

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

March 4, 2022

Mr. Jeremy Dommu
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Building Technologies Office, EE-5B
1000 Independence Avenue SW
Washington, DC 20585

RE: Docket Number EERE-2022-BT-TP-0005/RIN 1904-AF11: Request for Information for Test Procedure for Uninterruptible Power Supplies

Dear Mr. Dommu:

This letter constitutes the comments of the Appliance Standards Awareness Project (ASAP), American Council for an Energy-Efficient Economy (ACEEE), Natural Resources Defense Council (NRDC), and New York State Energy Research and Development Authority (NYSERDA) on the request for information (RFI) for test procedure for uninterruptible power supplies (UPSs). 87 Fed. Reg. 5742 (February 2, 2022). We appreciate the opportunity to provide input to the Department.

We encourage DOE to investigate opportunities to expand the scope of the test procedure to include back-up battery chargers such as portable power systems. Portable power systems¹ are an emerging class of products that are becoming progressively more common for homes given the need for back-up power in climate emergencies and power outage situations.² However, these systems are not currently covered under any DOE test procedure. Given the substantial potential for growth of these products in the market, we encourage DOE to consider incorporating them into the scope of the test procedure.

We recommend that DOE add new test load conditions that represent light-load (i.e., 10%) and no-load (i.e., 0%) operation. In the current test procedure, UPSs are tested at 25%, 50%, 75%, and 100% load. The test procedure does not capture efficiency below 25% load, which is a common operating point for many devices. For example, desktop computers use most of their

¹ See <https://ecoflow.com/products/delta-pro-portable-power-station>.

² <https://www.prnewswire.com/news-releases/portable-power-station-market-size-worth-295-91-mn-globally-by-2028-at-4-9-cagr---exclusive-report-by-the-insight-partners-301488519.html>.

energy operating at loads of 10% or lower.³ Additionally, the current test procedure would not account for UPS energy consumption when the desktop computer is in off or sleep mode but still plugged in, which could be captured with a test point at 0%. Therefore, we believe that the loads currently specified in the test procedure are not representative of actual UPS use. The RFI notes that IEC 62040-3 Ed. 3.0 has been updated to include a no-load test condition. We encourage DOE to align with the updated industry test procedure and incorporate a no-load test load condition and to also incorporate an additional test at 10% load in order to better represent current UPS use.

We encourage DOE to update the reporting requirements to align with IEC 62040-3 Ed. 3.0 Annex J. The current test procedure requires that features that are not related to maintaining the energy storage device at full charge be switched off, disconnected, or set to their lowest power-consuming mode during testing.⁴ However, there are no requirements for manufacturers to report these features that are turned off or set to the lowest power-consuming mode. Annex J of IEC 62040-3 Ed. 3.0 includes an update to require manufacturers to report these manually switched off features. We encourage DOE to align its certification requirements with the criteria in IEC 62040-3 Ed. 3.0 to report features, interfaces, or ports that have been turned off or set to the lowest power consuming mode during testing.

We urge DOE to adjust the UPS load weightings, including incorporating a light-load weighting, to ensure that they are representative of current use. Table 1 shows the current load weightings for each reference test load, which are meant to represent the portion of time spent at the specified loading point. However, these load weightings may no longer be representative of modern UPS operation. As mentioned above, many devices spend considerable time operating at low load conditions. We believe that a review of current UPS operation may find that higher weightings are warranted for low-load conditions. Thus, we urge DOE to incorporate a 10% load into the overall efficiency metric and investigate the current real-world operating range of various devices to determine more accurate weightings for the time spent at specific reference loads.

Table 1. Load weightings specified in Table 4.3.1 of current test procedure⁵

Rated output power (W)	UPS architecture	Portion of time spent at reference load			
		25%	50%	75%	100%
P ≤1500 W	VFD	0.2	0.2	0.3	0.3
	VI or VFI	0*	0.3	0.4	0.3
P >1500 W	VFD, VI, or VFI	0*	0.3	0.4	0.3

* Measuring efficiency at loading points with 0 time-weighting is not required.

³ See Natural Resources Defense Council comments on ENERGY STAR UPS Version 2.0. <https://www.energystar.gov/sites/default/files/NRDC%20Comments%20on%20ENERGY%20STAR%20Uninterruptible%20Power%20Supplies%20Draft%201%20Version%202.0%20Specification.pdf>.

⁴ 10 CFR 430, Subpart B, Appendix Y.

⁵ 87 Fed. Reg. 5746.

We recommend that DOE establish a separate standby metric based on the no-load test condition. As described above, we encourage DOE to align with the updated industry test procedure to incorporate a new test load condition at 0% load. We further encourage the Department to establish a separate standby mode metric based on this no-load test condition. A standby mode measurement at the no-load test condition would provide consumers with a more accurate understanding of UPS energy consumption and align with the approach used for external power supplies⁶ and the proposed approach for battery chargers.⁷

EPCA requires DOE to amend test procedures for all covered products to include standby and off mode energy consumption.⁸ In the 2016 test procedure NOPR for UPSs, DOE noted that for battery chargers, the battery charger is disconnected from the battery itself during standby and off mode operation, and since UPSs are always connected to a load, these modes of operation would not be applicable.⁹ Thus, DOE did not consider standby mode and off mode energy consumption for UPSs at that time. However, we note that the UPS no-load condition aligns closely with battery charger maintenance mode (maintenance mode operation occurs when a battery charger is connected to a battery and provides some limited charging in order to maintain the battery at full charge). In the 2021 battery charger test procedure NOPR, DOE tentatively determined that maintenance mode would qualify under EPCA's definition of standby.¹⁰ Therefore, we believe that it would be appropriate to establish a standby metric for UPSs based on the no-load test condition.

We recommend that DOE require non-linear loads for UPS active mode testing. The current test procedure does not specify the type of load to be used for testing; however, many devices including computers, monitors, and servers are non-linear loads. Thus, many UPSs are designed to handle non-linear loads, while the test procedure is not representative of the real-world use of these products. We encourage DOE to require the use of non-linear loads for testing which will increase the representativeness of the test procedure and provide a more accurate relative ranking of products. We note that Annex E of IEC 62040-3 Ed. 3.0, which provides a reference non-linear load for testing, could be incorporated by reference in the DOE test procedure.

Thank you for considering these comments.

Sincerely,



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Appliance Standards Awareness Project



Amber Wood
Director, Buildings Program
American Council for an Energy-Efficient Economy

⁶ 10 CFR 430, Subpart B, Appendix Z.

⁷ 86 Fed. Reg. 66888. November 23, 2021.

⁸ 42 U.S.C. 6295(gg)(2)(A).

⁹ 81 Fed. Reg. 31546. May 19, 2016.

¹⁰ 86. Fed. Reg. 66888-66889. November 23, 2021.



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