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**[6450-01-P]**

**DEPARTMENT OF ENERGY**

**10 CFR Parts 429 and 430**

**[Docket No. EERE-2014-BT-TP-0043]**

**RIN: 1904-AD36**

# Energy Conservation Program: Test Procedures for External Power Supplies

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

**ACTION:** Notice of proposed rulemaking.

**SUMMARY:** The U.S. Department of Energy is proposing to revise its test procedure for external power supplies. These proposed revisions, if adopted, would harmonize the instrumentation resolution and uncertainty requirements with the second edition of the International Electrotechnical Commission (IEC) 62301 standard when measuring standby power along with other international standards programs. The proposal would also clarify certain testing set-up requirements. Finally, DOE is proposing an optional test to measure the active-mode efficiency at a 10% loading condition and an optional recording of power factor at this loading condition and each of the other required loading conditions.

**DATES:** DOE will accept comments, data, and information regarding this notice of proposed rulemaking no later than [**INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**]. See section V, "Public Participation," for details.  DOE will hold a public meeting on this proposed test procedure if one is requested by [**INSERT DATE 15 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**

**ADDRESSES:** Any comments submitted must identify the NOPR for Test Procedures for External Power Supplies, and provide docket number EERE-2014-BT-TP-0043 and/or regulatory information number (RIN) number 1904–AD36. Comments may be submitted using any of the following methods:

1. Federal eRulemaking Portal: http://www.regulations.gov. Follow the instructions for submitting comments.
2. E-mail: ExtPowerSupplies2014TP0043@ee.doe.gov. Include the docket number and/or RIN in the subject line of the message.
3. Mail: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. If possible, please submit all items on a CD. It is not necessary to include printed copies.
4. Hand Delivery/Courier: Ms. Brenda Edwards, U.S. Department of Energy, Building Technologies Program, 950 L'Enfant Plaza, SW., Suite 600, Washington, DC, 20024. Telephone: (202) 586-2945. If possible, please submit all items on a CD. It is not necessary to include printed copies.

For detailed instructions on submitting comments and additional information on the rulemaking process, see section V of this document (Public Participation).

Docket: The docket, which includes Federal Register notices, public meeting attendee lists and transcripts, comments, and other supporting documents/materials, is available for review at regulations.gov. All documents in the docket are listed in the regulations.gov index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

A link to the docket web page can be found at: http://www1.eere.energy.gov/buildings/appliance_standards/product.aspx?productid=23 . This web page will contain a link to the docket for this notice on the regulations.gov site. The regulations.gov web page will contain simple instructions on how to access all documents, including public comments, in the docket. See section V for information on how to submit comments through regulations.gov.

For further information on how to submit a comment, review other public comments and the docket, or to request a public meeting, contact Ms. Brenda Edwards at (202) 586-2945 or by email: Brenda.Edwards@ee.doe.gov.

**FOR FURTHER INFORMATION CONTACT:**

Direct requests for additional information may be sent to Mr. Jeremy Dommu, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, EE-2J, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 586-9870.

E-mail: battery_chargers_and_external_power_supplies@EE.Doe.Gov

For legal issues, please contact Mr. Michael Kido, U.S. Department of Energy, Office of the General Counsel, GC-71, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 586–8145. E-mail: Michael.Kido@hq.doe.gov.

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## I. Authority and Background

Title III of the Energy Policy and Conservation Act of 1975 (42 U.S.C. 6291, et seq.; "EPCA" or, in context, "the Act") sets forth a variety of provisions designed to improve energy efficiency. (All references to EPCA refer to the statute as amended through the American Energy Manufacturing Technical Corrections Act (AEMTCA), Pub. L. 112-210 (Dec. 18, 2012).) Part B of title III, which for editorial reasons was re-designated as Part A upon incorporation into the U.S. Code (42 U.S.C. 6291–6309, as codified), establishes the "Energy Conservation Program for Consumer Products Other Than Automobiles." External power supplies are among the products affected by these provisions.

Under EPCA, the energy conservation program consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. The 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, and (2) making representations about the efficiency of those products. Similarly, DOE must use these test procedures to determine whether the products comply with any relevant standards promulgated under EPCA.

<u>General Test Procedure Rulemaking Process</u>

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE follows when prescribing or amending test procedures for covered products. EPCA provides in relevant part that any test procedures prescribed or amended under this section shall be reasonably designed to produce test results which measure the energy efficiency, energy use, or estimated annual operating cost of a covered product during a representative average use cycle or period of use and shall not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

In addition, when DOE determines that a test procedure requires amending, it publishes a notice with the proposed changes and offers the public an opportunity to comment on the proposal. (42 U.S.C. 6293(b)(2)) As part of this process, DOE determines the extent to which, if any, the proposed test procedure would alter the measured energy efficiency of any covered product as determined under the existing test procedure. (42 U.S.C. 6293(e)(1)) If DOE determines that the amended test procedure would significantly alter the measured efficiency of a covered product, DOE would amend the applicable energy conservation standard accordingly. (42 U.S.C. 6293(e)(2))

Section 135 of the Energy Policy Act of 2005 (EPACT 2005), Pub. L. No. 109-58 (Aug. 8, 2005), amended sections 321 and 325 of EPCA by adding certain provisions related to external power supplies (EPSs). Among these provisions were new definitions defining what constitutes an EPS and a requirement that DOE prescribe “definitions and test procedures for the power use of battery chargers and external power supplies.” (42 U.S.C. 6295(u)(1)(A)) DOE complied with this requirement by publishing a test procedure final rule on December 8, 2006, that, among other things, established a new appendix Z to subpart B of part 430 (“appendix Z”) to address the testing of EPSs to measure their energy efficiency and power consumption. See 71 FR 71340 (codified at 10 CFR part 430, subpart B, appendix Z "Uniform Test Method for Measuring the Energy Consumption of External Power Supplies").

Congress further amended EPCA's EPS provisions through its enactment of the Energy Independence and Security Act of 2007 (EISA 2007), Pub. L. No. 110-140 (Dec. 19, 2007). That law amended sections 321, 323, and 325 of EPCA. These changes are noted below.

Section 301 of EISA 2007 amended section 321 of EPCA by modifying the EPS-related definitions found in 42 U.S.C. 6291. While EPACT 2005 defined an EPS as "an external power supply circuit that is used to convert household electric current into DC current or lower-voltage AC current to operate a consumer product,"[1] 42 U.S.C. 6291(36)(A), section 301 of EISA 2007 further amended this definition by creating a subset of EPSs called Class A External Power Supplies. EISA 2007 defined this subset of products as those EPSs that, in addition to meeting several other requirements common to all EPSs, are "able to convert [line voltage AC] to only 1 AC or DC output voltage at a time" and have "nameplate output power that is less than or equal to 250 watts." (42 U.S.C. 6291(36)(C)(i)) As part of these amendments, EISA 2007 prescribed minimum standards for these products and directed DOE to publish a final rule by July 1, 2011, to determine whether to amend these standards. See 42 U.S.C. 6295(u)(3)(A) and (D).

[1] The terms "AC" and "DC" refer to the polarity (i.e., direction) and amplitude of current and voltage associated with electrical power. For example, a household wall socket supplies alternating current (AC), which varies in amplitude and reverses polarity. In contrast, a battery or solar cell supplies direct current (DC), which is constant in both amplitude and polarity.

Section 310 of EISA 2007 amended section 325 of EPCA by defining the terms “active mode,” “standby mode,” and “off mode.” Each of these modes corresponds to the operational status of a given product – i.e., whether it is (1) plugged into AC mains and switched “on” and performing its intended function, (2) plugged in but not performing its intended function (i.e., simply “standing by” to be operated), or (3) plugged in but switched “off” if a manual on-off switch is present. Section 310 also required DOE to amend its test procedures to ensure that standby and off mode energy consumption are measured. It also authorized DOE to amend, by rule, any of the definitions for active, standby, and off mode as long as the DOE considers the most current versions of Standards 62301 (“Household Electrical Appliances—Measurement of Standby Power”) and 62087 (“Methods of Measurement for the Power Consumption of Audio, Video and Related Equipment”) of the International Electrotechnical Commission (IEC). See 42 U.S.C. 6295(gg)(2)(A) (incorporating EISA 2007 amendments related to standby and off mode energy). Consistent with these provisions, DOE issued a final rule that defined and added these terms and definitions to 10 CFR part 430, subpart B, appendix Z (“appendix Z”).  See 74 FR 13318 (March 27, 2009).

DOE further amended appendix Z by adding a test method for multiple-voltage EPSs. 76 FR 31750. The amendments also revised the definition of “active power” and clarified how to test EPSs that have a current-limiting function along with those devices that either (1) combine this function with the ability to communicate with their loads or (2) can communicate with their loads but without combining that capability with a current-limiting function. A current-limited EPS is one that can significantly lower its output voltage once an internal, output-current limit has been exceeded, while an EPS that communicates with its load refers to an EPS’s ability to identify or otherwise exchange information with its load (i.e., the end-use product to which it is connected). These revisions were necessary to provide manufacturers with sufficient clarity on how to conduct the test and how to report the measured energy use for these types of EPSs.

After releasing a preliminary analysis and issuing a proposed set of energy conservation standards, DOE published a final rule prescribing new standards for non-Class A EPSs and amended standards for some Class A EPSs. See 79 FR 7845 (Feb. 20, 2014). Manufacturers of the affected products must meet these standards by 2016.

Since the publication of those standards, DOE has received follow-up questions and requests for clarification regarding the testing of EPSs. To ensure that manufacturers have sufficient clarity regarding the testing of their products, particularly in light of the fact that they will soon be required to certify those products as being compliant with the new standards, DOE is proposing to make certain clarifications to appendix Z to eliminate any testing ambiguity when measuring the efficiency of an EPS. These proposed changes would update references to the latest version of IEC 62301 and clarify DOE's test methods to better reflect evolving technologies.

## II. Summary of the Notice of Proposed Rulemaking

This proposal seeks to make several changes to the current test procedure for measuring the energy efficiency of EPSs.

First, it would harmonize DOE's test procedure with the latest version of IEC 62301 by providing specific resolution and measurement tolerances. These specifications will assist in ensuring that testing is performed with equipment that is capable of reaching these tolerances and that the resulting measurements are consistent.

Second, the proposal would define and clarify how to test adaptive EPSs (also referred to as "adaptive-charging", "smart-charging" or "quick-charging" EPSs). Because these types of EPSs were not considered when the current test procedure was first adopted, Appendix Z does not provide the means to address the unique characteristics of these types of EPSs fully and consistently without the addition of certain clarifications that DOE is proposing. These proposed clarifications will provide a standardized method for all manufacturers and testing laboratories to follow when testing an adaptive EPS.

Third, DOE is proposing to add test configurations that can be used to avoid potential losses caused by testing cables. Appendix Z does not clearly outline how multiple measurement devices that operate simultaneously should be connected to a unit under test (UUT). These changes would remove the potential for electrical energy losses in the measurement cables and guarantee accurate, repeatable, and reproducible results.

Fourth, DOE would clarify that when testing an EPS that is incapable of being tested at one or more of the loading conditions used to calculate the average active-mode efficiency, such conditions will be omitted when calculating this metric. Instead, the average active-mode efficiency will be determined by averaging the efficiency results at each of the loading conditions that can be measured.

Fifth, the proposal would add an optional procedure for measuring the active-mode efficiency of a unit under test that would occur at the 10 percent loading condition to gain a broader understanding of EPS efficiency at low load levels and increase the flexibility of the test procedure. Adding this optional provision would enable DOE, manufacturers, and testing labs to gain familiarity with the measurement of this additional loading point. This additional condition would affect both single-voltage and multiple-voltage EPSs but would not be used for purposes of calculating the average active-mode efficiency that a manufacturer must report for compliance purposes. Reporting of the test results of this loading condition also would not be required as part of the compliance certification. It may, however, be used in helping develop future EPS energy conservation standards should DOE decide that amending these standards would meet the statutory requirements.

Sixth, DOE is proposing to add a provision to permit the optional recording of power factor during testing. Power factor is a measurement of the transfer of electrical power to a given device – with a higher power factor signaling a more efficient system for delivering real power and a lower power factor pointing to a less efficient one. Adding this optional measurement would assist DOE in its understanding of EPS efficiency on a system level. In the case of an EPS, a lower power factor in a given design mainly impacts the amount of transmission line loss within the building where the EPS is operating. By recording the power factor at each load condition, manufacturers may be willing to provide DOE with more data regarding how these losses may impact the total efficiency profile of an EPS. This additional information, similar to the data obtained through the use of the additional loading point data noted above, could be used by the agency in subsequent rulemakings to help craft a more precise and accurate means of evaluating EPS efficiency that will enable manufacturers to produce more effective and efficient EPSs while ensuring that consumer needs continue to be met. By adding this optional provision, manufacturers, DOE, and testing labs will also gain familiarity with measuring and recording this element during testing.

Seventh, DOE is proposing to add clarifying language to the EPS standards published in §430.32 ("Energy and water conservation standards and their compliance dates"). DOE believes that further detail is necessary to help clarify which standards apply to each type of EPS. To this end, DOE proposes to insert a summary table to enable one to more readily identify which standards apply to which type of EPS. While these revisions will not affect either the current or February 2016 EPS standards, they will aid manufacturers in complying with the new regulations.

Finally, DOE is proposing to expand the scope of its sampling plan for Class A EPSs to apply to those that will be subject to standards for the first time in 2016. DOE is proposing these revisions to consolidate all EPSs within the scope of federal standards under one sampling plan and to provide manufacturers with the necessary procedures they will need to follow when certifying their EPSs as compliant with the applicable standards. Previously, DOE only provided a sampling plan for Class A EPSs and reserved a second sampling plan for non-Class A EPSs. By adopting a single sampling plan that would apply to all EPSs, DOE would be creating a single approach for ensuring that a given EPS basic model complies with the applicable standards.

Table II.1 – Summary of Proposed Changes and Affected Sections of 10 CFR Part 430

| Appendix Z to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of External Power Supplies | |
|---|---|
| Existing Section in 10 CFR Part 430 | Summary of modifications |
| 1.Scope | • No Change |
| 2.Definitions | • Inserting definitions for “average active-mode efficiency” and “adaptive external power supply” |
| 3.Test Apparatus and General Instructions | • Insert exceptions to the test method of 3(a) within subsections 3(a)(i) and 3(a)(ii)<br>• Incorporate by reference the uncertainty and resolution requirements of the IEC 62301 (2nd Ed.) standard in 3(a)(i)(A) |
| 4.Test Measurement | • Modify 4(a)(i) to include a table of the required loading conditions and an additional optional loading point at a 10 percent loading condition<br>• Insert an optional power factor measurement at each loading condition in 4(a)(i)<br>• Clarify the necessary connections when using multiple measurement devices (4(a)(i))<br>• Clarify how to test when one or more loading conditions cannot be sustained (4(a)(i)(B))<br>• Modify 4(a)(ii) to refer to the appropriate loading conditions in Table 1<br>• Modify several sections of 4(b)(i) to refer to an updated Table 2<br>• Revising 4(b)(i)(A)(5) to refer to a new Table 2, which contains a list of prescribed loading conditions to use, including a new 10 percent loading condition<br>• Modify 4(b)(ii) to refer to the updated loading conditions in new Table 2 |

**III.Discussion**

A. Measurement Accuracy and Precision

On June 13, 2005, the IEC published its first edition of testing standard IEC 62301, which provided a method for measuring standby power of household appliances. The standard quantified minimum resolution requirements for energy measurement instruments and outlined the necessary procedures to ensure stable energy readings for any unit under test (UUT). The standard also set limits on the uncertainties associated with any measurement taken that is meant to represent the energy consumption of a household device. It has since become recognized by many regulatory bodies as the default guideline for any power or energy measurement required for formal certification. DOE subsequently adopted instrumentation resolution and measurement uncertainty requirements identical to those in the IEC 62301 standard and codified these requirements at 10 CFR 430, subpart B, appendix Z on June 1, 2011. 76 FR 31750.

The IEC published Edition 2.0 of IEC 62301 in January 2011. This revised version of the testing standard refined the test equipment specifications, measuring techniques, and uncertainty determination to improve the method for measuring loads with high crest factors and/or low power factors, such as the low power modes typical of EPSs operating in no-load mode. These provisions were contained in Section 4 of IEC 62301, with informative guidance provided in Annex B and Annex D on measuring low power modes and determining measurement uncertainty.

To ease the overall burden involved with the testing of EPSs, and to continue to improve DOE's efforts at harmonizing its testing requirements where feasible to do so, DOE is proposing to incorporate by reference the second edition of IEC 62301 for the application of testing EPS energy consumption. This proposed action would include the resolution parameters for power measurements and uncertainty methodologies found in Section 4 (General conditions for measurements) as well as the associated references to Annexes B (Notes on the measurement of low power modes) and D (Determination of uncertainty of measurement) within that section of the second edition of the IEC 62301 standard. DOE seeks comment on the merits of incorporating these revisions into the current EPS test procedure in appendix Z.

B. Test Set-up

DOE had previously proposed, and ultimately finalized, requirements in 2006 that incorporated by reference certain sections of a test procedure adopted by the California Energy Commission (CEC) into appendix Z. See generally, 71 FR 71339 (Dec. 8, 2006) (final rule incorporating elements of the CEC test procedure for EPSs). That procedure -- "Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies (August 11, 2004)" -- contained a number of provisions, including one ("Measurement Approach") that outlined how UUTs should be conditioned and connected to metering equipment to perform the test properly regardless of the type of load. While this provision generally describes the testing set-up to follow, it also contains gaps that could lead to ambiguous results when testing an EPS. In particular, the procedure does not specify how to connect metering equipment in certain EPS configurations.

As described in section 4 (“General Conditions for Measurement”) of the CEC procedure, power measurements can be made using either power analyzers or suitably calibrated voltmeters and ammeters. When using voltmeters and ammeters, the active-mode efficiency at each loading condition can be calculated using the output voltage measurement from the voltmeter and the output current measurement from the ammeter. DOE has found that resistive losses can be inadvertently introduced into the test set-up, which can affect the results and the overall calculated average, active load efficiency. These losses would not occur when using an EPS to power an end-use product. They do occur, however, if the voltmeter and ammeter are not physically and electrically connected to the output terminal of the EPS. Specifically, lower voltage measurements can result when connecting the voltmeter after the series ammeter connection as opposed to physically and electrically connecting the voltmeter directly to the output. Although, in theory, the ammeter acts as a dead short (i.e., a short circuit having zero resistance) and does not introduce electrical resistance during the measurement, in practice, the testing leads can introduce resistive losses that vary based on, among other factors, the wire gauge of the leads, the length of the leads, and the frequency of the signal being measured. At higher current loads, these losses become even more pronounced and can lead to significant resistive losses within the signal path despite the low impedance nature of ammeters. The existence of these losses results in an inaccurate output power calculation (and inaccurate efficiency measurements) under all loading conditions, as the voltmeter measures a lower voltage than the EPS is actually producing.

To illustrate this point, DOE tested a single EPS unit using two different testing configurations. In the “loss- producing” (or “lossy”) configuration, DOE used a voltmeter to measure the voltage at the load after the ammeter measurement using 10 AWG[2] banana cable interconnects rated for 10 amps and 600 volts. This testing setup resulted in significantly lower efficiency measurements across all loading conditions than the "lossless" configuration where the voltage was measured at the output connector of the EPS. As expected, the difference in the efficiency measurements was even more pronounced as the current load was increased. The results comparing the two different testing configurations are summarized in Table III-1.

**Table III-1 EPS Efficiency Testing Variation Results**

| | | **25% Load** | **50% Load** | **75% Load** | **100% Load** | **Average Active-Mode Efficiency** |
|---|---|---|---|---|---|---|
| **SETUP #1* (LOSS-PRODUCING)** | Input Power (W) | 10.37 | 20.57 | 30.89 | 41.36 | |
| | Output Voltage (V) | 11.69 | 11.12 | 10.37 | 9.83 | |
| | Output Current (A) | 0.75 | 1.5 | 2.25 | 3 | |
| | Efficiency | 84.5% | 81.1% | 75.5% | 71.3% | 78.1% |
| **SETUP #2* (LOSSLESS)** | Input Power (W) | 10.37 | 20.57 | 30.89 | 41.36 | |
| | Output Voltage (V) | 12.01 | 11.85 | 11.6 | 11.53 | |
| | Output Current (A) | 0.75 | 1.5 | 2.25 | 3 | |
| | Efficiency | 86.9% | 86.4% | 84.5% | 83.6% | 85.3% |
| | **Difference** | **2.3%** | **5.3%** | **9.0%** | **12.3%** | **7.2%** |

*All testing results are based on the results collected from a 12V, 3A external power supply.

DOE believes that most technicians are already setting up their test equipment to connect directly to the output to avoid these resistance losses. However, based on the test results presented in Table III-1 and because the CEC test method does not specifically explain how to

[2] American Wire Gauge (AWG) is a standardized wire gauge system to quantify the diameter of electrically conducting wire

attach measurement equipment, DOE believes that additional details on how to set up the test equipment should be provided to ensure such losses are not introduced.

Accordingly, DOE proposes to amend section 4(a)(i) of appendix Z to require that any equipment necessary to measure the active-mode efficiency of a UUT at a specific loading condition must be connected directly to the output cable of the unit. This step will remove any unintended losses in the test measurement introduced by the metering equipment because both meters will be measuring directly from the output connector of the EPS rather than at different points in the signal path. DOE seeks comment on whether these additional clarifications regarding the testing set-up when using voltmeters and ammeters would help to clarify the test method and ensure testing accuracy.

C. EPSs with Current Limits

The EPS test procedure produces five output values that are used to determine whether a tested EPS complies with Federal standards. These output values (or metrics) are outlined in sections 4(a)(i) and 5(b)(i)(A)(5) of appendix Z and include active-mode efficiency measurements at 25 percent, 50 percent, 75 percent, and 100 percent load, as well as the total power consumption of an EPS at 0 percent load. The four loaded efficiencies (i.e., 25 percent through 100 percent) are averaged to determine the overall EPS conversion efficiency. This average efficiency can be compared to the federal standard, which is an equation that determines the minimum required efficiency based on the nameplate output power of the EPS under consideration. However, some EPSs, like those used for radios and LED applications, are designed to drive the output voltage to zero under specific loading conditions either to protect the EPS from damage, or overstress, or because the end-use application was never designed to operate in those states. Thus, it is not possible to measure the efficiency at these specific loading conditions. (This type of feature or technology is commonly referred to as “output-current-limiting” or “current-limiting” because of the device’s actions to limit the output current to the connected device that the EPS serves.) Prior to the publication of the June 2011 test procedure final rule, DOE solicited comments from interested parties concerning how to test EPSs that utilize output-current-limiting techniques at 100 percent load using the test procedure in appendix Z. 75 FR at 16973. Based on the comments received and to ensure that these types of EPSs could be tested for compliance with the federal standards, DOE amended section 4(a)(i) to allow manufacturers with products that limit the output current at 100 percent load to test and certify affected individual units using active-mode efficiencies measured at 25 percent, 50 percent, and 75 percent loads. 76 FR at 31771.

Since these amendments were made, DOE has become aware of other EPS designs, specifically those that operate LED drivers, which employ current-limiting circuitry at loading conditions under 100 percent as a form of fault protection and reset. These EPSs will drive the output voltage down to zero to eliminate any power delivery when the end-use product demands less than a certain percentage of the nameplate output current. Once the output has been reduced to zero, the EPS will periodically check the output load conditions by momentarily reestablishing the nameplate output voltage and monitoring the resulting current draw. If the minimum output current is not reached during these periods, the output is driven to zero again and the EPS output power drops to zero. This technique is commonly referred to as “hiccup protection” and it serves to protect both the EPS and the end-use product from damage if the product begins to operate in a range outside its intended design. Additionally, hiccup protection can be used to minimize energy consumption by quickly putting the EPS into a standby state if the end-use product requires only a constant current load to operate and the current demand falls below the minimum current load threshold. Similar to EPSs that limit output current at maximum load, these EPSs cannot be tested and certified properly under the current DOE test procedure when testing at a 25 percent load. At this loading condition, EPSs with hiccup protection that are designed for lower load conditions would not provide any output power to measure efficiency.

To quantify the active-mode efficiency of these EPSs, DOE proposes to amend section 4(a)(i)(C) of appendix Z (which includes a procedure to test those EPSs that list both an instantaneous and continuous output current) to require that in cases where an EPS cannot sustain output at one or more of the four loading conditions, these loading conditions would not be measured.  Instead, for these EPSs, the average efficiency would be the average of the loading conditions for which it can sustain output. In addition to this provision, DOE proposes to define the "average active-mode efficiency" of an EPS as the average of the loading conditions (100 percent, 75 percent, 50 percent, and 25 percent of its nameplate output current) for which the EPS can sustain the output current. Defining average active mode efficiency will assist manufacturers in preparing certification reports and provide additional clarity as to which metrics are considered for compliance with the current federal standards. By including the necessary loading points within the definition, there will be a clearer distinction between the outputs of the test procedure and the data points required for certification. DOE seeks comment on the benefits or burdens of representing the average active-mode efficiency of these devices as the average of the efficiencies at the loading conditions that can be tested and on the proposed definition for average active mode efficiency. Among the issues of interest to DOE is what impact, if any, the proposed changes would have on the results from testing and whether the proposed changes would resolve the identified issues.

D. Power Factor

Power factor is a relative measure of transmission losses between the power plant and an item plugged into AC mains (i.e., a wall outlet). Due to nonlinear and energy-storage circuit elements such as diodes and inductors, electrical products often draw currents that are not proportional to the line voltage. These currents are either distorted or out of phase in relation to the line voltage, resulting in no active power drawn by the EPS or transmitted to the load.

However, although the EPS itself consumes no active power, these currents are real and cause power dissipation from conduction losses in the transmission and distribution wiring, which is referred to as reactive power. The power factor of a given device is represented as a ratio of the active power delivered to the device relative to the combination of this reactive power and active power. An ideal load will have a power factor of 1, where all the power generated is delivered to the load as active power. For a given nameplate output power and efficiency, products with a lower power factor cause greater power dissipation in the transmission wiring, an effect that also becomes more pronounced at higher input powers.

As the National Resources Defense Council (NRDC) noted in its primer on additional energy efficiency opportunities for EPSs, a device with a power factor of 0.4 draws 2.5 times more current than a device with a power factor of 1 and can cause building wire losses to be 6.25

times greater in the worst case scenario.[3] In this scenario, the amount of electricity required by the device is far greater than the real (i.e., active) power delivered, resulting in poor system efficiency. The significance of power factor's role in overall energy consumption has also been recognized by the Environmental Protection Agency (EPA). Its voluntary ENERGY STAR program previously included provisions that restricted the minimum power factor at 100 percent load for EPSs with nameplate output powers greater than or equal to 100 watts,[4] which helped to reduce $I^2R$ (i.e., electrical resistance) losses in building distribution wiring as part of their efficiency program for EPSs. These provisions also aligned with version 4 of the EPA's prior program requirements for internal computer power supplies.

DOE has acknowledged the grid-level impact of power factor when it comes to EPS design, but stated that it would be difficult to accurately quantify transmission losses because they would depend on the length of the transmission wires, which differ for each residential consumer. See 79 FR at 7869. However, DOE believes that power factor is a critical component in establishing the overall efficiency profile of EPSs. Most of the efficient power supplies available on the market today use switched-mode topologies (i.e., power transfer circuits that use switching elements and electromagnetic fields to transmit power) that draw current in short spikes from the power grid. These current spikes can cause the voltage and current input waveforms of the EPS to be significantly out of phase, resulting in a low power factor and putting more stress on the power grid to deliver real power. While switched-mode power

[3] NRDC: External Power Supplies – Additional Efficiency Opportunities, http://www.appliance-standards.org/sites/default/files/Next_Efficiency_Opportunities_for_External_Power_Supplies_NRDC.pdf
[4] EPA: ENERGY STAR® Program Requirements for Single Voltage External Ac-Dc and Ac-Ac Power Supplies Eligibility Criteria (Version 2.0), http://www.energystar.gov/ia/partners/prod_development/revisions/downloads/eps_spec_v2.pdf

supplies have served to dramatically improve the achievable efficiencies of EPSs, the fact that power factor has gone unexamined during their widespread adoption has brought overall system efficiency into consideration. Therefore, DOE believes that in order to capture a representative average use cycle for EPSs, power factor should be taken into consideration at each loading condition. However, at this time DOE is proposing to make power factor measurements optional within the test procedure and will not require any power factor measurements recorded during testing to be submitted in any certification report. Modifying the test procedure in this way will increase testing flexibility with minimal additional testing burden should technicians choose to conduct the additional measurements, as most modern power analyzers are capable of measuring true power factor. Because DOE requires direct meter readings of input and output power at each loading condition, the power factor at each loading condition can be collected at the same time as the efficiency measurements with virtually no added test time or equipment. However, DOE also recognizes the variability associated with measuring power factor. EPSs that lack any sort of corrective power factor circuitry can have varying power factors depending on the conditions surrounding the transmission lines in the testing area as well as the input impedance. These variables could affect the repeatability of any power factor measurements in EPSs that do not contain corrective circuitry. As such, DOE is seeking comment on the impacts and testing burdens related to including optional power factor measurements at each loading condition as well as any potential pitfalls related to repeatability in EPSs without power factor correction.

E. Adaptive EPSs

DOE is proposing that EPSs capable of adjusting their output voltage be tested at both the highest and lowest output voltage for loading conditions where output current is greater than 0% (currently, loading conditions 1 to 4). For the 0% loading condition (currently, loading condition

5), DOE is proposing to add clarifying language stating that the EPS under test be placed in no-load mode and any additional signal connections to the unit be disconnected prior to measuring input power. Several considerations led DOE to propose this particular approach.

The newly amended federal efficiency standards for EPSs determine the minimum mandatory average active-mode efficiency for an EPS using a series of equations and the product's nameplate output power. 79 FR at 7848-7849. Typically, an EPS will have a nameplate output voltage, nameplate output power, and/or a nameplate output current listed so that, among other reasons, original equipment manufacturers (OEMs) can utilize them as off-the-shelf designs for their products. DOE uses these metrics to determine the necessary loading conditions for testing and ultimately how to determine the average active-mode efficiency and no-load power measurement of the EPS. The average active-mode efficiency is calculated by determining the average of the efficiencies measured at loading conditions of 100%, 75%, 50%, and 25% of the rated nameplate output current (loading conditions 1 to 4). No-load mode power is equal to the active input power at the loading condition which is 0% of nameplate output current (currently referred to as loading condition 5).

As was noted in chapter 11 of the technical support document (TSD) to the standards final rule for EPSs published on February 10, 2014, one of the largest applications of EPSs within the consumer marketplace is in portable computing devices, such as tablets and mobile phones. Since the publication of the final rule, DOE has become aware of a new charging technology where EPSs designed around the current universal charging solution (UCS) utilize a specific communication protocol with their end-use devices to draw higher charging currents than the universal serial bus (USB) standard specifies when the battery is significantly depleted. This technology enables the use of a faster charging rate, which effectively decreases the overall charging time needed to replenish the discharged battery. In many cases, this means increasing the output voltage as well as the output power of the EPS to recharge a deeply discharged battery within the end-use product. This technique is commonly referred to as “quick charging” or “adaptive charging”, but manufacturers may refer to this charging methodology in several different ways.

DOE’s current understanding is that the faster charge rate only occurs when the communication protocol between the EPS and the device is activated, which could not occur via a user-initiated action because the user is not given access to change the charging rate. Instead, charging is activated through communication lines between the charger and the charge control chip embedded in the end-use device. The user remains unaware of this communication for the duration of the charge. Only certain products paired with the necessary chargers will be able to communicate and have the EPS provide higher charging current, whereas the same charger would provide a lower charging current when paired with a device not capable of this communication. Provided that these EPSs would produce only one output voltage at a time, they would be considered single-voltage EPSs and not multiple voltage EPSs under the definitions established for single-voltage and multiple-voltage EPSs in appendix Z. However, DOE proposes to further classify these types of EPSs in appendix Z as “adaptive external power supplies” and define them as single-voltage external power supplies that can alter their output voltage during active mode based on an established communication protocol with the end-use application without any user-generated action. DOE is seeking comment on whether the proposed definition of an adaptive external power supply accurately describes this new type of EPS and on any potential improvements that could be made to the proposed definition to eliminate any ambiguities.

While DOE previously examined the issue of EPSs that communicate with their loads in its June 1, 2011 rule, only recently has it been made aware that proprietary communication protocols can result in a higher power consumption for certain end-use consumer products rather than others. 76 FR at 31752-31753 and 31770-31771. Additionally, DOE believes that manufacturers may list multiple output voltages, multiple output currents, and/or multiple output powers to categorize all the potential states of the EPS, making the correct testing and certification conditions difficult to discern. Such an EPS may provide the standard USB protocol ratings of 5 volts at 1 amp, but have the capability to elevate the charging voltage to 12 volts at 1 amp under the right conditions. This is only one practical example because manufacturers can tailor their communication protocols to generate multiple voltage, ampere, and output power ranges under different operating conditions for these types of EPSs. While these varying states may result in faster charging and increased utility, the technology makes testing and quantifying the average active-mode efficiencies of these devices difficult.

DOE is seeking input regarding how adaptive EPSs should be tested and certified. Specifically, DOE is seeking input on how to determine the loading conditions in which to test these EPSs. Since adaptive EPSs can be used to power other devices that are not capable of communicating with a load, it is important to consider the efficiency of the EPS when load-communicating does not occur. However, when the EPS communicates with a load and varies the output voltage or current to decrease an end-use product's charging time, the test procedure should be able to capture the efficiencies at the various output conditions in which it will operate. This could be performed by conducting the test twice at each loading condition – once at the highest achievable output voltage that is utilized while communicating with a load and once at the lowest achievable output voltage utilized during load communication regardless of what may be stated on the nameplate in both conditions. Due to the nature of EPS design, the points in between the highest and lowest output voltage will be no less efficient than either extreme[5]. Therefore, DOE proposes to test adaptive EPSs at both the highest and lowest voltage it can achieve at all measured loading conditions with output current greater than 0%. DOE has been informed by stakeholders that these adaptive EPSs will either have multiple voltage and current ranges printed on the nameplate or may not indicate the operating ranges at all. However, DOE seeks comment on whether the range of voltages utilized while an EPS is communicating with its load is printed on the EPS nameplate or if there are other methods available to determine the highest and lowest voltage utilized during load communication, if it is not indicated on the nameplate of the EPS.

DOE also has concerns regarding the accuracy and repeatability of no-load measurements recorded when testing an adaptive EPS. As part of the test procedure, DOE requires that an input power measurement taken at the 0 percent loading condition (currently, loading condition 5) is measured and recorded as no-load mode power consumption. Appendix Z defines no-load mode as the mode of operation when an EPS is connected to the main electricity supply and the output

[5] At higher output voltages, EPSs typically have greater efficiency due to a lower loss ratio of the fixed voltage drops in the conversion circuitry to the nominal output voltage. These losses do not increase linearly with output voltage, so higher output voltages typically provide greater conversion efficiency.

is (or “all outputs are” for a multiple-voltage EPS) not connected to a load (or “loads” for a multiple-voltage EPS). However, the test procedure for single-voltage EPSs does not instruct technicians to explicitly remove any external loads or to put the EPS into “no-load mode” in order to conduct the test at a 0% loading condition. The language in the test procedure only states that the load must be decreased to zero percent and the AC input power must be recorded. This ambiguity would permit the test to be conducted by either removing the load in order to achieve the 0% loading condition or decreasing the current demand to 0% while the test load is still physically connected. As such, variability in test measurements may arise when testing adaptive EPSs because the output voltage fluctuates according to the communication between the EPS and the end-use product.

Based on its examination of a variety of adaptive EPSs and their accompanying end-use products, DOE suspects that if the load is not disconnected from the EPS entirely, but instead, the current demand is decreased to zero electronically with the load still physically connected, that the output voltage may remain artificially high and impact the results of the no-load power measurement. This higher output voltage would not be representative of the voltage this EPS would operate under in no-load mode, because an adaptive EPS would only output a higher voltage when requested via the adaptive communication protocol.

To clarify the testing methodology for all types of EPSs in no-load mode, DOE is proposing to add language to the single-voltage test procedure stating that any EPS under test must be placed into no-load mode and any additional single connection be disconnected before taking a measurement at zero percent load. While this language is absent from the single-voltage

EPS test procedure, DOE notes that the test procedure at appendix Z already specifically states in section 4(b)(i)(A)(6) that any multiple-voltage EPS under test should be placed in no-load mode and any additional signal connections to the unit be disconnected before measuring input power at the zero percent loading condition. DOE is seeking comment on whether such additional clarification is also warranted for testing the no-load of single-voltage EPSs, including adaptive EPSs.

The additional clarifications DOE is proposing in this NOPR for testing adaptive EPSs will not alter the current methodology for testing active-mode efficiency or no-load power. Rather, they are meant to provide guidance on how to test and certify these EPSs given the recent advancements in EPS technology. The average active-mode efficiency will still be based on the average of the four loading conditions used to measure single-voltage efficiency. Under DOE's proposal, manufacturers of adaptive EPSs will generate two average active-mode efficiency metrics for each EPS – one based on the average of the efficiencies recorded at the lowest voltage achieved during the charging cycle and one based on the average of the efficiencies recorded at the highest voltage achieved during the charging cycle. This testing approach closely parallels DOE's testing approach for switch-selectable EPSs. However, unlike switch-selectable EPSs, DOE is requiring only one no-load power measurement because the EPS will be disconnected from any load during the measurement and will, as a result, not be communicating – thereby removing any chance of raising or lowering the output voltage. Because this approach will yield a static output voltage in no-load mode, one no-load power measurement for adaptive EPSs will be sufficient. As a result, DOE proposes to amend 10 CFR 429.37 to state that manufacturers will be required to submit average active-mode efficiencies at both the highest and lowest output voltages as well as a single no-load power measurement for adaptive EPSs. DOE is seeking comment on the most appropriate method to report and certify adaptive EPSs.

F. <u>EPS Loading Points</u>

DOE currently requires that efficiency measurements be recorded by manufacturers at 0 percent, 25 percent, 50 percent, 75 percent, and 100 percent of the nameplate output current load. See 10 CFR 430, subpart B, appendix Z. The last four measurements areaveraged to determine the overall active-mode efficiency of an EPS. While these measurements span the majority of an EPS's loading profile, consumer loads are increasingly utilizing standby modes to minimize power consumption during periods of inactivity, a development that has resulted in many EPSs spending more time in loading conditions below 25 percent where the EPS active-mode efficiency tends to rapidly decrease due to the increase in the ratio of fixed losses to the output power. This decrease is due in large part to a higher loss ratio where the fixed losses represent a higher percentage of the overall power consumed when compared to the output power.

Regarding these lower load states, NRDC noted that industry has already performed significant research to improve the conversion efficiency of EPSs at these states.[6] As part of its research, NRDC compared a standard computer EPS complying with the Level V requirements of the international efficiency marking protocol against a reference design from a major power supply integrated circuit manufacturer. While the computer EPS and the reference design remained relatively similar across all the loading points considered in the DOE test procedure (i.e., 25%, 50%, 75%, and 100%), the EPSs diverged significantly below 25 percent load. The

[6] NRDC: External Power Supplies – Additional Efficiency Opportunities, http://www.appliance-standards.org/sites/default/files/Next_Efficiency_Opportunities_for_External_Power_Supplies_NRDC.pdf

reference design showed as much as a 25 percent increase in active-mode efficiency over the computer EPS at loads below those required by the EPS test procedure. While this is just one example, DOE has also been informed by interested parties and during manufacturer interviews that the industry aims to prevent the energy gains made by smarter consumer loads from being offset by EPS designs that cannot maintain flatter efficiency profiles over the full load range. Again, as noted by the NRDC, consumer products are increasingly spending a significant portion of their operating time in lower power modes or standby states where the EPS load-demand is below 25 percent. Since EPS efficiency tends to fall off at these lower loads, improving the active-mode efficiency of EPSs at loading points below 25 percent to levels similar to the achievable efficiencies at higher loading points would create a more constant efficiency level, regardless of the load demand. This approach will ensure that the overall system remains efficient when consumer loads fall below a 25 percent load rather than relying on an inefficient EPS that hampers system efficiency.

Other standards-setting bodies have recognized the potential energy savings from reducing lower-load losses. Significantly, on October 29, 2013, the European Union published Version 5 of its Code of Conduct on Energy Efficiency of External Power Supplies (Code of Conduct).[7] That document lays out the foundation for a set of voluntary guidelines for individual manufacturers to meet and includes specifications regarding EPS coverage, energy efficiency, and monitoring provisions. The energy efficiency levels in the Code of Conduct have been revised to reflect the same four loading point measurements required by DOE, but also include a

[7] European Union: Code of Conduct on External Power Supplies Version 5 (available at http://iet.jrc.ec.europa.eu/energyefficiency/sites/energyefficiency/files/code_of_conduct_for_ps_version_5_-_draft_120919.pdf )

separately calculated performance level using an additional loading point at a lower 10 percent load. See European Comm'n, Code of Conduct on Energy Efficiency of External Power Supplies, Version 5, Annex (Oct. 29, 2013). The energy efficiency provisions are further divided into two groupings – Tier 1 and Tier 2. These tiers delineate two separate sets of standards with two unique effective dates. Tier 1 went into effect in January 2014, while the more stringent standards in Tier 2 will take effect in January 2016. Like DOE's test procedure at Appendix Z, the new Code of Conduct provides that manufacturers measure the efficiency at each loading condition along with a no-load power consumption metric in accordance with the CEC's test procedure for single voltage EPSs. Also like appendix Z, the Code of Conduct's prescribed energy efficiency levels at the specified five loading points for both Tier 1 and Tier 2 rely on equations that generate a minimum average active-mode efficiency based on the nameplate output power of an EPS.

Although the revised Code of Conduct includes the additional loading point measurement at 10% load, this data point is not included when calculating the average active-mode efficiency of a given EPS. Instead, the Code of Conduct continues to rely on the four loading points on which DOE's standards are based – i.e., 25%, 50%, 75%, and 100% load – for this metric. The Code of Conduct sets a separate performance standard at 10% load, but, like DOE, relies on an equation based on the nameplate output power of an EPS to determine the minimum applicable standard at this loading point.

Based on the research conducted by NRDC and the efforts of the European Commission to improve light load efficiency, additional energy savings opportunities for EPSs may be possible given the increase in low-power states in smart devices. In order to increase the flexibility of the EPS test procedure should DOE decide to incorporate such a measurement into an efficiency standard in the future, DOE proposes to add a sixth, optional, loading condition at 10 percent of the nameplate output current to the EPS test procedure. Similar to the power factor measurements, recording the active-mode efficiency at this loading condition would be optional and would not be part of the mandatory submissions on any certification report. Data voluntarily gathered by manufacturers at this additional loading point could serve to inform DOE on the current efficiency landscape of EPSs below 25 percent load while also attempting to harmonize with the efforts of the European Commission.

While DOE is proposing to add this new, but optional, 10% loading point to the test procedure, DOE is not proposing to use this new loading condition as part of the calculation of average-active mode efficiency should manufacturers decide to record the active-mode efficiency at the new loading condition . The average-active mode efficiency metric will continue to be calculated by averaging the efficiencies at the 25%, 50%, 75%, and 100% loading conditions. In the future, DOE may consider whether future revisions to the energy conservation standards for EPSs should include the efficiency at the new loading condition either as part of the calculation of average active-mode efficiency or as a separate independent standard. This proposed change will have no impact on measuring compliance with the current energy conservation standards for Class A EPSs or the recently promulgated standards for direct operation EPSs that manufacturers must meet beginning in 2016.

No additional testing burden would be placed on manufacturers as a result of this proposed change because the 10% loading condition test is optional. However, should manufacturers elect to make this measurement, DOE believes the additional testing burden would be minimal. Measuring the efficiency at this new loading point would require no additional equipment. The tester would only have to adjust the resistive or electronic load to the correct conditions. This additional test would increase the overall testing time by no more than ten minutes even after adhering to the given minute stability criteria at the new load condition. Because DOE only requires direct meter readings to record the measurements, testing at this additional loading condition would have a minimal increase in burden and duration of the test. DOE seeks comment on the benefits and burdens of adding an additional loading condition to the EPS test procedure as an optional measurement. The other loading conditions will remain the same as has been previously stated under this proposal.

G. Energy Conservation Standards

On February 10, 2014, DOE issued new and amended standards for EPSs; compliance with these standards is required by February 10, 2016. 79 FR 7845. These new standards will require many EPSs already subject to standards as Class A EPSs to meet more stringent requirements. Additionally, the new regulations established efficiency standards for some types of EPSs, such as multiple-voltage and high power EPSs, which had not previously been required to meet any efficiency standard. In updating these regulations, DOE established two new definitions – direct operation and indirect operation EPSs. As defined in DOE's regulations at 10 CFR 430.2, a "direct operation EPS" is an EPS that can operate a consumer product that is not a battery charger without the assistance of a battery, whereas an "indirect operation EPS" is an EPS that cannot operate a consumer product (other than a battery charger) without the assistance of a battery. DOE intended that these terms be mutually exclusive and collectively exhaustive, so that any EPS would be either a direct or indirect operation EPS, but not both. The new regulations required that any direct-operation EPS (regardless of whether it was also a Class A EPS) would have to meet these new standards. Any indirect operation EPS would not be required to meet the new standards, but would still be required to comply with the Class A efficiency requirements if that EPS meets the definition of a Class A EPS. The Class A EPS definition is found in 42 U.S.C. 6291(36). DOE also updated the International Efficiency Marking Protocol to add a new mark, "VI," to indicate compliance with the new efficiency requirements established for direct operation EPSs.

The following chart summarizes the energy conservation standards and marking requirements based on whether the EPS is (1) a Class A or non-Class A EPS and (2) direct or indirect operation.

**Table III-2.Applicable Standards of Class A and Non-Class A EPSs**

| | **Class A EPS** | **Non-Class A EPS** |
|---|---|---|
| **Direct Operation EPS** | Level VI:<br>10 CFR 430.32(w)(1)(ii) | Level VI:<br>10 CFR 430.32(w)(1)(ii) |
| **Indirect Operation EPS** | Level IV:<br>10 CFR 430.32(w)(1)(i) | No Standards |

To clarify these requirements, DOE is proposing to add the above table to a new 10 CFR 430.32(w)(1)(iii).

H. Indirect Operation EPSs

To distinguish between a direct and indirect operation EPS, the definition of an indirect operation EPS includes a specific method to determine whether an EPS is an indirect operation EPS. First, if the EPS can be connected to a battery-operated consumer product with removable batteries, then the batteries should be removed. Then, the EPS should be connected to mains power and an attempt to operate the product should be made. If the product cannot operate without the batteries, it is an indirect operation EPS. If the batteries cannot be removed, then the time necessary for a product in "off–mode" to turn on and become operational should be recorded when (1) the battery is completely charged and (2) when the battery is completely discharged. If the difference in these two conditions is greater than 5 seconds, then the EPS is an indirect operation EPS.

Stakeholders asked whether an EPS that can be used with multiple end-use applications – some of which are operated directly and others indirectly – would be treated by DOE as an indirect or direct operation EPS. So long as an EPS can operate any consumer product directly, DOE considers it to be a direct operation EPS. If an EPS is shipped with a consumer product that the EPS can only operate indirectly, but that same EPS can also be used to directly operate another consumer product, DOE would still consider that EPS to be a direct operation EPS and subject to the applicable direct operation EPS efficiency standards.

Stakeholders also asked whether an EPS that can operate a battery charger contained in a separate physical enclosure from the end-use product is considered an indirect or direct operation EPS. DOE notes that a battery charger is considered a consumer product in and of itself, and DOE is currently undertaking a rulemaking to consider establishing efficiency standards for battery chargers. With this in mind, DOE excluded battery chargers as a type of consumer product that a direct operation EPS can operate as part of the definition for a direct operation EPS in the external power supply and battery charger NOPR published on March 27, 2012. See 77 FR 18478. This was due in large part to the fact that the efficiency of an EPS that can only operate a battery charger, but not any other consumer product, may be covered by future efficiency standards for battery chargers. Therefore, an EPS that can only operate a battery charger in a separate physical enclosure from the end-use product, but not any other consumer product, would not be considered a direct operation EPS, and would therefore, not be subject to the efficiency standards for direct operation EPSs. See 79 FR at 7929. DOE is proposing to modify the indirect operation EPS definition to clearly include within its scope those EPSs that can only operate battery chargers contained in physical enclosures separate from the end-use products (but not other consumer products). The modified definition would specify that an indirect operation EPS is an EPS that (1) cannot operate a consumer product (that is not a battery charger) without the assistance of a battery or (2) solely provides power to a battery charger that is contained in a separate physical enclosure from the end-use product. DOE seeks feedback on this proposed amendment.

I. Scope of Coverage

Congress established the definition of an external power supply to mean "an external power supply circuit that is used to convert household electric current into DC current or lower-voltage AC current to operate a consumer product" (10 CFR 430.2). This definition outlines the distinguishing criteria for a product to be considered an EPS and, therefore, to be considered a covered product. While a covered product may be subject to energy conservation standards, DOE has established standards only for certain types of EPSs to date. So, while an EPS is a covered product, not all EPSs are subject to energy conservation standards. Currently, a Class A EPS must meet the standards prescribed in 10 CFR 430.32. Beginning in 2016, energy conservation standards will also apply to direct operation EPSs.

Any product that meets the statutory definition of a Class A external power supply is currently subject to the no-load mode power and average active-mode efficiency requirements in 10 CFR 430.32(w). This definition specifies that a Class A EPS is one with the following six characteristics:[8]

- designed to convert line voltage AC input into lower voltage AC or DC output;
- able to convert to only 1 AC or DC output voltage at a time;
- sold with, or intended to be used with, a separate end-use product that constitutes the primary load;
- contained in a separate physical enclosure from the end-use product;
- connected to the end-use product via a removable or hard-wired male/female electrical connection, cable, cord, or other wiring; and
- nameplate output power that is less than or equal to 250 watts.

DOE has received numerous inquiries from manufacturers requesting additional guidance on applying these six criteria. In order to ensure clarity and consistency for stakeholders and manufacturers, the following subsections discuss some of the most commonly asked questions about the definition of a Class A EPS.

1. <u>Solid State Lighting</u>

[8] Two exclusions apply to the Class A External Power Supply definition. Devices that require Federal Food and Drug Administration listing and approval as a medical device in accordance with section 513 of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 360(c)) or devices that power the charger of a detachable battery pack or charge the battery of a product that is fully or primarily motor operated are not considered Class A External Power Supplies. See 42 U.S.C. 6291(36)(C)(ii).

DOE has received specific inquiries from manufacturers asking whether “transformers” used with solid state lighting (SSL), such as LED drivers used for landscape lighting, lighting strings, portable luminaries, and other lighting applications are subject to the Class A external power supply energy conservation standards. Provided the product meets all six characteristics of a Class A EPS, then it would be subject to the Class A EPS energy conservation standards, regardless of the end-use application. As discussed in the February 10, 2014 final rule, DOE has determined that there are no technical differences between the EPSs that power certain SSL (including LED) products and those that are used with other end-use applications. 79 FR 7845. As such, DOE believes that many drivers, or transformers, used for SSL applications would meet the definition of a Class A EPS and would therefore be subject to the applicable energy conservation standards.

2. Convert to Only One AC or DC Output Voltage at the Same Time

DOE has also received questions related to the Class A EPS criterion specifying that a given device can “convert to only AC or DC output voltage at a time”. This requirement would be met if an EPS can provide two or more outputs at the same voltage at the same time or if it can provide two or more different output voltages, but not at the same time. These criteria would not be met if the EPS can provide more than one nominal lower-voltage AC or DC output at the same time; such an EPS would not be considered a Class A EPS, but would be considered a multiple-voltage EPS because it is designed to convert line voltage AC input into more than one simultaneous lower-voltage output. Direct operation multiple-voltage EPSs are subject to conservation standards beginning in 2016.

3.Power over Ethernet

DOE has also been asked about how the criterion requiring that a Class A EPS be connected to the end-use product via a removable or hard-wired male/female electrical connection, cable, cord, or other wiring would apply to a Power over Ethernet (PoE) device. PoE describes a system which passes electrical power along with data on Ethernet cabling allowing a single cable to provide both data connection and electrical power. Specifically, stakeholders have asked if PoE Injectors, components that provide power to an Ethernet cable, or EPSs that are connected to the end-use product by an Ethernet cable would be considered Class A external power supplies. An EPS may be considered a Class A EPS if it connects to the end-use application using any type of electrical connection, cable, cord, or other wiring, including both removable and hard-wired connections. An Ethernet cable would meet these criteria, so an EPS that connects to the end-use product via an Ethernet cable would still be considered a Class A EPS and would be subject to the applicable energy conservation standards if it meets the other five criteria of a Class A EPS.

4.Security or Life Safety Alarm or Surveillance Systems

Finally, DOE has received questions on the exemption from the no-load mode energy consumption standards for certain EPSs manufactured before July 1, 2017. Under 42 U.S.C. 6295(u)(3)(E), an EPS that (1) is an AC-to-AC EPS; (2) has a nameplate output of 20 watts or more, and (3) is certified to the Secretary as being designed to be connected to a security or life safety alarm or surveillance system component does not have the meet the no-load mode requirements, provided it is manufactured before July 1, 2017 and is marked in accordance with the International Efficiency Marketing Protocol.[9] *See also* 10 CFR 430.32(w)(5) (codifying the statutory requirements of 42 U.S.C. 6295(u)(3)(E)). Per 10 CFR 430.2, a security or life safety alarm or surveillance system means equipment designed and marketed to perform certain functions on a continuous basis, such as monitoring intrusion to real property, providing notification of threats to life safety or physical property, controlling access to real property or physical assets, or preventing unauthorized removal of physical assets. The term security or life safety alarm or surveillance system does not include any product with a principal function other than life safety, security, or surveillance that is designed and marketed with a built-in alarm or theft-deterrent feature or does not operate necessarily and continuously in active mode.

Examples of products that would meet this definition of security or life safety alarm or surveillance systems include home security system consoles, keyless entry electronic door locks, and smoke detectors because these products are designed and marketed to continuously monitor intrusion or access to real property, control access to property, and monitor threats to real property. On the other hand, landscape lighting with motion sensors, video cameras, and smart phones with theft deterrent features are examples of products with principal functions other than life safety, security, or surveillance that are designed and marketed with built-in alarm or theft deterrent features or that do not operate necessarily and continuously in active mode. These products would not be exempt from the no-load mode energy consumption standards. It should be noted that EPSs that receive the exemption are still required to meet the average active-mode

[9] Energy Efficiency and Renewable Energy Office (EERE): International Efficiency Marking Protocol for External Power Supplies Version 3.0 (available at http://www.regulations.gov/#!documentDetail;D=EERE-2008-BT-STD-0005-0218)

efficiency requirements and that this exemption expires on July 1, 2017, so EPSs manufactured after this date will also be required to comply with the applicable no-load limits.

J. Sampling Plan

For certification and compliance, manufacturers are required to rate each basic model according to the sampling provisions specified in 10 CFR Part 429. The sampling plan for Class A EPSs can be found in 10 CFR 429.37, which requires that any represented value of the estimated energy consumption of a basic model of a Class A EPS for which consumers would favor a lower value shall be greater than or equal to the higher of the mean of the sample or the upper 97.5 percent confidence limit of the true mean divided by 1.05. DOE is also proposing to require manufacturers to provide the output current in ampere (A), which is currently only required if that information is not provided on the nameplate.

Given that the recent energy conservation standards rule applies to both Class A EPSs and direct operation EPSs that do not meet the Class A definition, there is no longer a need to differentiate between Class A and non-Class A EPSs for the purposes of part 429. Instead, DOE proposes to amend 10 CFR 429.37 so that the sampling plan, which currently applies only to Class A EPSs, would be applied to any EPS subject to energy conservation standards. DOE seeks comment on this proposal to apply the sampling plan requirements to all EPSs subject to an energy conservation standard, regardless of whether they meet the Class A definition.

K. Effective Date and Compliance Date of Test Procedure

If adopted, the effective date for this test procedure would be 30 days after publication of the test procedure final rule in the Federal Register. At that time, the new metrics and any other measure of energy consumption relying on these metrics may be represented pursuant to the final rule. Consistent with 42 U.S.C. 6293(c), energy consumption or efficiency representations by manufacturers must be based on the new test procedure and sampling plans starting 180 days after the date of publication of the test procedure final rule. Starting on that date, any such representations, including those made on marketing materials, websites (including qualification with a voluntary or State program), and product labels would be based on results generated using the proposed procedure as well as the sampling plan in 10 CFR part 429.

L. Impacts from the Test Procedure

When proposing to amend a test procedure, DOE typically determines the extent to which, if any, the proposed test procedure would alter the measured energy efficiency of any covered product when compared to the existing test procedure. (42 U.S.C. 6293(e)(1)) If DOE determines that the amended test procedure would alter the measured efficiency of a covered product to a significant extent, DOE would amend the applicable energy conservation standard accordingly. (42 U.S.C. 6293(e)(2)).

The proposed amendments would not alter the measured efficiency of EPSs. DOE expects that the rated values of EPSs tested under the current test method codified in Appendix Z would still be obtained when tested using today's proposed method because the proposal is not modifying the methods used to measure or calculate the rated values of an EPS that are used to determine whether that EPS would satisfy the regulatory conservation standards for average active-mode efficiency and no-load power. In other words, there should be no change in the measured results under the proposal. Rather, the proposed amendments would (1) harmonize DOE's procedure with the latest version of IEC 62301 concerning the measurement equipment resolution and measurement uncertainties; (2) define and clarify how to test adaptive EPSs; (3) clarify the testing configurations to avoid introducing additional losses in testing cables; (4) clarify the testing of EPSs that are not capable of being tested at one or more loading conditions; (5) add an optional test for active-mode efficiency measurements at a 10 percent loading condition for both single-voltage and multiple-voltage EPSs; (6) add an optional measurement for output power factor; and (7) revise the sampling plan to include EPSs that will be covered by Federal efficiency standards as of 2016.

In DOE's view, none of the proposed modifications will impact the measured energy use of tested EPSs because the fundamental testing methodology and certification process remains unchanged – i.e., the calculation of average active-mode efficiency or no-load power consumption would remain unchanged.  Additionally, DOE's proposed steps to address how to connect test equipment to an EPS to avoid introducing electrical energy losses would clarify the test procedure to ensure accurate and repeatable results.

DOE does not anticipate that the additional burden posed by these proposed changes, if any, are likely to be significant. None of these proposed amendments would involve changing the necessary testing equipment or add significant increases in testing time.  Measuring the active-mode efficiency of the new 10-percent loading condition is optional.  But even if this test is performed, it will not require any additional equipment that would be unnecessary for measuring the active-mode efficiency of the other loading conditions and will increase the total testing time for each unit by approximately 10 minutes. Similarly, the revised uncertainty and resolution requirements will not mandate any changes to the necessary testing equipment.

DOE does not believe the updated procedure will impose increased testing burden or alter the measured average active-mode efficiency or no-load power. While the proposed amendments would be required to be used beginning 180 days after publication of a final rule, manufacturers may begin using the amended test procedure immediately after a final rule is published.

## IV.Procedural Issues and Regulatory Review

A. Review Under Executive Order 12866

The Office of Management and Budget (OMB) has determined that test procedure rulemakings do not constitute "significant regulatory actions" under section 3(f) of Executive Order 12866, Regulatory Planning and Review, 58 FR 51735 (Oct. 4, 1993). Accordingly, this action was not subject to review under the Executive Order by the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget.

B.Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601, et seq.) requires preparation of an initial regulatory flexibility analysis (IFRA) for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. As required by Executive Order 13272, "Proper Consideration of Small Entities in Agency Rulemaking," 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel's website: http://energy.gov/gc/office-general-counsel.

For manufacturers of EPSs, 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. 65 FR 30836, 30848 (May 15, 2000), as amended at 65 FR 53533, 53544 (Sept. 5, 2000) and codified at 13 CFR part 121. The size standards are listed by North American Industry Classification System (NAICS) code and industry description and are available at http://www.sba.gov/content/summary-size-standards-industry. EPS manufacturing 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.

DOE reviewed the  proposed rule under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. This proposed rule prescribes certain limited clarifying amendments to an already-existing test procedure that will help manufacturers and testing laboratories to consistently conduct that procedure when measuring the energy efficiency of an EPS, including in those instances where compliance with the applicable Federal energy conservation is being assessed. DOE has tentatively concluded that the proposed rule would not have a significant impact on a substantial number of small entities.

DOE notes that there are no domestic manufacturers of EPSs. Given the absence of any domestic manufacturers of these products, there are no small business impacts to evaluate for purposes of the Regulatory Flexibility Act.

In addition, DOE expects any potential impact from its proposal to be minimal. As noted earlier, DOE's EPS test procedure has existed since 2005 and the modest clarifications in the proposal are unlikely to create a burden on any manufacturers. These proposed revisions, if adopted, would harmonize the instrumentation resolution and uncertainty requirements with the second edition of the International Electrotechnical Commission (IEC) 62301 standard when measuring standby power along with other international standards programs. They would also include modifications to the measurements specified by IEC 62301, including changes that would address active-mode efficiency loading points and require that power factor be recorded for each loading condition. The proposal would also clarify certain testing set-up requirements. These updates would not are expected to increase the testing burden on EPS manufacturers.

For these reasons, DOE certifies that the proposed rule would not have a significant economic impact on a substantial number of small entities. Accordingly, DOE has not prepared a regulatory flexibility analysis for this rulemaking. DOE will transmit the certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the SBA for review under 5 U.S.C. 605(b).

C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of EPS must certify to DOE that their products comply with any applicable energy conservation standards. In certifying compliance, manufacturers must test their products according to the DOE test procedures for EPSs 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 external power supplies. (76 FR 12422 (March 7, 2011)) 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 20 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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

D. Review Under the National Environmental Policy Act of 1969

DOE has determined that this proposal, which would add clarifying amendments to an existing test procedure, 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, this proposed rule would amend the existing test procedures without affecting the amount, quality or distribution of energy usage, and, therefore, would not result in any environmental impacts. Thus, this rulemaking is covered by Categorical Exclusion A6 under 10 CFR part 1021, subpart D, which applies to any rulemaking that interprets or amends an existing rule without changing the environmental effect of that rule. 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 has examined this proposed rule and has determined that it would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of today's proposed rule. States can petition

DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d)) No further action is required by Executive Order 13132.

F. Review Under Executive Order 12988

Regarding the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, "Civil Justice Reform," 61 FR 4729 (Feb. 7, 1996), imposes on Federal agencies the general duty to adhere to the following requirements: (1) eliminate drafting errors and ambiguity; (2) write regulations to minimize litigation; (3) provide a clear legal standard for affected conduct rather than a general standard; and (4) promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) clearly specifies the preemptive effect, if any; (2) clearly specifies any effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction; (4) specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in sections 3(a) and 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, the proposed rule meets the relevant standards of Executive Order 12988.

G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Pub. L. No. 104-4, sec. 201 (codified at 2 U.S.C. 1531). For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of $100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national economy. (2 U.S.C. 1532(a)-(b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed "significant intergovernmental mandate," and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at http://energy.gov/gc/office-general-counsel. DOE examined this proposed rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of $100 million or more in any year, so these requirements do not apply.

H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105-277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This proposed rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

I. Review Under Executive Order 12630

DOE has determined, under Executive Order 12630, "Governmental Actions and Interference with Constitutionally Protected Property Rights" 53 FR 8859 (March 18, 1988), that this proposed regulation would not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

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

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). DOE has reviewed this proposed rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

K. Review Under Executive Order 13211

Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OMB, a Statement of Energy Effects for any proposed significant energy action. A “significant energy action” is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that: (1) is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

This regulatory action to amend the test procedure for measuring the energy efficiency of external power supplies 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.

Certain of the proposed amendments would incorporate testing methods contained in the following standard: IEC Standard 62301 ''Household electrical appliances—Measurement of standby power.'' It would also incorporate a testing method developed by the State of California, section 1604(u)(1) of the CEC 2007 Appliance Efficiency Regulations. DOE has evaluated these testing standards and tentatively concludes that the IEC standard complies with the requirements of section 32(b) of the Federal Energy Administration Act, (i.e., that they were developed in a manner that fully provides for public participation, comment, and review). DOE will consult with the Attorney General and the Chairman of the FTC concerning the impact of these test procedures on competition, prior to prescribing a final rule.

**V.** Public Participation

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

<u>Submitting comments via regulations.gov</u>. The regulations.gov web page will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative

name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

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

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

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

Submitting comments via email, hand delivery, or mail. Comments and documents submitted via email, hand delivery, or mail also will be posted to regulations.gov. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information on a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments

Include contact information each time you submit comments, data, documents, and other information to DOE. If you submit via mail or hand delivery, please provide all items on a CD, if feasible. It is not necessary to submit printed copies. No facsimiles (faxes) will be accepted.

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

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

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

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

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

A. Issues on Which DOE Seeks Comment

Although DOE welcomes comments on any aspect of this proposal, DOE is particularly interested in receiving comments and views of interested parties concerning the following issues:

1. DOE seeks comment on its proposal to incorporate the accuracy and precision requirements found in the current version of IEC 62301 (2nd ed.) as part of DOE's external power supply test procedure. Would the incorporation of these requirements be sufficient to ensure that the measurements obtained during testing when following the procedure are accurate, consistent, and repeatable? What potential problems, if any, could occur if DOE were to incorporate these requirements into its test procedure?

2. DOE seeks comment on its proposed clarification regarding the test set-up when measuring output power with a combination of a voltmeter and ammeter. Is the additional language sufficient to ensure that tests are repeatable and that the testing set-up is unambiguous? Are there any potential problems with mandating this type of connection that could negatively impact the efficiency measurement and ultimately a manufacturer's ability to comply with the federal standard?

3. DOE seeks comment on allowing manufacturers with products that limit the current under certain loading conditions to certify their products using an average efficiency metric of all the load conditions in the DOE test procedure that can be tested. Would allowing manufacturers to certify their products in this fashion lead to gaming of the test procedure or a circumvention of the standard? Would issuing waivers on a case-by-case basis be a preferable alternative? What is the likelihood that manufacturers will design

around certain loading conditions to take advantage of this new approach in order to more easily comply with the federal standard?

4. DOE seeks comment on its proposal to optionally measure power factor at each loading condition. Does this put unnecessary additional burden on manufacturers for testing? Does DOE need to establish a methodology for measuring power factor beyond what is outlined in IEC 62301 ($2^{nd}$ Ed.)? How significant is power factor in determining the overall efficiency of an EPS? Would power factor measurements be repeatable?

5. DOE seeks comment on whether the proposed definition of an adaptive external power supply accurately describes this new type of EPS. Is the definition too broad such that other single-voltage operation EPSs or battery chargers may now be considered adaptive EPSs? Is there a more appropriate term than “adaptive”?

6. DOE seeks comment on its proposed approach to testing adaptive EPSs. Should such products be considered EPSs? Can these types of EPSs be tested using a test jig provided by the manufacturer? If so, what output power rating should be considered for certification? If not, are there methods DOE should consider to improve the test procedure in regards to EPSs that communicate with their loads?

7. DOE seeks comment on how to determine the highest and lowest voltages on adaptive EPSs. Should these numbers be required for submission during certification? Should the test procedure be modified to measure such values?

8. DOE is seeking comment on adding language to clarify the testing set-up at 0 percent load. Is stating that the EPS must be in no-load mode before the EPS is tested at 0 percent

load necessary? For adaptive EPSs, is there potential to capture different results when the EPS is disconnected versus if the load was simply reduced to zero but still physically connected to the output of the EPS?

9. DOE seeks comment on how to rate and certify adaptive EPSs. Is requiring that manufacturers submit data at both voltage extremes overly burdensome? Are there any technical limitations to requiring that these measurements be taken and submitted? Are there more appropriate ways of rating such EPSs?

10. DOE seeks comment on including an additional, optional loading condition at 10 percent of the rated nameplate output power of the unit under test in the EPS test procedure. Would testing an EPS at 10 percent load more completely represent the achievable efficiencies of the EPS under test? Would the efficiencies recorded at this loading point be significantly lower from those taken at the loading points in the current DOE test procedure?

11. DOE seeks comment on its proposed revision to the definition of “indirect operation external power supply”. Do these changes more accurately define what is meant by an indirect operation EPS? Is there the potential for this new definition to increase the scope of coverage of the EPS standard?

12. DOE seeks comment on creating a single sampling plan for both Class A and non-Class A EPSs. Is there any reason that all EPSs within the scope of federal standard should not be subject to the same sampling requirements? Are the manufacturing variations

somehow different between different groups of EPSs that would necessitate separate sampling requirements?

## VI. Approval of the Office of the Secretary

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

**List of Subjects**

**10 CFR Part 429**

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Reporting and recordkeeping requirements

**10 CFR Part 430**

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

Issued in Washington, DC, on October 2, 2014.

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

For the reasons stated in the preamble, DOE is proposing to amend parts 429 and 430 of Chapter II of Title 10, Code of Federal Regulations as set forth below:

**PART 429--CERTIFICATION, COMPLIANCE, AND ENFORCEMENT FOR CONSUMER PRODUCTS AND COMMERCIAL AND INDUSTRIAL EQUIPMENT**

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

**Authority:** 42 U.S.C. 6291-6317.

2. Section 429.37 is amended by revising the section heading and paragraph (b)(2) to read as follows:

**§429.37 External Power Supplies.**

* * * * *

(b) * * *

(2) Pursuant to §429.12(b)(13), a certification report shall include the following public product-specific information:

(i) External power supplies: The average active mode efficiency as a percent (%), no-load mode power consumption in watts (W), nameplate output power in watts (W), and the output current in amperes (A) of the basic model or the output current in amperes (A) of the highest- and lowest-voltage models within the external power supply design family.

(ii) Switch-selectable single-voltage external power supplies: The average active mode efficiency as a percentage (%) value, no-load mode power consumption in watts (W), at the lowest and highest selectable output voltages, nameplate output power in watts (W), and the output current in amperes (A).

(iii) Adaptive single-voltage external power supplies: The average active mode efficiency at the highest achievable output voltage as a percentage (%) value, the average active mode efficiency at the lowest achievable output voltage as a percentage (%) value, nameplate output power in watts (W), and the output current in amperes (A) at the highest and lowest achievable output voltages. No-load mode power consumption in watts (W).

(iv) External power supplies that are exempt from no-load mode requirements under §430.32(w)(1)(iii): A statement that the product is designed to be connected to a security or life safety alarm or surveillance system component, the average active mode efficiency as a percentage (%) value, the nameplate output power in watts (W), and the certification report must also include the output current in amperes (A) of the basic model or the output current in amperes (A) of the highest- and lowest-voltage models within the external power supply design family.

**PART 430--ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS**

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

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

4. Section 430.2 is amended by revising the introductory text of the definition of “Indirect operation external power supply” to read as follows:

**§430.2 Definitions.**

* * * * *

*Indirect operation external power supply* means an EPS that cannot operate a consumer product (that is not a battery charger) without the assistance of a battery, as determined by the steps in paragraphs (1)(i) through (v) of this definition, or an EPS that solely provides power to a battery charger that is contained in a separate physical enclosure from the end-use product:

* * * * *

**§430.3 [Amended]**

5. Section 430.3 is amended by removing from paragraph (o)(4), “and X” and adding “X, and Z” in its place.

6. Section 430.32 is amended by adding paragraph (w)(iii) to read as follows:

**§430.32 Energy and water conservation standards and their compliance dates.**

* * * * *

(w) * * *

(iii) The following table summarizes the energy conservation standards that are applicable to external power supplies beginning on February 10, 2016.

| | **Class A EPS** | **Non-Class A EPS** |
|---|---|---|
| **Direct Operation EPS** | Level VI:<br>10 CFR 430.32(w)(1)(ii) | Level VI:<br>10 CFR 430.32(w)(1)(ii) |
| **Indirect Operation EPS** | Level IV:<br>10 CFR 430.32(w)(1)(i) | No Standards |

* * * * *

7. Appendix Z to subpart B of part 430 is amended:

a. In section 2., Definitions, by

ii. Redesignating paragraphs(d) and (e) as (e) and (f), and paragraphs (f) through (x) as paragraphs (h) through (z), respectively; and

iii. Adding new paragraphs (d) and (g);

b. In section 3, Test Apparatus and General Instructions, by

i. Revising paragraphs (a), and (b)(i)(A); and

ii. Removing paragraphs (b)(i)(B) and (b)(i)(C);

c. In section 4, Test Measurement, by:

i. Revising paragraphs (a)(i), and (a)(ii);

ii. Adding a new paragraph (a)(i)(D); and

iii. Revising paragraphs (b)(i)(A)(3), (b)(i)(A)(5), (b)(i)(A)(6), (b)(i)(B)(2), (b)(i)(C), (b)(i)(E), (b)(i)(F), and (b)(ii).

The revisions and additions read as follows:

**Appendix Z to Subpart B of Part 430—Uniform Test Method for Measuring the Energy Consumption of External Power Supplies**

* * * * *

2. *Definitions*. * * *

*  *  *  *  *

(d) Adaptive external power supply means an external power supply that can alter its output voltage during active mode based on an established communication protocol with the end-use application without any user-generated action.

*  *  *  *  *

(g) Average Active Mode Efficiency means the average of the loading conditions (100 percent, 75 percent, 50 percent, and 25 percent of its nameplate output current) for which it can sustain the output current.

*  *  *  *  *

3. *Test Apparatus and General Instructions:*

(a) Single-Voltage External Power Supply. The test apparatus, standard testing conditions, and instructions for testing external power supplies shall conform to the requirements specified in section 4, "General Conditions for Measurement," of the CEC's "Test Method for Calculating the Energy Efficiency of Single-Voltage External AC-DC and AC-AC Power Supplies," August 11, 2004, (incorporated by reference, see §430.3) with the following two exceptions.

(i) In section 4.b of the CEC test method, "Measuring Equipment", measurements shall conform to the uncertainty requirements specified in section 4.4.1 of the second edition of IEC 62301 (incorporated by reference, see §430.3).

(ii) When following section 4.d of the CEC test method, "Test Voltage", the applied test voltage shall only be 115 volts, 60 Hz.

(b) *Multiple-Voltage External Power Supply*. * * *

(i) Verifying Accuracy and Precision of Measuring Equipment

(A) Any power measurements recorded, as well as any power measurement equipment utilized for testing, shall conform to the uncertainty and resolution requirements outlined in Section 4, “General conditions for measurements”, as well as Annexes B, “Notes on the measurement of low power modes”, and D, “Determination of uncertainty of measurement”, of IEC 62301 ($2^{nd}$ Ed.) (incorporated by reference, see §430.3).

* * * * *

4. *Test Measurement:*

(a) * * *

(i) Standby Mode and Active Mode Measurement — When measuring standby mode (i.e., no-load mode) energy consumption and active mode efficiency, follow the steps specified in section 5, “Measurement Approach” of the CEC's “Test Method for Calculating the Energy Efficiency of Single-Voltage External Ac-Dc and Ac-Ac Power Supplies,” August 11, 2004, (incorporated by reference, see §430.3) EXCEPT use the loading conditions listed in Table 1 of this section. Power factor may be measured at each Loading Condition (1, 2, 3, 4, and 5 in Table 1 of this section) and be recorded separately. For Loading Condition 6, place the unit under test in no-load mode, disconnect any additional signal connections to the unit under test, and measure input power. In section 5.b, the loading conditions are:

Table 1—Loading Conditions for a Single-Voltage Unit Under Test

| Percentage of Nameplate Output Current | |
| --- | --- |
| Load Condition 1 | 100 % of Nameplate Output Current ± 2% |
| Load Condition 2 | 75% of Nameplate Output Current ± 2% |
| Load Condition 3 | 50% of Nameplate Output Current ± 2% |
| Load Condition 4 | 25% of Nameplate Output Current ± 2% |
| Load Condition 5 | 10% of Nameplate Output Current ± 2% (optional) |
| Load Condition 6 | 0% |

Test switch-selectable single-voltage external power supplies twice—once at the highest nameplate output voltage and once at the lowest. Test adaptive external power supplies twice – once at the highest achievable output voltage and once at the lowest. Any additional metering equipment such as voltmeters and/or ammeters used in conjunction with resistive or electronic loads as described in section 5.c must be connected directly to the end of the output cable of the UUT.

* * * * *

(D) If an external power supply cannot sustain output at one or more of loading conditions 1 – 4 as specified in Table 1 of this section, the external power supply should only be tested at the loading conditions for which it can sustain output. In these cases, the average active-mode efficiency shall be the average of the loading conditions for which it can sustain the output. In the case where the external power supply lists both an instantaneous and continuous output current, it shall be tested at the continuous condition only.

(ii) Off-Mode Measurement—If the external power supply unit under test incorporates manual on-off switches, the unit under test shall be placed in off mode, and its power consumption in off mode measured and recorded. The measurement of the off mode energy consumption shall conform to the requirements specified in section 5, “Measurement Approach,” of the CEC's

“Test Method for Calculating the Energy Efficiency of Single-Voltage External Ac-Dc and Ac-Ac Power Supplies,” August 11, 2004 (incorporated by reference, see §430.3), with two exceptions. In section 5.a , “Preparing UUT [Unit Under Test] for Test,” all manual on-off switches shall be placed in the “off” position for the measurement. In section 5.d , “Testing Sequence,” the technician shall consider the UUT stable if, over 5 minutes with samples taken at least once every second, the AC input power does not drift from the maximum value observed by more than 1 percent or 50 milliwatts, whichever is greater. The only loading condition that will be measured for off mode is “Load Condition 6” in Table 1 of this appendix. for switch-selectable single-voltage external power supplies, measure the off mode power consumption twice— once at the highest nameplate output voltage and once at the lowest.

(b) Multiple-Voltage External Power Supply. * * *

(i) * * *

(A) * * *

(3) After this warm-up period, the technician shall monitor AC input power for a period of 5 minutes to assess the stability of the unit under test. If the power level does not drift by more than 1 percent from the maximum value observed, the unit under test can be considered stable and measurements can be recorded at the end of the 5-minute period. Measurements at subsequent loading conditions, listed in Table 2 of this section, can then be conducted under the same 5-minute stability instructions. Only one warm-up period of 30 minutes is required for each unit under test at the beginning of the test procedure.

* * * * *

(5) The unit under test shall be tested at the loading conditions listed in Table 2 of this section, de-rated per the proportional allocation method presented in the subsection immediately following Table 2.

Table 2—Loading Conditions for a Multiple-Voltage Unit Under Test

| Percentage of Nameplate Output Current | |
|---|---|
| Load Condition 1 | 100 % of De-rated Nameplate Output Current ± 2% |
| Load Condition 2 | 75% of De-rated Nameplate Output Current ± 2% |
| Load Condition 3 | 50% of De-rated Nameplate Output Current ± 2% |
| Load Condition 4 | 25% of De-rated Nameplate Output Current ± 2% |
| Load Condition 5 | 10% of De-rated Nameplate Output Current ± 2% (optional) |
| Load Condition 6 | 0% |

(6) Input and output power measurements shall be conducted in sequence from Loading Condition 1 to Loading Condition 5, as indicated in Table 2 of this section. For Loading Condition 6, place the unit under test in no-load mode, disconnect any additional signal connections to the unit under test, and measure input power.

(B) * * *

(2) If $D \geq 1$, then loading every bus to its nameplate output current does not exceed the overall nameplate output power for the power supply. In this case, each output bus will simply be loaded to the percentages of its nameplate output current listed in Table 2 of this section. However, if $D < 1$, it is an indication that loading each bus to its nameplate output current will exceed the overall nameplate output power for the power supply. In this case, and at each loading condition,

each output bus will be loaded to the appropriate percentage of its nameplate output current listed in Table 2, multiplied by the derating factor *D*.

(C) Minimum output current requirements. Depending on their application, some multiple-voltage power supplies may require a minimum output current for each output bus of the power supply for correct operation. In these cases, ensure that the load current for each output at Loading Condition 4 in Table 2 of this section is greater than the minimum output current requirement. Thus, if the test method's calculated load current for a given voltage bus is lower than the minimum output current requirement, the minimum output current must be used to load the bus. This load current shall be recorded in the test report.

* * * * *

(E) Efficiency calculation and data recordation. The efficiency of a unit under test shall be calculated by dividing the measured active output power of that unit at a given loading condition by the active AC input power measured at that loading condition. The average active-mode efficiency of the unit shall be calculated by averaging the efficiency of the unit under test as calculated at Loading Conditions 1 through 4, unless output cannot be sustained at one of those loading conditions. In that case, average-active mode efficiency is calculated as described in paragraph (a)(i)(D) of this section. Additionally, an optional calculation and individual recording of the efficiency at Loading Condition 5 (specified in Table 2 in paragraph (b)(i)A)(5) of this section) may also be performed. Power factor for Loading Conditions 1 through 5 (as specified under the same Table 2) may also be recorded, but these measurements are not mandatory. The efficiency at each loading condition and the power factor at each loading condition shall be individually recorded.

(F) Power consumption calculation. Power consumption of the unit under test at Loading Conditions 1, 2, 3, 4, and 5 is the difference between the active output power at that Loading Condition and the active AC input power at that Loading Condition. The power consumption of Loading Condition 6 (no-load) is equal to the AC active input power at that Loading Condition.

(ii) Off Mode Measurement—If the multiple-voltage external power supply unit under test incorporates any on-off switches, the unit under test shall be placed in off mode and its power consumption in off mode measured and recorded. The measurement of the off mode energy consumption shall conform to the requirements specified in paragraph (b)(i) of this section. The only loading condition that will be measured for off mode is “Loading Condition 6” in paragraph (b)(i)(A), “Loading conditions and testing sequence”, except that all manual on-off switches shall be placed in the off position for this measurement.