

Appliance Standards Awareness Project
American Council for an Energy-Efficient Economy
New York State Energy Research and Development Authority
Natural Resources Defense Council

March 15, 2022

Ms. Catherine Rivest
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Building Technologies Office, EE-2J
1000 Independence Avenue SW, Washington, DC 20585

RE: Docket Number EERE-2017-BT-TP-0020: Proposed Rule for Test Procedures for Single Package Vertical Air Conditioners and Heat Pumps

Dear Ms. Rivest:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), the American Council for an Energy-Efficiency Economy (ACEEE), New York State Energy Research and Development Authority (NYSERDA), and the Natural Resources Defense Council (NRDC) on the notice of proposed rulemaking for test procedures for single package vertical air conditioners and heat pumps (SPVUs). 87 FR 2490 (January 14, 2022). We appreciate the opportunity to provide input to the Department.

We support adopting IEER as the efficiency metric in Appendix G1. However, we are concerned that the weighting factors in the calculation of IEER may underweight performance at higher outdoor temperatures. In addition, we are concerned that the proposed test procedures may significantly underestimate fan energy consumption by specifying external static pressure requirements that are too low (for ducted units) and by excluding fan energy for modes outside of mechanical cooling and heating. Finally, while we support DOE's recognition of the importance of cold climate performance of heat pumps by including an optional 17 °F heating test, we encourage the Department to also include an optional 5 °F heating test and to allow these optional representations to be reported to DOE as public information.

We support adopting IEER but urge DOE to ensure that the calculation is adequately representing seasonal efficiency. Using the IEER metric to rate SPVUs will better represent how units perform over a cooling season compared to EER. However, we are concerned that the metric may not reflect the total cooling provided divided by the total energy consumed. Specifically, we understand that the weighting factors represent the relative time that the unit is operating at the different cooling conditions. However, calculating the weighting factors solely based on operating hours does not take into account that an hour of operation at a higher outdoor temperature is providing more cooling and consuming more energy than an hour of operation at a lower outdoor temperature. Therefore, we are concerned that the proposed IEER calculation may be underweighting performance at the higher outdoor temperature

conditions and overweighting performance at the lower outdoor temperature conditions. We encourage DOE to ensure that the IEER calculation is adequately representing seasonal efficiency.

In addition, we understand that the weighting factors for the IEER calculation in AHRI 920-2021 were developed using data from typical SPVU installations, and we support the efforts to define a representative part-load metric for this equipment. We note, however, that product literature indicates that SPVU installations are more broad than the applications listed in this NOPR. In particular, manufacturer materials indicate SPVU applicability in hotels, multifamily dwellings, and permanent classrooms.¹ We therefore encourage DOE to investigate whether the weighting factors are representative of SPVU installations.

We encourage DOE to determine more appropriate external static pressure test conditions for ducted units. DOE has proposed to maintain the existing external static pressure requirements that were unchanged in the update from AHRI 390-2003 in the latest AHRI 390-2021 version. We are concerned that the external static pressures for ducted SPVUs in Table 2 of AHRI 390 may be too low and not representative of field installations. Almost all models categorized as SPVUs in the DOE Compliance Certification Database (CCD) have cooling capacities less than or equal to 70,000 BTU/hr,² which means that virtually all ducted SPVUs are tested at a minimum ESP between 0.1 and 0.2 inches of water column.³ While the duct runs may typically be short in SPVU installations, we believe that testing any ducted unit at an ESP of 0.1 is unrealistic. For example, for central air conditioners, DOE found that filter foulant and evaporator coil fouling alone contribute 0.2 inches w.c. of ESP.⁴ We therefore believe that the test procedure is likely underestimating fan power consumption and encourage DOE to investigate more representative ESP values.

We urge DOE to more fully capture fan energy use in the SPVU test procedure. As DOE notes in the NOPR, the ASRAC Commercial and Industrial Fans and Blowers Working Group Term Sheet recommended that DOE test procedures and efficiency metrics for commercial air-conditioning equipment, including SPVUs, be amended to more fully capture fan energy consumption.⁵ However, DOE is not proposing to include fan energy use during modes of operation outside of cooling for ACs or heating and cooling for heat pumps. We are concerned that by not capturing this additional fan energy use (e.g., for ventilation or supplementary heating), the test procedure may be significantly underestimating fan energy consumption. For instance, the EPA recommends that outdoor air be

¹For example:

https://www.magic-pak.com/MagicPak/literature/technical-specifications/M-Series_MGE4_11EER_Tech_Spec.pdf, p. 2., http://www.bardhvac.com/digcat/S3364_TechDoc_CD/TechDoc-PDF/S3583.pdf, p. 1., <https://1669395.fs1.hubspotusercontent-na1.net/hubfs/1669395/2022%20Literature%20PDFs/2022%20Brochures/2022%20Vert-I-Pak%20Brochure.pdf>, p. 1.

²97% of all models listed in the DOE CCD (as of 3/4/2022). We understand that some models may be reclassified as central air conditioners (CACs) with the definitions proposed in this NOPR.

https://www.regulations.doe.gov/certification-data/CCMS-4-Air_Conditioners_and_Heat_Pumps_-_Single_Package_Vertical.html#q=Product_Group_s%3A%22Air%20Conditioners%20and%20Heat%20Pumps%20-%20Single%20Package%20Vertical%22

³ Minimum ESPs per Table 2 in AHRI 390-2021: ≤ 28 kBTU/hr capacity of 0.1 inch w.c. $28 \leq 42$ kBTU/hr capacity of 0.15 inch w.c., and $42 \leq 70$ kBTU/hr capacity of 0.2 inch w.c..

⁴ <https://www.regulations.gov/document/EERE-2014-BT-STD-0048-0034>, p. 20.

⁵ <https://www.regulations.gov/document/EERE-2013-BT-STD-0006-0179>, p. 16.

supplied continuously during occupied hours to maintain good indoor air quality in portable classrooms.⁶ In addition, failing to capture fan energy use in these additional operational modes could result in inaccurate relative rankings of equipment.⁷ We therefore urge DOE to capture fan energy use outside of cooling mode for ACs and heating and cooling modes for heat pumps to ensure that the test procedures are representative of an average energy use cycle.

We encourage DOE to allow manufacturers to voluntarily report performance at both 17 degrees and 5 degrees to DOE as public information. Cold climate performance is increasingly important to purchasers of heat pumps. Therefore, we support DOE’s proposal to allow optional representations of COP for heat pumps based on the AHRI Low Temperature Operation Heating test at 17 °F. However, we encourage DOE to also introduce an optional 5 °F point test procedure, like the Department has in Appendix M1 for consumer heat pumps. Northeast Energy Efficiency Partnerships (NEEP) has published a cold climate SPVHP specification that sets a minimum COP at 5 °F,⁸ and it is reasonable to expect that an increasing number of manufacturers will test and report cold climate performance. Adding an optional 5 °F test point to the SPVU test procedure will help ensure that any representations that manufacturers make about low-temperature performance will be based on a standardized test procedure. In addition, we encourage DOE to allow both optional COP values (at 17 °F and 5 °F) to be reported and made available in the public DOE compliance certification database. We expect that this information will be valuable to both purchasers of this equipment and administrators of utility programs.

Thank you for considering these comments.

Sincerely,



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⁶ <https://www.epa.gov/iaq-schools/maintain-portable-classrooms-part-indoor-air-quality-design-tools-schools>

⁷ For example, in the case of commercial unitary air conditioners and heat pumps, because the test procedure also fails to capture fan energy use outside of mechanical cooling, DOE’s analysis for the 2016 Direct Final Rule found that total energy consumption did not uniformly decrease with higher efficiency levels. See <https://www.regulations.gov/document/EERE-2013-BT-STD-0007-0105>, p. 7-10.

⁸ https://neep.org/sites/default/files/media-files/ccpthp_spvhp_specification_v1.pdf