

[6450-01-P]

DEPARTMENT OF ENERGY

10 CFR Part 430

[EERE-2022-BT-TP-0005]

RIN 1904-AF11

Energy Conservation Program: Test Procedure for Uninterruptible Power Supplies

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

ACTION: Final rule.

SUMMARY: The U.S. Department of Energy (“DOE”) is amending the test procedure for uninterruptible power supplies (“UPSs”) to incorporate by reference relevant portions of the latest version of the industry testing standard, harmonize the current DOE definitions for UPS, total harmonic distortion, and certain types of UPSs with the definitions in the latest version of the industry standard, and add a no-load testing condition, as an optional test.

DATES: The effective date of this rule is [INSERT DATE 75 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]. The amendments will be mandatory for product testing starting [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

The incorporation by reference of certain material listed in the rule is approved by the Director of the Federal Register on [INSERT DATE 75 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

ADDRESSES: The docket, which includes *Federal Register* notices, public meeting attendee lists and transcripts, comments, and other supporting documents/materials, is

available for review at *www.regulations.gov*. All documents in the docket are listed in the *www.regulations.gov* index. However, not all documents listed in the index may be publicly available, such as those containing information that is exempt from public disclosure.

A link to the docket webpage can be found at *www.regulations.gov/docket/EERE-2022-BT-TP-0005*. The docket webpage contains instructions on how to access all documents, including public comments, in the docket.

For further information on how to review the docket contact the Appliance and Equipment Standards Program staff at (202) 287-1445 or by email: *ApplianceStandardsQuestions@ee.doe.gov*.

FOR FURTHER INFORMATION CONTACT:

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SUPPLEMENTARY INFORMATION:

DOE incorporates by reference the following industry standard into part 430:

IEC 62040-3, “*Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements*,” Edition 3.0, copyright April 2021.

Copies of IEC 62040-3 Ed. 3.0 are available from the International Electrotechnical Commission, 3 Rue de Varembe, Case Postale 131, 1211 Geneva 20, Switzerland; webstore.iec.ch.

For a further discussion of this standard, see section IV.N of this document.

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I. Authority and Background

Uninterruptible power supplies (“UPSs”) are a class of battery chargers and fall among the list of “covered products” for which DOE is authorized to establish and amend energy conservation standards and test procedures. (42 U.S.C. 6295(u)) DOE’s test procedure for UPSs is currently prescribed at title 10 of the Code of Federal Regulations (“CFR”), part 430 section 32(z)(3); and 10 CFR part 430 subpart B appendix Y (“appendix Y”) and appendix Y1 (“appendix Y1”). The following sections discuss DOE’s authority to establish and amend test procedures for UPSs and relevant background information regarding DOE’s consideration of test procedures for this product.

A. Authority

The Energy Policy and Conservation Act, Pub. L. 94-163, as amended (“EPCA”),¹ 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 B of EPCA² established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency. These products include UPSs, the subject of this document. (42 U.S.C. 6295(u))

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

² For editorial reasons, upon codification in the U.S. Code, Part B was redesignated Part A.

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), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The Federal testing requirements consist of test procedures that manufacturers of covered products must use as the basis for (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted under EPCA (42 U.S.C. 6295(s)), and (2) making other representations about the efficiency of those products. (42 U.S.C. 6293(c)) Similarly, DOE must use these test procedures to determine whether the products comply with any relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

Federal energy efficiency requirements for covered products established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (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))

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE must follow when prescribing or amending test procedures for covered products. EPCA requires that any test procedures prescribed or amended under this section shall 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 (as determined by the Secretary) or period of use and shall not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

EPCA also requires that, at least once every 7 years, DOE evaluate test procedures for each type of covered product, including UPSs, 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 or period of use. (42 U.S.C. 6293(b)(1)(A))

If the Secretary determines, on her own behalf or in response to a petition by any interested person, that a test procedure should be prescribed or amended, the Secretary shall promptly publish in the *Federal Register* proposed test procedures and afford interested persons an opportunity to present oral and written data, views, and arguments with respect to such procedures. The comment period on a proposed rule to amend a test procedure shall be at least 60 days and may not exceed 270 days. In prescribing or amending a test procedure, the Secretary shall take into account such information as the Secretary determines relevant to such procedure, including technological developments relating to energy use or energy efficiency of the type (or class) of covered products involved. (42 U.S.C. 6293(b)(2)). If DOE determines that test procedure revisions are not appropriate, DOE must publish its determination not to amend the test procedure. (42 U.S.C. 6293(b)(1)(A)(ii))

In addition, EPCA requires that DOE amend its test procedures for all covered products to integrate measures of standby mode and off mode energy consumption into

the overall energy efficiency, energy consumption, or other energy descriptor, unless the current test procedure already incorporates the standby mode and off mode energy consumption, or if such integration is technically infeasible. (42 U.S.C. 6295(gg)(2)(A))

If an integrated test procedure is technically infeasible, DOE must prescribe separate standby mode and off mode energy use test procedures for the covered product, if a separate test is technically feasible. (42 U.S.C. 6295(gg)(2)(A)(ii)) Any such amendment must consider the most current versions of the International Electrotechnical Commission (“IEC”) Standard 62301³ and IEC Standard 62087⁴ as applicable. (42 U.S.C. 6295(gg)(2)(A))

DOE is publishing this final rule in satisfaction of the 7-year review requirement specified in EPCA. (42 U.S.C. 6293(b)(1)(A))

B. Background

On December 12, 2016, DOE amended its battery charger test procedure by publishing a final rule in the *Federal Register* that added a discrete test procedure for UPSs (“December 2016 Final Rule”). 81 FR 89806. The December 2016 Final Rule incorporated by reference specific sections of the relevant industry standard for UPSs, with additional instructions, into the current battery charger test procedure published at appendix Y. 81 FR 89806, 89810.

On September 8, 2022, DOE published a final rule in the *Federal Register* amending the existing test procedure at appendix Y for battery chargers and creating a

³ IEC 62301, *Household electrical appliances—Measurement of standby power* (Edition 2.0, 2011-01).

⁴ IEC 62087, *Audio, video and related equipment—Methods of measurement for power consumption* (Edition 1.0, Parts 1–6: 2015, Part 7: 2018).

new test procedure at appendix Y1 that expanded the scope of the battery charger test method to include open placement and fixed-position wireless battery chargers and established separate metrics for active mode, standby mode, and off mode for all battery chargers other than UPSs (“September 2022 Final Rule”). 87 FR 55090. Manufacturers will be required to continue to use the amended test procedure in appendix Y until the compliance date of any new final rule establishing amended energy conservation standards based on the newly established test procedure in appendix Y1. 87 FR 55090, 55122. At such time as DOE establishes new standards for battery chargers other than UPSs using these new metrics, manufacturers would no longer use appendix Y and instead will be required to determine compliance using the updated test procedure at appendix Y1. *Id.* at 87 FR 55125. The September 2022 Final Rule also replicated all aspects of testing UPSs from appendix Y to appendix Y1, ensuring that instructions for all battery chargers are consolidated in one location. *Id.* at 87 FR 55125–55132.

On February 2, 2022, DOE initiated a rulemaking process to consider amendments to the UPS test procedure by publishing in the *Federal Register* a request for information (“RFI”) seeking data and information regarding the existing DOE test procedure for UPSs (“February 2022 RFI”). 87 FR 5742. On May 11, 2022, DOE issued a correcting amendment to address an error in describing input dependency modes in the regulatory text as it appeared in the December 2016 Final Rule. 87 FR 28755.

On January 5, 2023, DOE published a notice of proposed rulemaking (“NOPR”) proposing amendments to appendices Y and Y1 of the UPS test procedure to consider the latest revision of the industry standard that is incorporated by reference and to provide an optional test method for measuring power consumption of a UPS at no-load conditions

(“January 2023 NOPR”). 88 FR 790. DOE held a webinar related to the January 2023 NOPR on February 2, 2023 (“February 2023 public meeting”).

DOE received comments in response to the January 2023 NOPR from the interested parties listed in Table I.1.

Table I.1 List of Commenters with Written Submissions in Response to the January 2023 NOPR

Commenter(s)	Reference in this Final Rule	Comment No. in the Docket	Commenter Type
National Electrical Manufacturers Association	NEMA	10	Trade Association
Northwest Energy Efficiency Alliance	NEEA	11	Efficiency Organization
Appliance Standards Awareness Project and American Council for an Energy-Efficient Economy	Joint Commenters	12	Efficiency Organizations

A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.⁵ To the extent that interested parties have provided written comments that are substantively consistent with any oral comments provided during the February 2023 public meeting, DOE cites the written comments throughout this final rule. Any substantial oral comments provided during the

⁵ The parenthetical reference provides a reference for information located in the docket of DOE’s rulemaking to develop test procedures for UPSs. (Docket No. EERE-2022-BT-TP-0005, which is maintained at www.regulations.gov). The references are arranged as follows: (commenter name, comment docket ID number, page of that document).

webinar but were not accompanied by written comments are summarized and cited separately throughout this final rule.

II. Synopsis of the Final Rule

In this final rule, DOE amends appendices Y and Y1 as follows:

- Incorporate by reference the current revision to the applicable industry standard—IEC 62040-3 Ed. 3.0, “Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements”—to reflect redesignated subsections in the latest version of that standard.
- Provide an optional test method for measuring the power consumption of UPSs at no-load conditions.

The adopted amendments are summarized in Table II.1 and compared to the test procedure provision prior to the amendment, as well as the reason for the adopted change.

Table II.1 Summary of Changes in the Amended UPS Test Procedure

DOE Test Procedure Prior to Amendment	Amended Test Procedure	Attribution
References IEC 62040-3 Ed. 2.0.	Updates each reference to IEC 62040-3 Ed. 3.0.	To harmonize with the latest industry standard.
Provides definitions for UPS, total harmonic distortion, and certain types of UPSs that differ non-substantively from the definitions in IEC 62040-3 Ed. 3.0.	Harmonizes DOE definitions with definitions of UPS provided in IEC 62040-3 Ed. 3.0.	To harmonize with the latest industry standard.
Does not provide a method for testing the power consumption of UPSs at no-load conditions.	Incorporates the no-load test from Annex J of IEC 62040-3, Ed. 3.0 as an optional test method for voluntary representations of no-load power consumption.	In response to comments received on the February 2022 RFI and

DOE Test Procedure Prior to Amendment	Amended Test Procedure	Attribution
		the January 2023 NOPR.

DOE has determined that the amendments described in section III of this document and adopted in this document will not alter the measured efficiency of UPSs or require retesting or recertification solely as a result of DOE's adoption of the amendments to the test procedure. Additionally, DOE has determined that the amendments will not increase the cost of testing. Discussion of DOE's actions are addressed in detail in section III of this document.

The effective date for the amended test procedure adopted in this final rule is 75 days after publication of this document in the *Federal Register*. Representations of energy use or energy efficiency must be based on testing in accordance with the amended test procedure beginning 180 days after the publication of this final rule.

III. Discussion

In the following sections, DOE adopts certain proposed amendments to its test procedure for UPSs. For each adopted amendment, DOE provides relevant background information, discusses relevant public comments, and provides reasons for the amendment.

A. Scope of Applicability

The scope of the current test procedure at appendices Y and Y1, as applicable to UPSs, covers UPSs⁶ that utilize the standardized National Electrical Manufacturer Association (“NEMA”) plug, 1–15P or 5–15P,⁷ and have an alternating current (“AC”) output. Appendices Y and Y1, section 1.

To the extent that a portable power system meets the definition of a battery charger, operates on direct current (“DC”) or United States AC line voltage, but does not meet the definition of a back-up battery charger as defined by DOE, such a product is currently covered within the scope of the non-UPS portion of the battery charger test procedure, which includes all battery chargers operating at either DC or United States AC line voltage (115V at 60Hz). Appendices Y and Y1, section 1. As discussed in the January 2023 NOPR, DOE has identified—based on a review of product literature—a wide range of portable power stations currently certified as non-UPS battery chargers and listed in the compliance certification database (“CCD”),⁸ suggesting that manufacturers have the mutual understanding that such products are covered within the scope of the non-UPS portion of the battery charger test procedure. 88 FR 790, 793. Because such products are already included within the scope of the non-UPS battery charger test procedure, DOE tentatively determined that no changes were warranted to the scope of the UPS test procedure with respect to such products. *Id.*

⁶ As discussed further in section III.B of this document, DOE defines a UPS as a battery charger consisting of a combination of converters, switches, and energy storage devices (such as batteries), constituting a power system for maintaining continuity of load power in case of input power failure. Appendices Y and Y1, section 2.27.

⁷ Plug designations are as specified in American National Standards Institute (“ANSI”)/NEMA WD 6-2016, incorporated by reference at 10 CFR 430.2.

⁸ For example, DOE has identified the following inexhaustive list of portable power stations models in the battery charger CCD: Jackery 550, DEWALT DXAEPS14, STANLEY J5C09, Anker A1710, Duracell PPS1000-1050-120-01.

To the extent that a portable power station meets DOE's definition of a back-up battery charger, such a product is likely a “whole-home power backup device” and would be outside the scope of appendices Y and Y1. DOE tentatively determined in the January 2023 NOPR that the market for whole-home backup devices is still nascent, albeit growing, and the devices currently lack widespread use among consumers. *Id.* at 88 FR 794. DOE stated its concern that defining such technologies and addressing them in the UPS test procedure at this time could potentially restrict the development of these less mature technologies. *Id.* Furthermore, DOE did not have sufficient consumer usage data, nor did commenters provide any such information, that would be needed at this time to develop a test procedure that produces representative results for these products. *Id.* For these reasons, DOE did not propose to expand the scope of the UPS test procedure to include whole-home backup power systems. *Id.*

In response to the January 2023 NOPR, NEEA expressed its support for DOE’s determination that portable power stations would be covered under the non-UPS battery charger test procedure scope. (NEEA, No. 11 at p. 2)

For the reasons discussed here and in the January 2023 NOPR, in this final rule, DOE has determined that no amendments are needed to the scope of the UPS test procedure to address portable power systems that meet the definition of a battery charger, operate on DC or United States AC line voltage, but do not meet the definition of a back-up battery charger as defined by DOE. Consistent with the January 2023 NOPR, DOE is also not expanding the scope of the UPS test procedure to include whole-home backup power systems.

B. Definitions

DOE defines a UPS as a battery charger consisting of a combination of convertors, switches, and energy storage devices (such as batteries), constituting a power system for maintaining continuity of load power in case of input power failure.

Appendices Y and Y1, section 2.27. This definition aligns with the definition of a UPS provided in IEC 62040-3 Ed. 2.0, which is currently incorporated by reference into appendices Y and Y1.

DOE recognizes the benefit of harmonizing with the latest versions of industry standards where applicable and appropriate. IEC 62040-3 Ed. 3.0 includes slightly revised language stating “maintaining continuity of AC load power in case of AC input power failure.” In the January 2023 NOPR, DOE tentatively determined that the addition of the term “AC” in the IEC 62040-3 Ed. 3.0 definition is consistent with the range of products that meet the current definition of a UPS and would not change the scope of products subject to the test procedure.⁹ 88 FR 790, 794. Therefore, DOE proposed to update its definition of a UPS to incorporate by reference the definition specified in IEC 62040-3 Ed. 3.0 and requested comment on its proposal to harmonize its definition of a UPS with that of IEC 62040-3 Edition 3.0 in the January 2023 NOPR. *Id.* Specifically, DOE requested comment on its tentative determination that such harmonization would not affect the current scope of the UPS test procedure. *Id.*

In response to the January 2023 NOPR, NEMA supported DOE's proposal to harmonize its UPS definition with IEC 62040-3 Ed. 3.0 but suggested that DOE further clarify that the load power being maintained must be AC. (NEMA, No. 10 at pp. 1–2)

⁹ DOE notes that use of NEMA 1-15P/5-15P wall plugs, as specified by the currently defined scope for UPSs, implies the use of AC input power.

Similarly, in the February 2023 public meeting, Schneider Electric suggested to DOE to further clarify in the UPS definitions that the current test procedure is only designed for AC input and AC output UPSs.¹⁰

With regards to the suggestions from NEMA and Schneider Electric, DOE notes that the proposed UPS definition has already harmonized with IEC 62040-3 Ed. 3.0 by adding the clarification of “maintaining continuity of AC load power in case of AC input power failure.” Additionally, section 1 of appendices Y and Y1 describes the scope of the test procedure as applying to only those UPSs that utilize a NEMA 1-15P or 5-15P plug and have an AC output. DOE has determined that adding the term “AC” to describe the load power within the definition of UPS is redundant and risks falling out of harmonization with the definition found in IEC 62040-3 Ed. 3.0 without much to gain. As such, DOE has determined that adding the additional term “AC” to describe output power in the definition is unnecessary. Accordingly, DOE is finalizing its proposed definition of a UPS to harmonize with that of IEC 62040-3 Edition 3.0 without changes in this final rule.

Section 2.26 of appendices Y and Y1 defines “total harmonic distortion (“THD”)”, expressed as a percent, as the root mean square (“RMS”) value of an AC signal after the fundamental component is removed and interharmonic components are ignored, divided by the RMS value of the fundamental component. Section 3.5.49 of IEC 62040-3 Ed. 3.0 defines THD as the ratio of the RMS value of the sum of the harmonic components X_h of orders 2 to 40 to the RMS value of the fundamental component X_1 ,

¹⁰ Schneider Electric’s comment can be found at pp. 8-9 of the February 2023 public meeting transcript, available at <https://www.regulations.gov/document/EERE-2022-BT-TP-0005-0009>.

and also includes a mathematical formula accompanying this descriptive definition. The key difference between the definitions is that DOE refers to the RMS value of the AC signal, whereas the IEC 62040-3 Ed. 3.0 definition more narrowly specifies measuring the RMS value of harmonic components of order 2 through 40. DOE understands that, in measuring the RMS value of a signal, a laboratory would be required to determine the number of harmonics to include within the measurement. By specifying harmonic components of order 2 through 40, DOE tentatively concluded in the January 2023 NOPR that the IEC definition may provide a more reproducible measurement among different laboratories compared to the current DOE definition, which requires a laboratory to determine which harmonic components to measure. For this reason, DOE proposed to update its definition of THD to incorporate by reference the definition specified in IEC 62040-3 Ed. 3.0. 88 FR 790, 794.

Additionally, DOE carefully reviewed its definitions of “voltage frequency dependent (“VFD”) UPS,”¹¹ “voltage and frequency independent (“VFI”) UPS,”¹² and

¹¹ Section 2.27.1 of appendices Y and Y1 defines VFD UPS as a UPS that produces an AC output where the output voltage and frequency are dependent on the input voltage and frequency. This UPS architecture does not provide corrective functions like those in voltage independent and voltage and frequency independent systems. The definition also includes a *Note* specifying that VFD input dependency may be verified by performing the AC input failure test in section 6.2.2.7 of IEC 62040-3 Ed. 2.0 and observing that, at a minimum, the UPS switches from normal mode of operation to battery power while the input is interrupted.

¹² Section 2.27.2 of appendices Y and Y1 defines VFI UPS as a UPS where the device remains in normal mode producing an AC output voltage and frequency that is independent of input voltage and frequency variations and protects the load against adverse effects from such variations without depleting the stored energy source. The definition also includes a *Note* specifying that VFI input dependency may be verified by performing the steady state input voltage tolerance test and the input frequency tolerance test in sections 6.4.1.1 and 6.4.1.2 of IEC 62040-3 Ed. 2.0, respectively, and observing that, at a minimum, the UPS produces an output voltage and frequency within the specified output range when the input voltage is varied by ± 10 percent of the rated input voltage and the input frequency is varied by ± 2 percent of the rated input frequency.

“voltage independent (“VI”) UPS”¹³ in comparison to the definitions provided in sections 5.3.4.2.2,¹⁴ 5.3.4.2.3,¹⁵ and 5.3.4.2.4,¹⁶ respectively, of IEC 62040-3 Ed. 3.0. The IEC definitions closely align with the core capabilities described by the DOE definitions. However, DOE’s definitions each include a “Note” that provides greater specificity regarding certain product characteristics than the definitions provided by IEC 62040-3 Ed. 3.0. For example, the Note to section 2.27.2 of appendices Y and Y1 (providing the definition for VFI UPS) specifies that, at a minimum, the VFI UPS produces an output voltage and frequency within the specified output range even when the input voltage is varied by ± 10 percent of the rated input voltage and the input frequency is varied by ± 2 percent of the rated input frequency. By contrast, the definition of VFI UPS in IEC 62040-3 Ed. 3.0 specifies the AC input power voltage tolerance bands to be the greater of ± 10 percent of the rated input voltage and what is declared by the manufacturer and the

¹³ Section 2.27.3 of appendices Y and Y1 defines VI UPS as a UPS that produces an AC output within a specific tolerance band that is independent of under-voltage or over-voltage variations in the input voltage without depleting the stored energy source. The output frequency of a VI UPS is dependent on the input frequency, similar to a voltage and frequency dependent system. The definition also includes a *Note* specifying that VI input dependency may be verified by performing the steady state input voltage tolerance test in section 6.4.1.1 of IEC 62040-3 Ed. 2.0 and ensuring that the UPS remains in normal mode with the output voltage within the specified output range when the input voltage is varied by ± 10 percent of the rated input voltage.

¹⁴ Section 5.3.4.2.2 of IEC 62040-3 Ed. 3.0 specifies that a UPS classified as VFD shall protect the load from a complete loss of AC input power. The output of the VFD UPS is dependent on changes in voltage and frequency of the AC input power and is not intended to provide additional voltage corrective functions, such as those arising from the use of tapped transformers. VFD classification is verified when performing the test described in section 6.2.2.7.

¹⁵ Section 5.3.4.2.3 of IEC 62040-3 Ed. 3.0 specifies that a UPS classified VI shall protect the load as required for VFD and also from under-voltage applied continuously to the input, and over-voltage applied continuously to the input. The output voltage of the VI UPS shall remain within declared voltage limits (provided by voltage corrective functions, such as those arising from the use of active and/or passive circuits). The manufacturer shall declare an output voltage tolerance band narrower than the input voltage tolerance band. VI classification is verified when performing the tests described in section 6.4.1.2. The definition also includes a *Note* specifying that the energy storage device does not discharge when the AC input power is within the input voltage tolerance band.

¹⁶ Section 5.3.4.2.4 of IEC 62040-3 Ed. 3.0 specifies that a UPS classified VFI is independent of AC input power voltage and frequency variations as specified and declared in section 5.2 and shall protect the load against adverse effects from such variations without discharging the energy storage device. VFI classification is verified when performing the tests described in section 6.4.1.3.

AC input power frequency to be the greater of ± 2 percent of the rated input frequency and what is declared by the manufacturer. Similarly, the Note to section 2.27.3 of appendices Y and Y1 (providing the definition for VI UPS) specifies an input voltage variation of ± 10 percent, whereas the corresponding definition in IEC 62040-3 Ed 3.0 specifies the voltage limits to be the greater of ± 10 percent of the rated input voltage and what is declared by the manufacturer.

DOE notes that there are scenarios where using the manufacturer-declared limits may result in a different input dependency classification of a UPS when compared to using DOE's current input voltage tolerance limits. For example, a manufacturer that declares an input voltage tolerance limit of ± 15 percent for a VI basic model could have a unit that is unable to maintain the required output when the input voltage is adjusted by more than 13 percent in real world testing. Per the IEC definition, this unit would fail the VI input dependency at the manufactured declared limits of ± 15 percent and therefore be classified as a VFD UPS (the highest input dependent UPS topology). However, the same unit when tested per DOE's current input voltage limits of ± 10 percent would continue to classify it as a VI.

To avoid such discrepancies, DOE proposed in the January 2023 NOPR to harmonize its definitions of VFD UPS, VI UPS, and VFI UPS with IEC 62040-3 Ed 3.0 but maintain the notes alongside each definition that currently establish the input voltage and frequency tolerance limits of ± 10 percent and ± 2 percent, respectively. *Id.* at 88 FR 794–795.

DOE noted also that the section numbers of IEC 62040-3 Ed. 2.0 currently referenced by DOE's definitions have been updated to different section numbers in IEC

62040-3 Ed. 3.0. Therefore, DOE proposed to update its definitions of VFD UPS, VI UPS, and VFI UPS to reference the corresponding updated section numbers within IEC 62040-3 Ed. 3.0. *Id.* at 88 FR 795.

DOE initially determined that the proposed amended definitions would not substantively change the scope or applicability of the test procedure as compared to the current definitions. *Id.*

In the January 2023 NOPR, DOE requested comment on its proposal to update its definitions of THD, VFD UPS, VI UPS, and VFI UPC to harmonize with the IEC 62040-3 Ed 3.0 definitions. *Id.*

In response to the January 2023 NOPR, NEEA and NEMA supported DOE's proposal to harmonize with IEC 62040-3 Ed. 3.0, specifically on the proposed updated definitions of THD, VFD, VI, and VFI. (NEEA, No. 11 at pp. 2–3; NEMA, No. 10 at pp. 1–2) NEEA further stated that these updated definitions can increase reproducibility and reduce complexity. (NEEA, No. 11 at p. 2)

NEMA further recommended that DOE specify VFI operating conditions and revise the language used when referring to drawing power from the energy storage device. (NEMA, No. 10 at p. 2) NEMA also recommended that DOE clarify that the voltage limits should be referring to those described in section 5.3 of IEC 62040-3 Ed. 3.0 for VI UPSs. (*Id.*)

DOE appreciates the comments from NEMA and NEEA regarding their support for the updates to the definitions of THD, VFD, VI, and VFI. In response to the recommendation from NEMA, DOE notes that DOE’s proposed updates to the VFI UPS definition already reference section 5.2 of IEC 62040-3 Ed. 3.0 for VFI UPS input voltage and frequency variation limits. Furthermore, the proposed definition also clarifies that VFI UPSs “shall protect the load against adverse effects from such variations without discharging the energy storage device.” 88 FR 790, 805. DOE further notes that IEC 62040-3 Ed. 3.0 does not specifically prescribe a voltage limit for VI UPSs. Rather, the voltage limit is based on the UPS model and is declared by manufacturers directly. As such, DOE has determined that it would not be essential to add reference to section 5.3 of IEC 62040-3 Ed. 3.0 for VI UPS output voltage tolerance.

For the reasons discussed here and in the January 2023 NOPR, in this final rule, DOE is updating the definitions of THD, VFD, VI, and VFI to harmonize with the IEC 62040-3 Ed 3.0 definitions, including referencing the corresponding updated section numbers within IEC 62040-3 Ed 3.0 definitions, and maintaining the notes to these definitions as proposed in the January 2023 NOPR.

C. Updates to Industry Standards

As discussed, the current UPS test procedure incorporates by reference certain sections of IEC 62040-3 Ed. 2.0 regarding test setup, input and output power measurement, and the optional determination of UPS architecture. Specifically:

- The definitions of VFD UPS, VFI UPS, and VI UPS in sections 2.27.1 through 2.27.3 of appendices Y and Y1 reference: (1) the AC input failure test in section 6.2.2.7 of IEC 62040-3 Ed. 2.0, which in turn references section 5.3.4 and Annex G of IEC 62040-3 Ed. 2.0; (2) the steady state input voltage tolerance test in section 6.4.1.1 of IEC 62040-3 Ed. 2.0, as a subsection to section 6.4.1, which in turn references sections 5.2.1 and 5.2.2.k of IEC 62040-3 Ed. 2.0; and (3) the input frequency tolerance test in section 6.4.1.2 of IEC 62040-3 Ed. 2.0, which in turn references sections 5.3.2.d and 5.3.2.3 of IEC 62040-3 Ed. 2.0.
- Section 4.2.1 of appendices Y and Y1 specifies configuring the UPS according to Annex J.2 of IEC 62040-3 Ed. 2.0.
- Section 4.3.3 of appendices Y and Y1 specifies measuring input and output power according to section J.3 of Annex J of IEC 62040-3 Ed. 2.0.

Since the publication of the December 2016 Final Rule, IEC has updated the IEC 62040-3 standard to its third edition (*i.e.*, IEC 62040-3 Ed. 3.0). The following paragraphs summarize the key changes from the second edition, based on DOE's review of the revised standard.

Section 4 of IEC 62040-3 Ed. 3.0 includes updates to various environmental conditions, such as the general test environment and operating conditions when testing UPSs. Appendices Y and Y1, however, do not refer to section 4 of the IEC 62040-3 standard but instead provide their own environmental and operating conditions for testing purposes. Therefore, DOE determined in the January 2023 NOPR that its test procedure

for measuring the efficiency of UPSs will remain unaffected by the updates to section 4 of the IEC 62040-3 Ed. 3.0. 88 FR 790, 795.

Section 5.2 of IEC 62040-3 Ed. 2.0 addresses UPS input specifications, such as the input voltage range, input frequency range, and total harmonic distortions during which the UPS under test must remain in the normal mode of operation. While an initial review of IEC 62040-3 Ed. 3.0 shows significant editorial changes to the sections that define these parameters, the remainder of the parameters remain unchanged. Similarly, section 5.3 of IEC 62040-3 Ed. 3.0 provides the minimum output specifications for UPSs that must be declared by manufacturers, such as its input dependency, rated output voltage and RMS output voltage tolerance band, rated frequency tolerance band, rated output active and apparent power, total harmonic distortion, etc. As before, the majority of the changes to this section are editorial or a reorganization.

Section 6 of IEC 62040-3 Ed. 2.0 previously provided instructions for performing the AC input failure test (*see* section 6.2.2.7), the steady-state input voltage tolerance test (*see* section 6.4.1.1), and the input frequency tolerance test (*see* section 6.4.1.2) that are used to classify the input dependency of a UPS as VI, VFD, or VFI. IEC 62040-3 Ed. 3.0 has since updated these subsections with the following changes: subsection titles and numbering have been updated to specifically refer to them as VI, VFD, and VFI input dependency tests; additional criteria have been added for meeting the VI, VFD, and VFI classifications; and a new test load condition at 0 percent (*i.e.*, no-load) has been added (*see* section III.E of this document for further discussion of a no-load test).

Additional updates to Annex J to IEC 62040-3 Ed. 3.0 require multi-mode UPSs to be tested at all dependency modes, whereas DOE's current test procedure explicitly

requires UPSs to be tested at only their highest and lowest input dependency modes. Annex J has also been updated to allow manufacturers to test UPSs with functions or ports set to the lowest power-consuming mode or disconnected if they are not related to maintaining the energy storage device (*i.e.*, batteries) at full charge, along with added reporting requirements for manufacturers to report these features, interfaces, or ports that have been turned off or set to the lowest power-consuming mode. This updated clarification regarding additional features is similar to DOE's current UPS test procedure, which requires UPSs to be tested with such features off or disconnected; however, DOE currently does not require manufacturers to report these manually switched-off features.

DOE did not propose to amend the certification or reporting requirements for UPSs in the January 2023 NOPR. *Id.* at 88 FR 796. Instead, DOE stated that it may consider proposals to amend the certification requirements and reporting for UPSs under a separate rulemaking regarding appliance and equipment certification. *Id.*

In the January 2023 NOPR, DOE carefully reviewed IEC 62040-3 Ed. 3.0 as it relates to measuring the efficiency of a UPS. DOE determined that the relevant updates to IEC 62040-3 Ed. 3.0 compared to IEC 62040-3 Ed. 2.0 are largely editorial, including renumbering of certain sections referenced by the DOE test procedure, and that updating DOE's existing references to IEC 62040-3 Ed. 3.0 would not alter the measured efficiency of basic models. As a result, DOE proposed in the January 2023 NOPR to update its incorporation by reference of IEC 62040-3 Ed. 2.0 to IEC 62040-3 Ed. 3.0 in 10 CFR 430.3 and to update its references in appendices Y and Y1 accordingly to reflect the renumbering of sections in IEC 62040-3 Ed. 3.0. *Id.*

DOE's existing test procedure for UPSs allows recording of either instantaneous power or accumulated energy over a 15-minute period. DOE's review of Annex J in IEC 62040-3 Ed. 3.0 did not reveal any additional instructions that would further facilitate the use of the accumulated energy method. As such, DOE did not propose any changes to its existing language in section 4.3.3 of appendices Y and Y1. *Id.*

In the January 2023 NOPR, DOE requested comment on its proposal to incorporate by reference IEC 62040-3 Ed 3.0 and to update references in appendices Y and Y1 accordingly to reflect the renumbering of sections in IEC 62040-3 Ed 3.0. *Id.*

In response to the January 2023 NOPR, NEMA supported the proposed incorporation by reference and the associated renumbering. (NEMA, No. 10 at p. 2) NEEA also commented in support of DOE's proposal to update references based on the IEC 62040-3 Ed. 3.0 edition and recommended that DOE consider requiring manufacturers to report whether additional functionality was switched off for testing, which would increase transparency and harmonization. (NEEA, No. 11 at pp. 2–3) DOE appreciates NEEA's recommendation but reiterates that, under a separate rulemaking regarding appliance and equipment certification, DOE will review relevant reporting and certification requirements and may consider proposals to amend the certification requirements for UPSs at that time.

For the reasons discussed here and in the January 2023 NOPR, in this final rule, DOE is incorporating by reference IEC 62040-3 Ed 3.0 and updating references in appendices Y and Y1 to reflect the renumbering of sections in IEC 62040-3 Ed 3.0.

D. Loading Conditions

Section 4.3.3 of appendices Y and Y1 requires that the efficiency of a UPS be measured at 100, 75, 50, and 25 percent of the device's rated output power. Each of these measured efficiencies is weighted according to values provided in Table 4.3.1 of appendices Y and Y1 and combined to determine a single weighted average output metric (*i.e.*, the average load adjusted efficiency) representing the UPS's overall efficiency. These load conditions and weightings were established in the December 2016 Final Rule consistent with the load weightings specified in ENERGY STAR UPS Specification Version 1.0.¹⁷ 81 FR 89806, 89816. The current ENERGY STAR UPS Specification Version 2.0¹⁸ maintains these same load conditions and weightings. These load conditions and weightings are also consistent with those specified in section 6.4.1.6 of IEC 62040-3 Ed. 2.0 and section 6.4.1.9 of IEC 62040-3 Ed. 3.0.

In the January 2023 NOPR, DOE discussed comments received in response to the February 2022 RFI regarding a 10 percent loading point. 88 FR 790, 796-797. DOE noted that EPCA requires that any test procedures prescribed or amended under this section be reasonably designed to produce test results that 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. 6293(b)(3)) As such, DOE must weigh the representativeness of test results with the associated test burden in evaluating any amendments to its test

¹⁷ The ENERGY STAR UPS Specification Version 1.0 is available at www.energystar.gov/products/spec/uninterruptible_power_supplies_specification_version_1_0_pd.

¹⁸ The ENERGY STAR UPS Specification Version 2.0 is available at www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20Uninterruptible%20Power%20Supplies%20Final%20Version%202.0%20Specification_1.pdf.

procedures. Regarding the representativeness of the DOE UPS test procedure, the commenters did not provide specific data, nor was DOE aware of any specific data, demonstrating that a 10-percent loading condition would produce a more representative measure of energy use or energy efficiency of UPSs. In addition, DOE's test procedure does not differentiate between specific end-use applications. Therefore, load profiles specific to certain applications (*e.g.*, desktop computers) may not be representative of overall average use of UPSs across all end-use applications. Further, were DOE to consider a 10-percent load condition, DOE was not aware of any data to suggest what corresponding weighting factor should be used to combine this loading condition with the other defined loading conditions comprising the overall efficiency metric.

Regarding test burden, as noted, the loading points currently specified in appendices Y and Y1 are consistent with the loading points defined by ENERGY STAR, as well as section 6.4.1.6 of IEC 62040-3 Ed. 3.0. DOE also noted that the requirements of IEC 62040-3 Ed. 3.0 are referenced by the European Union ("EU") Code of Conduct ("CoC") on Energy Efficiency and Quality of AC UPSs Version 2.0.¹⁹ Like many other types of consumer electronics, UPSs are manufactured and distributed globally by multinational suppliers; as such, any differences between the DOE UPS test procedure (applicable to products sold or imported into the United States) and internationally-

¹⁹ The EU CoC on Energy Efficiency and Quality of AC UPSs Version 2.0 is available at e3p.jrc.ec.europa.eu/publications/code-conduct-energy-efficiency-and-quality-ac-uninterruptible-power-systems-ups-0.

recognized industry test methods impose a burden that is acutely impactful to the consumer electronics industry.

Having weighed the potential improvement to representativeness against the potential for increased test burden associated with adding a required 10-percent loading condition that would be applicable to all UPSs, DOE tentatively concluded in the January 2023 NOPR—based on information available—that the potential burden would outweigh any potential improvement in representativeness (*i.e.*, would introduce undue test burden). *Id.* at 88 FR 797. Consequently, DOE did not propose to modify its existing loading points, weightings, or overall efficiency metric in the January 2023 NOPR. *Id.*

In the January 2023 NOPR, DOE requested comment on its proposal to not modify the existing loading points, weighting, or the overall efficiency metric in the current UPS test procedure. *Id.*

In response to the January 2023 NOPR, NEMA commented in support of DOE's proposal to maintain the existing loading points as the referenced loading points and associated coefficients are employed by not only the IEC standard, but also EU CoC's regulation for UPSs. (NEMA, No. 10 at p. 2)

For the reasons discussed here and in the January 2023 NOPR, in this final rule, DOE is not modifying the existing loading points, weighting, or the overall efficiency metric in the UPS test procedure.

E. No-Load Test

DOE's test procedure for UPSs does not currently specify a method for determining the energy consumption of a UPS at no-load (*i.e.*, 0-percent loading condition).

However, DOE recognizes the usefulness of a no-load power consumption metric to the industry and stakeholders and proposed in the January 2023 NOPR to incorporate by reference the no-load test condition specified in section 6.4.1.10 of IEC 62040-3 Ed. 3.0 as an optional test in section 4.3.3 of appendices Y and Y1 that would be used as the basis for any representations of no-load power consumption. 88 FR 790, 797. DOE noted that manufacturers would not be required to certify no-load power consumption to DOE as a result of this amendment because the energy conservation standards for UPSs do not have a no-load requirement at this time. *Id.*

In the January 2023 NOPR, DOE requested feedback on its proposal to add a method for measuring the power consumption of UPSs at no-load as a test to be used as the basis for any representations of no-load power consumption. *Id.*

During the February 2023 public meeting, Appliance Standards Awareness Project ("ASAP") supported adding the optional no-load test based on the IEC test method and stated that the added no-load test can provide important information to customers. ASAP further encouraged DOE to enable voluntary no-load power reporting in the compliance database.²⁰ Schneider Electric also expressed support of the optional no-load testing requirement during the February 2023 public meeting.²¹

²⁰ ASAP's comment can be found at pp. 14-15 of the February 2023 public meeting transcript, available at www.regulations.gov/document/EERE-2022-BT-TP-0005-0009.

²¹ Schneider Electric's comment can be found at pp. 15-16 of the February 2023 public meeting transcript, available at www.regulations.gov/document/EERE-2022-BT-TP-0005-0009.

NEMA and NEEA also supported adding the optional no-load test procedure. (NEMA, No. 10 at p. 3; NEEA, No. 11 at p. 1) NEEA additionally urged DOE to enable manufacturer reporting of the no-load power and to require the no-load test in the next round of rulemaking. (NEEA, No. 11 at p. 1) NEEA stated that the no-load test would improve harmonization with other test procedures as the no-load test was already required by both the IEC and the ENERGY STAR test procedure. (*Id.* at pp. 1–2) NEEA stated that the no-load test can better and more effectively represent real-world usage of UPSs because desktop computers that are commonly connected to UPSs spend substantial time in sleep or off mode. (*Id.* at p. 2) NEEA noted that addressing the energy use of a UPS in no-load condition will increase the representativeness and can possibly achieve additional energy savings. (*Id.*) Similarly, the Joint Commenters supported DOE's proposal to add an optional no-load test, which would better represent current UPS usage, and requested DOE to enable voluntary reporting of the no-load power consumption on DOE's CCD. (Joint Commenters, No. 12 at p. 1) The Joint Commenters recommended that DOE establish a separate standby mode metric and standard based on the no-load testing condition in the future because UPSs' no-load mode aligns closely with battery chargers' maintenance mode, which qualify under EPCA's definition of standby. (*Id.*)

Regarding the comments recommending enabling the reporting option for the optional no-load test, DOE reiterates that DOE is not making any amendments to reporting or certification requirements for UPSs in this rulemaking. Instead, DOE may consider proposals to amend the certification requirements and reporting for UPSs under a separate rulemaking regarding appliance and equipment certification. DOE notes that it

is only adopting the no-load test as an optional test in this rulemaking and will continue to regularly review the UPS market to analyze the representativeness of the no-load test condition in real world applications. DOE also notes that an analysis of any potential energy conservation standards pertaining to the no-load test is outside the scope of this test procedure rulemaking.

For the reasons discussed here and in the January 2023 NOPR, in this final rule, DOE is finalizing the proposals to add a method for measuring the power consumption of UPSs at no-load as a test to be used as the basis for any representations of no-load power consumption.

F. Reference Test Load

DOE's UPS test procedure refers to the 25, 50, 75, and 100-percent loads as "reference test loads." In general, test loads for testing consumer electronics can be either linear²² or non-linear²³ in nature.

While IEC 62040-3 Ed. 2.0 provides a definition for reference test load,²⁴ it does not explicitly address whether such a test load is linear or non-linear in nature. Section 2.24 of appendices Y and Y1 defines "reference test load" as a load or condition with a power factor of greater than 0.99 in which the AC output socket of the UPS delivers the active power (W) for which the UPS is rated. By specifying a power factor requirement

²² IEC 62040-3 Ed 3.0 defines a linear load as a load wherein the load impedance is a constant.

²³ IEC 62040-3 Ed 3.0 defines a non-linear load as a load wherein the load impedance is a variable dependent on other parameters, such as voltage or time.

²⁴ IEC 62040-3 Ed. 2.0 defines "reference test load" as a load or condition in which the output of the UPS delivers the active power (W) for which the UPS is rated.

of greater than 0.99, DOE’s current definition of “reference test load” necessitates the use of a test load that is both linear and resistive.

Section D.2 in Annex D of IEC 62040-3 Ed. 3.0 explains that the diversity of types of load equipment and their relevant characteristics are always changing with technology. For this reason, the UPS output performance is characterized by loading with passive reference loads to simulate, as far as practical, the expected load types, but it cannot be taken that these load types are totally representative of the actual load equipment in a given application. The UPS industry has generally specified UPS output characteristics under conditions of linear loading (*i.e.*, resistive or resistive/inductive). The effect on the output of the UPS by non-linear loads both in steady state and dynamic is, in many cases, to cause deviation from the output characteristic specified by the manufacturer/supplier where these are quoted under linear load conditions.

In the January 2023 NOPR, DOE discussed comments suggesting the use of non-linear loads. 88 FR 790, 798. While DOE recognized that loads protected by UPSs can be non-linear, the use of non-linear loads for testing may create certain challenges or difficulties in meeting the specified test conditions, as described within section D.2 of IEC 62040-3 Ed. 3.0. *Id.* This suggests that testing with non-linear loads may produce results that are less repeatable or reproducible than testing with linear loads. *Id.* In the January 2023 NOPR, DOE stated that it had no information, nor had commenters provided any information, about how the use of non-linear loads for UPS testing may affect repeatability, reproducibility, or test burden. *Id.* As a result, DOE did not propose the use of non-linear test loads for testing UPSs in the January 2023 NOPR. *Id.*

DOE did not receive any stakeholder comments on this topic in response to the January 2023 NOPR. As such, in this final rule, DOE is not making any amendments to the UPS test loads.

G. Test Procedure Costs and Harmonization

In this final rule, DOE is amending the existing test procedure for UPSs by updating the industry standard incorporated by reference to its latest version, updating definitions consistent with the latest version of the industry standard, and introducing an optional test for measuring the power consumption of UPSs at no-load conditions. DOE has determined that these amendments would not be unduly burdensome for manufacturers to conduct.

EPCA requires that test procedures prescribed by DOE not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) The following sections discuss DOE's evaluation of estimated costs associated with the finalized amendments.

1. Test Procedure Costs and Impact

This final rule updates certain referenced sections in the UPS test procedure at appendices Y and Y1 to the latest version of the industry standard and would not change the method of testing UPSs, but rather would only make non-substantive changes, such as section renumbering. The adopted amendments to harmonize certain definitions with the industry standard would not change the scope of products currently subject to the DOE test procedure or energy conservation standards. Additionally, the adopted optional test procedure for measuring the power consumption of UPSs at no-load conditions would not

be required for demonstrating compliance with standards. Therefore, the finalized amendments would not alter the measured energy efficiency or energy use of UPSs. Manufacturers will be able to rely on data generated under the current test procedure. Further, the adopted changes would not require the purchase of additional equipment or increased test burden, and consequently would not impact testing costs. If manufacturers elected to continue to make representations or begin making representations regarding UPS power consumption at no-load conditions, they may need to retest the no-load power portion of the test procedure for their UPS model. DOE estimates that this retest would cost approximately \$1,700 per unit if the test is conducted by a third-party lab and substantially less if done by the manufacturer themselves. However, as stated previously, any representations from such a retest would not be required for demonstrating compliance with standards for UPSs.

2. Harmonization with Industry Standards

DOE's established practice is to adopt relevant industry standards as DOE test procedures unless such methodology would be unduly burdensome to conduct or would not produce test results that reflect the energy efficiency, energy use, water use (as specified in EPCA), or estimated operating costs of that product during a representative average use cycle or period of use. Section 8(c) of appendix A of 10 CFR part 430 subpart C. In cases where the industry standard does not meet EPCA statutory criteria for test procedures, DOE will make modifications through the rulemaking process to these standards as the DOE test procedure.

The test procedure for UPSs at appendices Y and Y1 currently incorporates by reference IEC 62040-3 Ed. 2.0 regarding test setup, input and output power measurement, and the optional determination of UPS architecture. DOE is incorporating by reference the latest version of this industry standard (*i.e.*, IEC 62040-3 Ed. 3.0). Additional discussion of this update is provided in section III.C of this document.

In the January 2023 NOPR, DOE requested comment on the benefits and burdens of the proposed updates and additions to the industry standard referenced in the test procedure for UPSs. 88 FR 790, 798. NEMA supported DOE's proposal to harmonize with industry standards. (NEMA, No. 10 at p. 3) Therefore, in this final rule, DOE is adopting its proposal to harmonize with IEC 62040-3 Ed. 3.0.

H. Effective and Compliance Dates

The effective date for the adopted test procedure amendment will be 75 days after publication of this final rule in the *Federal Register*. EPCA prescribes that all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with an amended test procedure, beginning 180 days after publication of the final rule in the *Federal Register*. (42 U.S.C. 6293(c)(2)) EPCA provides an allowance for individual manufacturers to petition DOE for an extension of the 180-day period if the manufacturer may experience undue hardship in meeting the deadline. (42 U.S.C. 6293(c)(3)) To receive such an extension, petitions must be filed with DOE no later than 60 days before the end of the

180-day period and must detail how the manufacturer will experience undue hardship.
(*Id.*)

DOE also recognizes that the publication of separate final rules for battery chargers and UPSs may complicate the compliance dates in appendices Y and Y1 as they apply to battery chargers and UPSs, respectively. As an example, the September 2022 Final Rule amended appendices Y and Y1 requiring manufacturers of battery chargers to use this recently updated version of appendix Y beginning March 7, 2023. Considering that there are no differences in how a UPS is tested between the two versions, DOE concludes that it would be beneficial to refer to the same version of the appendix (as finalized by the September 2022 Final Rule) for testing both battery chargers and UPSs. DOE also concludes that presenting these various compliance dates and references to different versions of the appendices in a tabular format would clearly show the applicability of each appendix. Accordingly, in this final rule, DOE is updating the notes section at the beginning of appendices Y and Y1 to include a table that clearly identifies the appropriate appendix reference and compliance dates for each product at any given time.

IV. Procedural Issues and Regulatory Review

A. Review Under Executive Orders 12866, 13563, and 14094

Executive Order (“E.O.”) 12866, “Regulatory Planning and Review,” as supplemented and reaffirmed by E.O. 13563, “Improving Regulation and Regulatory Review,” 76 FR 3821 (Jan. 21, 2011) and amended by E.O. 14094, “Modernizing

Regulatory Review,” 88 FR 21879 (April 11, 2023), requires agencies, to the extent permitted by law, to (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify); (2) tailor regulations to impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations; (3) select, in choosing among alternative regulatory approaches, those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity); (4) to the extent feasible, specify performance objectives, rather than specifying the behavior or manner of compliance that regulated entities must adopt; and (5) identify and assess available alternatives to direct regulation, including providing economic incentives to encourage the desired behavior, such as user fees or marketable permits, or providing information upon which choices can be made by the public. DOE emphasizes as well that E.O. 13563 requires agencies to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. In its guidance, the Office of Information and Regulatory Affairs (“OIRA”) in the Office of Management and Budget (“OMB”) has emphasized that such techniques may include identifying changing future compliance costs that might result from technological innovation or anticipated behavioral changes. For the reasons stated in this preamble, this final regulatory action is consistent with these principles.

Section 6(a) of E.O. 12866 also requires agencies to submit “significant regulatory actions” to OIRA for review. OIRA has determined that this final regulatory action does not constitute a “significant regulatory action” under section 3(f) of E.O.

12866. Accordingly, this action was not submitted to OIRA for review under E.O. 12866.

B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires preparation of a final regulatory flexibility analysis (“FRFA”) for any final rule where the agency was first required by law to publish a proposed rule for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, “Proper Consideration of Small Entities in Agency Rulemaking,” 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel’s website: www.energy.gov/gc/office-general-counsel. DOE reviewed this final rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. DOE has recently conducted a focused inquiry into small business manufacturers of the UPSs covered by this rulemaking. DOE used available public information to identify potential small manufacturers. DOE accessed the CCD²⁵ to create a list of companies that import or otherwise manufacture the UPSs covered by this final rule.

²⁵ U.S. Department of Energy Compliance Certification Database, available at: www.regulations.doe.gov/certification-data/products.html.

For manufacturers of UPSs, the Small Business Administration (“SBA”) has set a size threshold, which defines those entities classified as “small businesses” for the purposes of the statute. DOE used the SBA’s small business size standards to determine whether any small entities would be subject to the requirements of the rule. *See* 13 CFR part 121. The size standards are listed by the North American Industry Classification System (“NAICS”) code and industry description and are available at www.sba.gov/document/support--table-size-standards. Manufacturing of UPSs is classified under NAICS 335999, “All Other Miscellaneous Electrical Equipment and Component Manufacturing.” The SBA sets a threshold of 500 employees or less for an entity to be considered as a small business for this category.

To estimate the number of small businesses that manufacture UPSs impacted by this rulemaking, DOE conducted a survey using information from DOE’s CCD and previous rulemakings. DOE used information from these sources to create a list of companies that potentially manufacture or sell UPSs. DOE screened out companies that do not offer products covered by this rulemaking, do not meet the definition of a “small business,” or are foreign owned and operated. DOE identified five companies that are small businesses manufacturing UPSs covered by this rulemaking.

However, DOE has concluded that the updates to DOE's test procedure for UPSs do not involve substantive changes to the test setup and methodology and will not pose any additional test burden or additional test costs for any UPS manufacturers, large or small.

Therefore, DOE concludes that the cost effects accruing from the final rule would not have a “significant economic impact on a substantial number of small entities,” and that the preparation of a FRFA is not warranted. DOE has submitted a certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the Small Business Administration for review under 5 U.S.C. 605(b).

C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of UPSs must certify to DOE that their products comply with any applicable energy conservation standards. To certify compliance, manufacturers must first obtain test data for their products according to the DOE test procedures, including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including UPSs. (*See generally* 10 CFR part 429.) The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (“PRA”). This requirement has been approved by OMB under OMB control number 1910-1400. Public reporting burden for the certification is estimated to average 35 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

DOE is not amending the certification or reporting requirements for UPSs in this final rule. Instead, DOE may consider proposals to amend the certification requirements and reporting for UPSs under a separate rulemaking regarding appliance and equipment certification. DOE will address changes to OMB Control Number 1910-1400 at that time, as necessary.

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

D. Review Under the National Environmental Policy Act of 1969

In this final rule, DOE establishes test procedure amendments that it expects will be used to develop and implement future energy conservation standards for UPSs. DOE has determined that this rule falls into a class of actions that are categorically excluded from review under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) and DOE's implementing regulations at 10 CFR part 1021. Specifically, DOE has determined that adopting test procedures for measuring energy efficiency of consumer products and industrial equipment is consistent with activities identified in 10 CFR part 1021, appendix A to subpart D, A5 and A6. Accordingly, neither an environmental assessment nor an environmental impact statement is required.

E. Review Under Executive Order 13132

Executive Order 13132, “Federalism,” 64 FR 43255 (August 4, 1999), imposes certain requirements on 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 examined this final rule and determined that it will 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 final 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, this final 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 regulatory action resulting in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of \$100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by

elected officers of State, local, and Tribal governments on a proposed “significant intergovernmental mandate,” and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at www.energy.gov/gc/office-general-counsel. DOE examined this final 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 final rule will 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 regulation will not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

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

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). Pursuant to OMB Memorandum M-19-15, Improving Implementation of the Information Quality Act (April 24, 2019), DOE published updated guidelines which are available at www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf. DOE has reviewed this final 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 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 significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use if the regulation is

implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

This regulatory action 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 modifications to the test procedure for UPSs adopted in this final rule incorporate testing methods contained in certain sections of the following commercial standard: IEC 62040-3 Ed. 3.0. DOE has evaluated this standard and is unable to conclude whether it fully complies 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 has consulted with both the Attorney General and the Chairman of the FTC about the impact on competition of using the methods contained in this standard and has received no comments objecting to its use.

M. Congressional Notification

As required by 5 U.S.C. 801, DOE will report to Congress on the promulgation of this rule before its effective date. The report will state that it has been determined that the rule is not a "major rule" as defined by 5 U.S.C. 804(2).

N. Description of Materials Incorporated by Reference

IEC 62040-3 Ed. 3.0, "Uninterruptible power systems (UPS) – Part 3: Method of specifying the performance and test requirements" is an industry-accepted test standard that specifies methods for measuring the efficiency of a UPS. The test procedure amended in this final rule updates all references from the previous edition (IEC 62040-3 Ed. 2.0) to this most current edition (IEC 62040-3 Ed. 3.0). IEC 62040-3 Ed. 3.0 is reasonably available from IEC and ANSI at webstore.ansi.org.

In this final rule, DOE included amendments to add a new section 0 (Incorporation by Reference) to both appendices Y and Y1 listing the applicable sections of IEC 62040-3 Ed. 3.0 that are referenced by the test procedure.

V. Approval of the Office of the Secretary

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

List of Subjects in 10 CFR Part 430

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

Signing Authority

This document of the Department of Energy was signed on March 25, 2024, by Jeff Marootian, 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 March 25, 2024.

Jeffrey M.
xMarootian

Digitally signed by
Jeffrey M. Marootian
Date: 2024.03.25
06:50:51 -04'00'

Jeff Marootian
Principal Deputy Assistant Secretary
for Energy Efficiency and Renewable Energy
U.S. Department of Energy

For the reasons stated in the preamble, DOE amends part 430 of Chapter II of Title 10, Code of Federal Regulations as set forth below:

PART 430 -- ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS

1. The authority citation for part 430 continues to read as follows:

Authority: 42 U.S.C. 6291-6309; 28 U.S.C. 2461 note.

2. Amend § 430.3 by removing paragraph (o)(3) and revising paragraph (q)(4) to read as follows:

§ 430.3 Materials incorporated by reference.

* * * * *

(q) * * *

(4) IEC 62040-3:2021 (“IEC 62040-3 Ed. 3.0”) *Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements*, Edition 3.0, 2021-04; IBR approved for appendices Y and Y1 to subpart B.

* * * * *

3. Appendix Y to subpart B of part 430 is amended by:

- a. Revising the introductory note;
- b. Adding section 0;
- c. Revising sections 2.26, 2.27, 2.27.1, 2.27.2, and 2.27.3;
- d. Revising the introductory text of sections 4.2.1 and 4.3.3; and
- e. Adding section 4.3.3(c).

The revisions and additions read as follows:

Appendix Y to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Battery Chargers

NOTE 1: For all Battery Chargers, including UPSs, compliance with the relevant standard in § 430.32(z) or any representation must be based upon results generated under the corresponding appendix listed in the table below:

	Battery Chargers other than UPSs	UPS
On or After [INSERT DATE 75 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>] and Before [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>]	Use appendix Y as it appeared on either March 7, 2023, or [INSERT DATE 75 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>].	Use appendix Y as it appeared on either March 7, 2023, or [INSERT DATE 75 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>].
On or After [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>] and Before compliance date of any new or amended standards published any time after September 2022	Use appendix Y as it appeared on [INSERT DATE 75 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>].	Use appendix Y as it appeared on [INSERT DATE 75 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>].
On or After compliance date of any new or amended standards published any time after September 2022	Use appendix Y1.	Use appendix Y1.

0. Incorporation by Reference

DOE incorporated by reference in § 430.3 the entire test standard for IEC 62040-3 Ed.

3.0. However, only enumerated provisions of this standard are applicable to this appendix, as follows. In cases in which there is a conflict, the language of the test procedure in this appendix takes precedence over the referenced test standard.

0.1 IEC 62040-3 Ed. 3.0:

- (a) Section 3.5, Specified values;
- (b) Section 3.5.49, total harmonic distortion;
- (c) Section 5, Electrical conditions, performance and declared values;
- (d) Section 5.2, UPS input specification, as specified in section 2.28.2 of this appendix;
- (e) Section 5.2.1, Conditions for normal mode of operation; Clause 5.2.1.a;
- (f) Clause 5.2.1.b;
- (g) Section 5.2.2, Conditions to be declared by the manufacturer; Clause 5.2.2.k;
- (h) Clause 5.2.2.l;
- (i) Clause 5.2.2.m;
- (j) Section 5.3, UPS output specification; Section 5.3.2, Characteristics to be declared by the manufacturer; Clause 5.3.2.b;
- (k) Clause 5.3.2.c;
- (l) Clause 5.3.2.d;
- (m) Clause 5.3.2.e;
- (n) Section 5.3.4.2, Input dependency AAA;
- (o) Section 6.2, Routine test procedure; Section 6.2.2, Electrical; Section 6.2.2.4, No load, as specified in section 4.3.3(c) of this appendix;

- (p) Section 6.2.2.7, AC input failure, as specified in Note to section 2.28.1 of this appendix;
- (q) Section 6.4, Type test procedure (electrical); Section 6.4.1, Input—AC input power compatibility; Section 6.4.1.2, Steady state input voltage tolerance and VI input independency, as specified in Note to section 2.28.3 of this appendix;
- (r) Section 6.4.1.3, Combined input voltage/frequency tolerance and VFI input independency, as specified in Note to section 2.28.2 of this appendix;
- (s) Annex G—AC input power failure—Test method;
- (t) Annex J—UPS efficiency and no load losses—Methods of measurement, as specified in sections 4.2.1 and 4.3.3 of this appendix.

0.2 [Reserved]

* * * * *

2.26. *Total harmonic distortion (THD)*, expressed as a percent, is as defined in section 3.5.9 of IEC 62040-3 Ed. 3.0.

2.27. *Uninterruptible power supply or UPS* means a battery charger consisting of a combination of convertors, switches and energy storage devices (such as batteries), constituting a power system for maintaining continuity of load power in case of AC input power failure.

2.27.1. *Voltage and frequency dependent UPS or VFD UPS* means a UPS that protects the load from a complete loss of AC input power. The output of a VFD UPS is dependent on changes in voltage and frequency of the AC input power and is not intended to provide additional voltage corrective functions, such as those arising from the use of

tapped transformers.

Note to 2.27.1: VFD input dependency may be verified by performing the AC input failure test in section 6.2.2.7 of IEC 62040-3 Ed. 3.0 and observing that, at a minimum, the UPS switches from normal mode of operation to battery power while the input is interrupted.

2.27.2. Voltage and frequency independent UPS or VFI UPS means a UPS that is independent of AC input power voltage and frequency variations as specified and declared in section 5.2 of IEC 62040-3 Ed. 3.0 and shall protect the load against adverse effects from such variations without discharging the energy storage device.

Note to 2.27.2: VFI input dependency may be verified by performing the combined input voltage/frequency tolerance and VFI input independency test in section 6.4.1.3 of IEC 62040-3 Ed. 3.0 respectively and observing that, at a minimum, the UPS produces an output voltage and frequency within the specified output range when the input voltage is varied by $\pm 10\%$ of the rated input voltage and the input frequency is varied by $\pm 2\%$ of the rated input frequency.

2.27.3. Voltage independent UPS or VI UPS means a UPS that protects the load as required for VFD and also from (a) under-voltage applied continuously to the input, and (b) over-voltage applied continuously to the input. The output voltage of a VI UPS shall remain within declared voltage limits (provided by voltage corrective functions, such as those arising from the use of active and/or passive circuits). The output voltage tolerance band shall be narrower than the input voltage tolerance band.

Note to 2.27.3: VI input dependency may be verified by performing the steady state input voltage tolerance test in section 6.4.1.2 of IEC 62040-3 Ed. 3.0 and ensuring that the UPS remains in normal mode with the output voltage within the specified output range when the input voltage is varied by $\pm 10\%$ of the rated input voltage.

* * * * *

4.2.1. General Setup

Configure the UPS according to Annex J.2 of IEC 62040-3 Ed. 3.0 with the following additional requirements:

* * * * *

4.3.3. Power Measurements and Efficiency Calculations

Measure input and output power of the UUT according to section J.3 of Annex J of IEC 62040-3 Ed. 3.0, or measure the input and output energy of the UUT for efficiency calculations with the following exceptions:

* * * * *

(c) For representations of no-load losses, measure the active power at the UPS input port with no load applied in accordance with section 6.2.2.4 of IEC 62040-3 Ed. 3.0.

* * * * *

4. Appendix Y1 to subpart B of part 430 is amended by:

- a. Revising the introductory note;
- b. Adding section 0;
- c. Revising sections 2.27, 2.28, 2.28.1, 2.28.2, and 2.28.3;
- d. Revising the introductory text of sections 4.2.1 and 4.3.3; and
- e. Adding section 4.3.3(c).

The revisions and additions read as follows:

Appendix Y1 to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of Battery Chargers

NOTE 1: For all Battery Chargers, including UPSs, compliance with the relevant standard in § 430.32(z) or any representation must be based upon results generated under the corresponding appendix listed in the table below:

	Battery Chargers other than UPSs	UPS
On or After [INSERT DATE 75 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>] and Before [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>]	Use appendix Y as it appeared on either October 11, 2022, or [INSERT DATE 75 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>].	Use appendix Y as it appeared on either October 11, 2022, or [INSERT DATE 75 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>].
On or After [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>] and Before compliance date of any new or amended standards published any time after September 2022	Use appendix Y as it appeared on [INSERT DATE 75 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>].	Use appendix Y as it appeared on [INSERT DATE 75 DAYS AFTER DATE OF PUBLICATION IN THE <i>FEDERAL REGISTER</i>].
On or After compliance date of any new or amended standards published any time after September 2022	Use appendix Y1.	Use appendix Y1.

Manufacturers may begin to use appendix Y1 to certify compliance with any new or amended energy conservation standards, published after September 8, 2022, prior to the applicable compliance date for those standards.

0. Incorporation by Reference

DOE incorporated by reference in § 430.3 the entire test standard for IEC 62040-3 Ed.

3.0. However, only enumerated provisions of this standard are applicable to this appendix, as follows. In cases in which there is a conflict, the language of the test procedure in this appendix takes precedence over the referenced test standard.

0.1 IEC 62040-3 Ed. 3.0:

- (a) Section 3.5 Specified values;
- (b) Section 3.5.49 total harmonic distortion;
- (c) Section 5, Electrical conditions, performance and declared values;
- (d) Section 5.2, UPS input specification, as specified in section 2.28.2 of this appendix;
- (e) Section 5.2.1, Conditions for normal mode of operation; Clause 5.2.1.a;
- (f) Clause 5.2.1.b;
- (g) Section 5.2.2, Conditions to be declared by the manufacturer; Clause 5.2.2.k;
- (h) Clause 5.2.2.l;
- (i) Clause 5.2.2.m;
- (j) Section 5.3, UPS output specification; Section 5.3.2, Characteristics to be declared by the manufacturer; Clause 5.3.2.b;
- (k) Clause 5.3.2.c;
- (l) Clause 5.3.2.d;
- (m) Clause 5.3.2.e;
- (n) Section 5.3.4.2, Input dependency AAA;
- (o) Section 6.2, Routine test procedure; Section 6.2.2, Electrical; Section 6.2.2.4, No load, as specified in section 4.3.3(c) of this appendix;

- (p) Section 6.2.2.7, AC input failure, as specified in Note to section 2.28.1 of this appendix;
- (q) Section 6.4, Type test procedure (electrical); Section 6.4.1, Input—AC input power compatibility; Section 6.4.1.2, Steady state input voltage tolerance and VI input independency, as specified in Note to section 2.28.3 of this appendix;
- (r) Section 6.4.1.3, Combined input voltage/frequency tolerance and VFI input independency, as specified in Note to section 2.28.2 of this appendix;
- (s) Annex G—AC input power failure—Test method;
- (t) Annex J—UPS efficiency and no load losses—Methods of measurement, as specified in sections 4.2.1 and 4.3.3 of this appendix.

0.2 [Reserved]

* * * * *

2.27. *Total harmonic distortion (THD)*, expressed as a percent, is as defined in section 3.5.9 of IEC 62040-3 Ed. 3.0.

2.28. *Uninterruptible power supply or UPS* means a battery charger consisting of a combination of convertors, switches and energy storage devices (such as batteries), constituting a power system for maintaining continuity of load power in case of AC input power failure.

2.28.1. *Voltage and frequency dependent UPS or VFD UPS* means a UPS that protects the load from a complete loss of AC input power. The output of a VFD UPS is dependent on changes in voltage and frequency of the AC input power and is not intended to provide additional voltage corrective functions, such as those arising from the use of

tapped transformers.

Note to 2.28.1: VFD input dependency may be verified by performing the AC input failure test in section 6.2.2.7 of IEC 62040-3 Ed. 3.0 and observing that, at a minimum, the UPS switches from normal mode of operation to battery power while the input is interrupted.

2.28.2. Voltage and frequency independent UPS or VFI UPS means a UPS that is independent of AC input power voltage and frequency variations as specified and declared in section 5.2 of IEC 62040-3 Ed. 3.0 and shall protect the load against adverse effects from such variations without discharging the energy storage device.

Note to 2.28.2: VFI input dependency may be verified by performing the combined input voltage/frequency tolerance and VFI input independency test in section 6.4.1.3 of IEC 62040-3 Ed. 3.0 respectively and observing that, at a minimum, the UPS produces an output voltage and frequency within the specified output range when the input voltage is varied by $\pm 10\%$ of the rated input voltage and the input frequency is varied by $\pm 2\%$ of the rated input frequency.

2.28.3. Voltage independent UPS or VI UPS means a UPS that protects the load as required for VFD and also from (a) under-voltage applied continuously to the input, and (b) over-voltage applied continuously to the input. The output voltage of a VI UPS shall remain within declared voltage limits (provided by voltage corrective functions, such as those arising from the use of active and/or passive circuits). The output voltage tolerance band shall be narrower than the input voltage tolerance band.

Note to 2.28.3: VI input dependency may be verified by performing the steady state

input voltage tolerance test in section 6.4.1.2 of IEC 62040-3 Ed. 3.0 and ensuring that the UPS remains in normal mode with the output voltage within the specified output range when the input voltage is varied by $\pm 10\%$ of the rated input voltage.

* * * * *

4.2.1. General Setup

Configure the UPS according to Annex J.2 of IEC 62040-3 Ed. 3.0 with the following additional requirements:

* * * * *

4.3.3. Power Measurements and Efficiency Calculations

Measure input and output power of the UUT according to section J.3 of Annex J of IEC 62040-3 Ed. 3.0, or measure the input and output energy of the UUT for efficiency calculations with the following exceptions:

* * * * *

(c) For representations of no-load losses, measure the active power at the UPS input port with no load applied in accordance with section 6.2.2.4 of IEC 62040-3 Ed. 3.0.