 390-2003 provides different test provisions, such as minimum external static pressure ("ESP"), based on whether the model is ducted or non-ducted. However, whether an SPVU is ducted may be more a characteristic of installation than the equipment itself. A given SPVU model could potentially be installed either with or without a duct. DOE's preliminary research has not revealed that SPVUs have physical characteristics that clearly distinguish them as ducted or non-ducted models, and DOE has identified several models that advertise the capability for use in both ducted and non-ducted installations. 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.

Issue 1: DOE requests comment on what, if any, equipment characteristics can be used to determine whether SPVU models would be installed (and hence should be tested) as ducted or non-ducted models. DOE also requests comments on whether individual SPVU models that are sold for both ducted and non-ducted applications are currently tested using both ducted and non-ducted standard rating conditions.

Section 5.2.3 of ANSI/AHRI 390-2003 requires that for SPVUs with an outdoor-side fan drive that is non-adjustable, standard ratings shall be determined at the outdoor-side 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, it is not clear from DOE's initial review of manufacturer literature which resistance elements should be used during the test to be consistent with what manufacturers consider as "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). In addition, 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.

Issue 2: DOE requests comments on the variations in outdoor air-side attachments (e.g., grills, louvers, wall sleeve) that could affect performance during testing. DOE seeks comment on what, if any, provisions should be considered for addition to the test procedure to standardize outdoor air flow for both externally and internally mounted SPVUs, including considerations regarding grills or louvers, geometry of wall pass-through sleeves, and a representative wall thickness.

ANSI/AHRI 390-2003 does not provide any specific guidance on setting and verifying the refrigerant charge of a unit. In a test procedure final rule for central air conditioners (CACs) published on June 8, 2016 ("June 2016 CAC TP final rule"), DOE established a comprehensive approach for refrigerant charging that improves test reproducibility. 81 FR 36992, 37030-37031. The approach indicates 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. The approach also requires that refrigerant line pressure gauges be installed for single-package units, unless otherwise specified in manufacturer instructions. Id. These methods provide general refrigerant charging instructions and guidelines that DOE believes should be applied to air conditioners and heat pumps across a range of capacities, including commercial equipment such as SPVUs.

Issue 3: DOE seeks comment on whether it would be appropriate to adopt an approach for charging requirements for SPVUs similar or identical to the approach adopted in the June 2016 CAC TP final rule. DOE seeks comments regarding which parts of the approach should or should not be considered for adoption, and for what reasons those provisions might or might not be suitable for application to SPVUs. DOE is also interested in receiving data that demonstrate how sensitive the performance of a SPVU is relative to changes in the various charge indicators used for different charging methods, specifically the method based on sub-cooling.

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 V. 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. DOE understands that voltage can affect the measured efficiency of air conditioners and may, therefore, consider adding provisions to its test procedure that specify at which nameplate voltage to conduct the test for dual nameplate voltage units.

Issue 4: DOE requests data and information demonstrating the effect of voltage on air conditioning equipment (including, but not limited to, SPVUs). Specifically, DOE seeks

comment on whether there is a consistent relationship between voltage and efficiency, and if so, whether testing at a lower voltage will typically result in a higher or lower tested efficiency. Further, DOE requests feedback on whether certain voltages within common dual nameplate voltage ratings (e.g., 208/230 V) are more representative of typical field installation.

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 in H_2O of ESP. However, ANSI/AHRI 390-2003 does not define "non-filtered equipment." It is possible that an SPVU may be designed so as not to be installed with a filter. For SPVUs designed to be installed with a filter, a filter may not be shipped with the unit (i.e., the filter would not be present during the test, requiring an increase in the minimum ESP to account for the pressure drop of the filter if one were present, as it is expected to be in the field).

Issue 5: DOE requests comments on whether there are any SPVUs that are not designed to be installed with a filter. Further, DOE requests comment on what the typical effectiveness (i.e., minimum efficiency reporting value (MERV) rating) is of filters provided or installed with SPVUs, which will impact the pressure drop across the filter. Finally, DOE requests 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.

2. Airflow and External Static Pressure

Table 4 of ANSI/AHRI 390-2003 specifies the minimum ESP required for testing ducted SPVUs based on capacity range. DOE is considering whether the minimum ESP levels in ANSI/AHRI 390-2003 are representative of field operation for ducted SPVUs.

Issue 6: DOE seeks comments on whether the minimum ESP requirements in Table 4 of 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.

ANSI/AHRI 390-2003 does not specify tolerances on achieving the rated airflow and/or the minimum ESP during testing. The performance of any air conditioner or heat pump can be affected by variations in airflow and ESP. Consequently, rated performance could vary from field performance if airflow and ESP during testing are different than that intended for field operation. How to control an SPVU to achieve a specified airflow at a specified ESP and how closely an SPVU can achieve the specified airflow and ESP depends on the type of fan drive system. There are two common types used in SPVUs: one is multi-speed drive, which provides discrete airflow settings (or motor speeds), each typically associated with certain functions and operating conditions (e.g., high or low static operation); the other is variable-speed drive, which can be adjusted continuously within a range of speeds. The type of fan drive system is determined by the type of fan motor (e.g., multi-speed motor, variable-speed motor), the type of drives (e.g., direct-drive, belt-drive), and whether there is any external control (e.g., variable-frequency drive). When a multi-speed drive system is required to meet the specified ESP, a certain deviation in airflow is expected because of limited speed options; whereas, for variable-speed drive systems, a smaller deviation is expected because of the capability to be adjusted continuously.

To address the tolerances for variable-speed fan drive systems, which are common in air-cooled commercial unitary air-conditioners ("ACUACs") with capacity greater than or equal to 65,000 Btu/h, DOE established a requirement for ACUACs that the full-load indoor airflow rate

must be within ± 3 percent of the certified airflow. Section 6 of Appendix A. In addition, the tolerance for ESP for testing ACUACs in DOE's current test procedure is -0.00/+0.05 in H_2O (see section 3 of Appendix A, which incorporates by reference Table 5 of ANSI/AHRI Standard 340/360-2007, "2007 Standard for Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment" ("ANSI/AHRI 340/360-2007")). In contrast, in DOE's test procedure for central air conditioners and heat pumps ("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. 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. See 10 CFR part 430, subpart B, appendix M, section 3.1.4.2.a.

Issue 7: DOE seeks more information on the different types of indoor air fan drive systems that are used for SPVUs. For example, are fans with multi-speed motors provided with variable-frequency drive or belt drives with variable-pitch sheaves to allow continuous variation of fan speed? Are direct-drive fans provided with variable-speed motors for which the installer can only select limited speeds?

Issue 8: DOE seeks information on how closely the rated airflow and specified ESP are achieved in laboratory testing of SPVUs. For indoor fans that are adjustable in discrete steps, is the specified ESP typically exceeded in order to match the certified airflow? Additionally, DOE seeks comments on whether the tolerances for setting airflow of ACUACs or of CACs would be

appropriate for all SPVUs or if separate tolerances should be provided based on fan motor type. If neither of the tolerances would be appropriate, DOE requests information or data on what tolerances would be appropriate for airflow and ESP.

ANSI/AHRI 390-2003 does not distinguish between cooling and heating airflow rates required for testing. 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. 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. For ACUAC heat pumps, DOE's current test procedure requires that indoor airflow and ESP first be set up 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 Section 6(i) of Appendix A). The DOE test procedure further requires that, unless the unit is designed to operate at different airflow rates for cooling and heating modes, the airflow-measuring apparatus (but not the unit under test) 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 Section 6(ii), Appendix A).

Issue 9: DOE requests comments on whether there are SPVHPs for which the heating airflow rate is designed to be different from the cooling airflow rate. If so, DOE seeks comments on whether provisions similar to those required for ACUACs would be appropriate for determining airflow rate and minimum ESP for heating mode tests for SPVHPs.

3. Outdoor Air Enthalpy Method

ANSI/AHRI 390-2003 references ANSI/ASHRAE Standard 37-1988, "Methods of Testing for Rating Unitary Air-Conditioning and Heat Pump Equipment" ("ANSI/AHRI 37-1988") for methods of testing SPVUs. Section 7.2 of ANSI/ASHRAE 37-1988 specifies that for equipment with cooling capacity less than 135,000 Btu/h, primary and secondary capacity measurements are required. 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. Section 10.1.2 of ANSI/ASHRAE 37-1988 then requires that the two test methods agree within 6 percent. DOE understands that the outdoor air enthalpy test method is commonly used as a secondary test method for determining capacity for SPVUs. The outdoor air enthalpy method requires the use of an air-side test apparatus that is connected to the unit under test. Due to concerns about the impact of the air-side test apparatus on performance as compared to performance in the field without the air-side test apparatus connected, section 8.5 of ANSI/ASHRAE 37-1988 (which is referenced by ANSI/AHRI 390-2003) specifies testing with and without the air-side test apparatus connected. First, ANSI/ASHRAE 37-1988 requires a one-hour preliminary test be conducted without the outdoor air-side test apparatus connected. Then, ANSI/ASHRAE 37-1988 specifies a one-hour test be conducted with the outdoor air-side test apparatus connected, which will serve as the official test. ANSI/ASHRAE 37-1988 requires agreement between evaporating and condensing temperatures between the two tests for a valid test. In a test procedure final rule for CACs/HPs, DOE amended its requirements when using the outdoor air enthalpy method as the secondary test method for capacity measurement for CAC/HPs. 82 FR 1426, 1508-1509 (Jan. 5, 2017).

Specifically, DOE's amended test procedure requires that a 30-minute official test be conducted without the outdoor air-side test apparatus connected, then a 30-minute test with the air-side test apparatus be conducted, the results of which are compared to the official, no air-side apparatus test. DOE is considering whether similar changes (i.e., requiring that the official test be conducted without the outdoor air-side test apparatus connected) would be appropriate for the test procedure for SPVUs. DOE expects that such a change would make the test more representative of field use and would improve the repeatability of the test.

Issue 10: DOE seeks 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.

4. Air Temperature Measurements

Outdoor air temperature and humidity are key parameters that affect SPVU performance, and for this reason, ANSI/AHRI 390-2003 requires accurate outdoor air condition measurements. However, DOE is considering whether the method set forth in ANSI/AHRI 390-2003 would benefit from additional specification as to outdoor air temperature measurement. For air-cooled and evaporatively cooled commercial unitary air conditioners, Appendix C of AHRI Standard 340/360-2015, "2015 Standard for Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment," ("AHRI 340/360-2015") provides details on entering outdoor air temperature measurement, including air sampling tree and aspirating psychrometer requirements. DOE is considering whether similar requirements should be adopted for testing SPVUs. However, DOE notes that in such case, some of the

requirements may have to be revised for application to SPVUs. For example, the requirement in section C3 of Appendix C of AHRI 340/360-2015 that "multiple individual reading thermocouples be installed around the unit air discharge perimeter so that they are below the plane of condenser fan exhaust and just above the top of the condenser coil" may not be appropriate for SPVUs, because the units typically exhaust outdoor air horizontally, instead of vertically as is the case for ACUACs.

While Appendix C of AHRI 340/360-2015 provides detailed requirements for measurement of entering outdoor air temperature, it provides no such requirements for measurement of entering indoor air temperature, leaving indoor air temperature, or leaving outdoor air temperature. 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. Therefore, DOE is also considering whether the requirements contained in Appendix C of AHRI 340/360-2015 would be appropriate for measurement of these parameters for testing SPVUs.

Issue 11: DOE seeks comments regarding which, if any, requirements for outdoor air temperature measurement in Appendix C of AHRI Standard 340/360-2015 may or may not be appropriate for testing SPVUs. Specifically, DOE requests comment on whether any requirements in Appendix C of AHRI Standard 340/360-2015 would be appropriate for measurement of indoor air entering and leaving temperatures, as well as outdoor air entering and leaving temperatures.

C. Energy Efficiency Descriptor

EPCA requires that test procedures produce test results that reflect efficiency of equipment during a representative average use cycle. (42 U.S.C. 6314(a)(2)) DOE prescribes

energy efficiency ratio (EER) as the cooling mode metric and coefficient of performance (COP) as the heating mode metric for SPVUs. 10 CFR 431.96. Correspondingly, ASHRAE 90.1-2016 only includes minimum efficiency levels in terms of the full-load metrics of EER and COP for SPVUs. In contrast, ASHRAE 90.1-2016 includes minimum cooling mode efficiency levels for CUACs and for variable refrigerant flow multi-split air conditioners and heat pumps in terms of both the full-load metric EER and the integrated energy efficiency ratio (IEER), which integrates the performance of the equipment when operating at part-load. IEER provides an indication of seasonal performance by integrating test results from four different load points with varying outdoor conditions and load levels (lower load for cooler conditions) in order to represent the equipment's average efficiency throughout the cooling season. ANSI/AHRI 390-2003 includes a part-load metric, integrated part-load value (IPLV) that integrates unit performance at each capacity step provided by the refrigeration system. However, the IPLV tests are all conducted at constant outdoor air conditions of 80 ºF dry bulb temperature and 67 ºF wet bulb temperature. DOE notes that some manufacturers make representations of part-load performance of SPVUs in product literature using IPLV, indicating a potential value in ratings that integrate performance of part-load operation. However, DOE also notes that IPLV was once used for rating CUACs but has since been removed from AHRI 340/360 in favor of IEER.

Issue 12: DOE requests comments on whether DOE should consider adopting for SPVUs a cooling-mode metric that integrates part-load performance to better represent full-season efficiency. If so, DOE requests comment on whether a part-load metric such as IEER or the current IPLV would be appropriate for SPVUs, and which of these would better represent actual performance.

DOE is aware that the energy use of field-installed fans will vary based on the use of the fan for various functions (e.g., economizing, ventilation, filtration, and auxiliary heat). Consequently, DOE is investigating 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. DOE also seeks comment on any anticipated burdens associated with such potential changes to the SPVUs test procedure. DOE also requests 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. DOE also seeks information as to whether accounting for the energy use of fan operation in SPVUs would alter measured efficiency, and if so, to what extent.

Issue 13: DOE seeks information, including any available data, on how frequently SPVU supply fans are operated when there is no demand for heating or cooling (i.e., for fresh air ventilation or air circulation/filtration), and what the typical operating schedules or duty cycles are for this function. Additionally, DOE requests data or information regarding how frequently auxiliary heating is installed with SPVUs and whether its operation is dependent on the supply fan of the SPVU. DOE requests data or information regarding how frequently the systems are used with economizers, how the economizers are integrated with the systems, and what control logic is typically used on the economizers. DOE further seeks comment as to whether or what portion of such fan operation is part of a "representative average use cycle." DOE also seeks information as to whether accounting for the energy use of fan operation in SPVUs would alter measured efficiency, and if so, to what extent.

Issue 14: Assuming DOE has authority to address fans embedded in other commercial equipment such as SPVUs (a conclusion the agency has not yet reached), DOE is interested in receiving comment and other information on this topic. DOE requests comment on whether any of the issues considered in this section would result in double regulation of the energy use of fans in SPVUs, and if so, how.

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. Based on preliminary DOE review of product literature, the time between defrost cycles can be between 30-90 minutes, and defrost cycle duration may be roughly 10 minutes. During the defrost cycle, the SPVHP is consuming energy but not providing heat, unless it also energizes auxiliary heat during defrost. DOE's 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). Hence, any differences in defrost cycle performance between different SPVHP models is not reflected in the heating mode metric, COP. DOE's 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. In contrast, DOE's test procedures for commercial heat pumps do not include consideration of defrost.

Issue 15: DOE seeks information regarding the types of buildings most commonly served by SPVHPs and the annual heating and cooling loads for such buildings, including information or data for SPVHP cooling and heating seasonal energy use therein. DOE also seeks 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.

D. Other Test Procedure Topics

In addition to the issues identified earlier in this document, DOE welcomes comment on any other aspect of the existing test procedure for SPVUs not already addressed by the specific areas identified in this document. DOE particularly seeks information that would improve the repeatability, reproducibility, and consumer representativeness of the test procedures. DOE also requests information that would help DOE create a procedure that would limit manufacturer test burden through streamlining or simplifying testing requirements. Comments regarding the repeatability and reproducibility are also welcome. DOE also requests comment on the benefits and burdens of adopting any industry based or other appropriate test procedure, without modification.

DOE also requests feedback on any potential amendments to the existing test procedure that could be considered to address impacts on manufacturers, including small businesses. Regarding the Federal test method, DOE seeks comment on the degree to which the DOE test procedure should consider and be harmonized with the most recent relevant industry standards for SPVUs and whether there are any changes to the Federal test method that would provide additional benefits to the public. DOE also requests comment on the benefits and burdens of adopting any industry/voluntary consensus-based or other appropriate test procedure, without modification. As discussed, the Federal test procedure for SPVUs currently incorporates by reference ANSI/AHRI 390-2003 (omitting section 6.4) and includes additional provisions to provide the method for an optional break-in period and to provide specifications for addressing key information typically found in the installation and operation manuals. Section 6.4 of ANSI/AHRI 390-2003 specifies the maximum deviation of published efficiency ratings from

measured test results; therefore, this section is omitted from DOE's current test procedure because it conflicts with DOE's certification, compliance, and enforcement regulations at 10 CFR part 429.

Additionally, DOE requests comment on whether the existing test procedure limits a manufacturer's ability to provide additional features to consumers of SPVUs. DOE particularly seeks information on how the test procedures could be amended to reduce the cost of new or additional features and make it more likely that such features are included on SPVUs.

III. Submission of Comments

DOE invites all interested parties to submit in writing by **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**, comments and information on matters addressed in this notice and on other matters relevant to DOE's consideration of an amended test procedure for SPVACs and SPVHPs. These comments and information will aid in the development of a test procedure notice of proposed rulemaking (NOPR) for SPVACs and SPVHPs if DOE determines that an amended test procedure may be appropriate for this equipment.

Submitting comments via *http://www.regulations.gov*. The *http://www.regulations.gov* webpage 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 *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 *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 *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 *http://www.regulations.gov* provides after you have successfully uploaded your comment.

Submitting comments via email, hand delivery, or mail. Comments and documents submitted via email, hand delivery, or mail also will be posted to *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. If you submit via mail or hand delivery, please provide all items on a CD, if feasible. It is not necessary to submit printed copies. No telefacsimiles (faxes) will be accepted.

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

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

Confidential Business Information. Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email, postal mail, or hand delivery two well-marked copies: one copy of the document marked "confidential" including all the information believed to be confidential, and one copy of the document marked "non-confidential" with the information believed to be confidential deleted. Submit these documents via email or on a CD, if feasible. DOE will make

its own determination about the confidential status of the information and treat it according to its determination.

Factors of interest to DOE when evaluating requests to treat submitted information as confidential include: (1) a description of the items, (2) whether and why such items are customarily treated as confidential within the industry, (3) whether the information is generally known by or available from other sources, (4) whether the information has previously been made available to others without obligation concerning its confidentiality, (5) an explanation of the competitive injury to the submitting person which would result from public disclosure, (6) when such information might lose its confidential character due to the passage of time, and (7) why disclosure of the information would be contrary to the public interest.

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

DOE considers public participation to be a very important part of the process for developing test procedures and energy conservation standards. DOE actively encourages the participation and interaction of the public during the comment period in each stage of this process. Interactions with and between members of the public provide a balanced discussion of the issues and assist DOE in the process. Anyone who wishes to be added to the DOE mailing list to receive future notices and information about this process should contact Appliance and Equipment Standards Program staff at (202) 287-1445 or via e-mail at *ApplianceStandardsQuestions@ee.doe.gov*.

Signed in Washington, D.C., on July 12, 2018.

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

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