ENERGY STAR® Program Requirements Product Specification for Uninterruptible Power Supplies (UPSs)

Eligibility Criteria Draft 2 Version 1.0

Following is the Version 1.0 ENERGY STAR Product Specification for Uninterruptible Power Supplies (UPSs). A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

1 DEFINITIONS

Unless otherwise specified, all terms used in this document are consistent with the definitions in the International Electrical Commission (IEC) standard IEC 62040-3[1].

For the purpose of this specification the following definitions apply:

A) Uninterruptible Power Supply (UPS): Combination of convertors, switches, and energy storage devices (such as batteries) constituting a power system for maintaining continuity of load power in case of input power failure.[2]

1) Power conversion mechanism:

i) Static UPS: UPS where solid-state power electronic components provide the output voltage.

ii) Rotary UPS: UPS where one or more electrical rotating machines provide the output voltage.

2) Power Output:

i) Alternating Current (AC)-output UPS: UPS that supplies power with a continuous flow of electric charge that periodically reverses direction.

ii) Direct Current (DC)-output UPS/Rectifier: UPS that supplies power with a continuous flow of electric charge that is unidirectional.

Note: DC-output UPSs are also known as rectifiers. A rectifier is a product that converts alternating current to direct current to supply a load and an energy storage mechanism. For the purposes of this document, the term "DC-output UPS/Rectifier" is used because a "rectifier" may also refer to an AC-UPS component.

3) Application:

i) Consumer UPS: AC-output UPS rated with output power less than or equal to 1.5 kW intended to protect desktop computers and related peripherals, and/or home entertainment devices such as TVs, set top boxes, DVRs, Blu-ray and DVD players.

ii) Commercial UPS: AC-output UPS with output power greater than 1.5 kW and less than or equal to 10 kW intended to protect small business and branch office information and communication technology equipment such as servers, network switches and routers, and small storage arrays.

iii) Data Center UPS: AC-output UPS with output power greater than 10 kW intended to protect large, installations of information and communication technology equipment such as enterprise servers, networking equipment, and large storage arrays.

1 International Electrotechnical Commission (IEC). IEC standard 62040-3.. "Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements." Ed. 2.0

2 Input power failure occurs when voltage and frequency are outside rated steady-state and transient tolerance bands or when distortion or interruptions are outside the limits specified for the UPS.

iv) Industrial UPS: UPS intended to protect industrial manufacturing processes and operations, and designed to withstand rough handling and abusive environments.

v) Utility UPS: UPS designed for use as part of the electrical transmission and distribution systems (e.g. electrical substation or neighborhood level UPSs).

vi) Safety UPS: UPS designed to comply with specific UL safety standards for safety-related applications, such as emergency lighting, operations or egress, or medical diagnostic equipment.

vii) Cable TV UPS: UPS designed to power the cable signal distribution system outside plant equipment and connected directly or indirectly to the cable itself. The "cable" may be coaxial cable (metallic wire) type or fiber-optic or wireless (e.g., "Wi-Fi").

B) Modular UPS: A UPS comprised of two or more single UPS units, sharing 1 or more common frames and a common energy storage system, whose outputs, in normal mode of operation, are connected to a common output bus contained entirely within the frames. The total quantity of single UPS units in a modular UPS equals "n + r" where n is the quantity of single UPS units required to support the load; r is the quantity of redundant UPS units. Modular UPSs may be used to provide redundancy, to scale capacity or both.

C) Redundancy: Addition of UPS Units in a parallel UPS to enhance the continuity of load power, and classified as follows.

1) N+0: UPS that cannot tolerate any failures while maintaining Normal Mode operation. No redundancy.

2) N + 1: Parallel UPS that can tolerate the failure of one UPS unit or one group of UPS units while maintaining Normal Mode operation.

3) 2N: Parallel UPS that can tolerate the failure of one half of its UPS units while maintaining Normal Mode operation.

Note: The average efficiency calculation in this specification is based on the typical loading in datacenters, which includes the influence of redundant deployments. EPA continues to propose that all units be tested in their non-redundant configuration, if available, so that the average efficiency weightings can be applied post-test to calculate a final metric. EPA also proposes reporting of efficiency at each loading point on the power and performance datasheet (PPDS) so that customers will be able to estimate the efficiency at their particular loading and redundancy configuration.

D) UPS Operational Modes:

1) Normal Mode: Stable mode of operation that the UPS attains under the following conditions:

i) AC input supply is within required tolerances and supplies the UPS.

ii) The energy storage system remains charged or is under recharge.

iii) The load is within the specified rating of the UPS.

iv) The bypass is available and within specified tolerances (if applicable).

2) Stored Energy Mode: Stable mode of operation that the UPS attains under the following conditions:

i) AC input power is disconnected or is out of required tolerance.

ii) All power is derived from the energy storage system.

iii) The load is within the specified rating of the UPS.

3) Bypass Mode: Mode of operation that the UPS attains when operating the load supplied via the bypass only.

E) UPS Input Dependency Characteristics:

1) Voltage and Frequency Dependent (VFD): Capable of protecting the load from power outage.[3]

2) Voltage Independent (VI): Capable of protecting the load as required for VFD, above, and in addition from:

   i) Under-voltage applied continuously to the input

   ii) Over-voltage applied continuously to the input[4]

3) Voltage and Frequency Independent (VFI): Independent of voltage and frequency variations and capable of protecting the load against adverse effects from such variations without depleting the stored energy source.

4) Single-mode UPS: A UPS that functions within the parameters of only one set of input dependency characteristics. For example, a UPS that functions only as VFI.

5) Multi-mode UPS: A UPS that is able to function within the parameters of more than one set of input dependency characteristics. For example, a UPS that can function as either VFI or VFD.

Note: The above input dependency characteristics are used to classify UPSs for the purpose of meeting efficiency requirements, with more stringent requirements for higher degrees of input dependency. Although input dependency characteristics have been standardized in IEC 62040-3, EPA has noticed some variation in what manufacturers consider VFI or VFD, with several manufacturers sharing test results where line-interactive or passive-standby UPSs were listed as meeting the VFI classification. EPA will continue to coordinate with stakeholders, including Certification Bodies and manufacturers, in assuring the correct usage of all terminology used in the specification.

F) Other Terms:

1) Bypass: Power path alternative to the AC converter.

   a) Maintenance bypass (path): Alternative power path provided to maintain continuity of load power during maintenance activities.

   b) Static bypass (electronic bypass): Power path (primary or stand-by) alternative to the indirect AC converter where control is via an electronic power switch, for example transistors, thyristors, triacs or other semiconductor device or devices

G) Reference Test Load: Load or condition in which the output of the UPS delivers the active power (W) for which the UPS is rated.[5]

H) Unit Under Test (UUT): The UPS undergoing the test, configured as though for shipment to the customer, and including any accessories (e.g., filters or transformers) necessary to meet the test setup as specified in section 4 of the ENERGY STAR test method.

I) Acronyms:

1) A: Ampere

2) ac: Alternating Current

3 The output of the VFD UPS is dependent on changes in AC input voltage and frequency and is not intended to provide additional corrective functions, such as those arising from the use of tapped transformers.

4 An output voltage tolerance band narrower than input voltage window shall be defined by the manufacturer. The output of the VI UPS is dependent on AC input frequency and the output voltage shall remain within prescribed voltage limits (provided by additional corrective voltage functions, such as those arising from the use of active and/or passive circuits).

5 This definition permits the UPS output to be backfed into the input AC supply when in test-mode and subject to local regulations.

3) dc: Direct Current

4) THD: Total Harmonic Distortion

5) UPS: Uninterruptible Power Supply

6) UUT: Unit Under Test

7) V: Volt

8) VFD: Voltage and Frequency Dependent

9) VFI: Voltage and Frequency Independent

10) VI: Voltage Independent

11) W: Watt

12) Wh: Watt-hour

2 SCOPE

2.1 Included Products

2.1.1 Products that meet the following Uninterruptible Power Supply (UPS) definitions are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2.2.

i. Static and Rotary UPS;

ii. Consumer, Commercial, and Data Center UPS; and

iii. DC-output UPS/Rectifier.

2.1.2 Remanufactured and Refurbished Units: To qualify, a remanufactured or refurbished unit shall meet the ENERGY STAR specification for UPS products in effect at the time of refurbishment.

Note: EPA will not create a specific category for refurbished UPSs; however, it will continue to include them within the specification. Partners wishing to label refurbished units shall qualify them to the ENERGY STAR program requirements in effect at the time the units are refurbished for sale. Similar to other ENERGY STAR product categories with a large market for refurbished units, EPA is proposing that refurbished UPSs be qualified based on a standard combination of original model and refurbishment kit; this combination will represent a new model which must then be tested for qualification.

EPA welcomes additional stakeholder input regarding processes and criteria for refurbished units.

2.2 Excluded Products

2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible for qualification under this specification. The list of specifications currently in effect can be found at www.energystar.gov/products.

2.2.2 The following products are not eligible for qualification under this specification:

i. Products that are internal to a computer or another end-use load (e.g., battery-supplemented internal power supplies or battery backup for modems, security systems, etc.);

Note: EPA may consider distributed UPS systems and related novel technologies in a future specification revision. Whereas centralized systems use a small number of relatively large UPSs, distributed systems rely on small UPSs built into each end-use load, typically through integration with the server power supply. EPA welcomes comment on the application of distributed UPS systems and their associated market and energy savings potential.

ii. Industrial UPSs, Utility UPSs, Safety UPSs, and Cable TV UPSs.

3 QUALIFICATION CRITERIA

3.1 Significant Digits and Rounding

3.1.1 All calculations shall be carried out with directly measured (unrounded) values.

3.1.2 Unless otherwise specified, compliance with specification limits shall be evaluated using directly measured or calculated values without any benefit from rounding.

3.1.3 Directly measured or calculated values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.

3.2 Energy Efficiency Requirements for AC-output UPSs

3.2.1 Single-mode UPSs: Average loading-adjusted efficiency (Eff_{AVG}), as calculated per Equation 1, shall be greater than or equal to the Minimum Average Efficiency Requirement (Eff_{AVG_MIN}), as determined per Table 2, for the specified output power and input dependency characteristic.

Equation 1: Calculation of Average Efficiency for AC-output UPSs

$$Eff_{AVG} = t_{25\%} \times Eff|_{25\%} + t_{50\%} \times Eff|_{50\%} + t_{75\%} \times Eff|_{75\%} + t_{100\%} \times Eff|_{100\%}$$

Where:

- *Eff_{AVG} is the average loading-adjusted efficiency,*
- *$t_{n\%}$ is the proportion of time spent at the particular n% of the reference test load, as specified in the loading assumptions in Table 1.*
- *$Eff|_{n\%}$ is the efficiency at the particular n% of the reference test load, as measured according to the test method.*

Table 1: AC-output UPS Loading Assumptions for Calculating Average Efficiency

UPS Class	Output Power, P, in kilowatts (kW)	Proportion on of Time Spent at Specified Proportion of Reference Test Load, $t_{n\%}$			
		25%	50%	75%	100%
Consumer	**P ≤ 1.5 kW**	0.2	0.2	0.3	0.3
Commercial	**1.5 kW < P ≤ 10 kW**	0	0.3	0.4	0.3
Data Center	**P > 10 kW**	0.25	0.50	0.25	0

Note: As proposed in Draft 1 and discussed during the May 12 stakeholder meeting, EPA is basing its efficiency requirements on a calculated average efficiency using assumptions about typical UPS loads (i.e., the proportion of time spent at each loading point). EPA will qualify units based on this single-metric requirement but will also require that manufacturers report efficiency at each loading point on the Power and Performance Datasheet (see section 3.6).

The loading point assumptions provided in Table 1 are based on stakeholder suggestions and empirical data. In particular, stakeholders have suggested that Consumer UPSs used in home and small office/retail settings (output power less than or equal to 1.5 kW) are often heavily loaded when the protected equipment is operating. Consumers typically buy UPSs that align closely with their power needs and do not "overbuy" on capacity. However, many consumer UPSs will spend some amount of time without any loading when (for example) a personal computer is turned off but its UPS is left on.

Stakeholders mentioned the same purchasing trends apply to Commercial UPSs, such that both classes of UPSs have high proportions of time at high load. In contrast to Consumer UPSs, these larger Commercial units will rarely or never be operated without load. Therefore, the Commercial UPS loading profile is given no weight at the 25% loading point.

EPA has developed the loading profile for Data Center UPSs through consideration of information presented by stakeholders during the May 12 meeting, feedback from stakeholders received during the comment period, and a dataset collected by the ENERGY STAR Buildings and Plants Program during the development of its labeling program from 2008 to 2009. This data set includes UPS utilization information collected from 108 locations, with a mix of stand-alone data centers and data centers within larger buildings. Note that the resultant loading profile is the same as that proposed in Draft 1.

EPA continues to seek comment on the representativeness of the proposed loading profiles. Additionally, EPA is supportive of any industry initiatives to conduct a market study that would obtain up-to-date UPS loading data to be utilized during future specification revisions. EPA believes this would be very beneficial to both the ENERGY STAR UPS specification and to the UPS industry.

Table 2: AC-output UPS Minimum Average Efficiency Requirement

Minimum Average Efficiency Requirement (Eff_{AVG_MIN}), Where: **• P is the Output Power in watts (W), and** **• ln is the natural logarithm.**				
		Input Dependency		
UPS Class	**Output Power**	**VFD**	**VI**	**VFI**
Consumer	**P ≤ 1500 W**	0.97		
Commercial	**1500 W < P ≤ 10,000 W**	0.97	0.96	$0.0099 \times \ln(P) + 0.805$
Data Center	**P > 10,000 W**	0.97	0.95	$0.0099 \times \ln(P) + 0.805$

Note: For the Consumer class, EPA notes that purchasers are interested in a particular output rating and battery lifetime and are not likely to have a strong preference for VFI over other input dependency types. Accordingly, EPA has grouped all UPSs in the Consumer output power range together for purposes of comparing efficiencies. Because input dependency is an important consideration for Commercial and Data Center applications, EPA evaluated VFI, VI, and VFD separately for output powers greater than 1.5 kW.

In category/input dependency pairs where large amounts of data were available, the proposed levels reflect the performance of the top 25% of tested models. Data on VI and VFD Data Center units were more limited, but EPA recognizes that units in these categories tend to be quite efficient and levels have been set to recognize and further promote energy efficiency in these areas.

3.2.2 Multi-mode UPSs: Average loading-adjusted efficiency (Eff_{AVG}), as calculated per Equation 2, shall be greater than or equal to the Minimum Average Efficiency Requirement (Eff_{AVG_MIN}), as determined per Table 2, for the specified output power and lowest-input dependency mode provided by the Multi-mode UPS. Multi-mode UPS systems must ship with their highest-input dependency mode enabled by default.

Equation 2: Calculation of Average Efficiency for Multi-mode Ac-output UPSs

$$Eff_{AVG} = 0.75 \times Eff_1 + 0.25 \times Eff_2$$

Where:

- *Eff_{AVG} is the average loading-adjusted efficiency,*
- *Eff_1 is the average loading-adjusted efficiency in the lowest-input dependency mode (i.e., VFI or VI), as calculated per Equation 1.*
- *Eff_2 is the average loading-adjusted efficiency in the highest-input dependency mode (i.e., VFD), as calculated per Equation 1.*

Note: Despite the differences of opinion surrounding the qualification of Multi-mode UPSs, EPA sees the potential for significant energy savings and therefore is proposing to incentivize the qualification of multi-mode UPSs in Draft 2. In particular, they shall be tested in their highest- and lowest-input dependency mode. The efficiency used for qualification shall be a weighted average of the two modes and must surpass the efficiency requirement for the lowest-input dependency mode. The efficiency in both modes shall be reported on the power and performance datasheet (PPDS). EPA welcomes comments on this proposal.

3.3 Energy Efficiency Requirements for DC-output UPSs/Rectifiers

3.3.1 Average loading-adjusted efficiency (Eff_{AVG}), as calculated per Equation 3, shall be greater than or equal to the Minimum Average Efficiency Requirement (Eff_{AVG_MIN}), as determined per Table 3.

Equation 3: Calculation of Average Efficiency for All DC-output UPSs

$$Eff_{AVG} = \frac{Eff|_{30\%} + Eff|_{40\%} + Eff|_{50\%} + Eff|_{60\%} + Eff|_{70\%} + Eff|_{80\%}}{6}$$

Table 3: DC-output UPS/Rectifier Minimum Average Efficiency Requirement

Minimum Average Efficiency Requirement (Eff_{AVG_MIN})
0.955

Note: Data available on DC-output UPS systems was limited but sufficient to set an efficiency level. EPA recognizes that DC-output units tend to be quite efficient and a level has been set to recognize and further promote energy efficiency in this category. EPA welcomes comment on the above efficiency level and continues to encourage stakeholders to share DC-output UPS data.

3.4 Power Factor Requirements

Note: EPA analyzed available data and determined that units for which manufacturers shared test data had an average power factor of 0.98. Due to the high power factor achieved by current units and stakeholder feedback, EPA does not feel a power factor requirement is warranted in this version of the specification.

3.5 Toxicity and Recyclability/Recycled Content Requirements

3.5.1 UPSs shall contain restricted levels of lead (<1000ppm), mercury (<100ppm), cadmium (<100ppm), hexavalent chromium (<1000ppm), polybrominated biphenyls (PBB) (<1000ppm) or polybrominated diphenyl ethers (PBDE) (<1000ppm). Batteries are exempt.

Note: Consistent with the ENERGY STAR commitment to delivering energy efficiency along with the product features and functions that consumers value, EPA would like to ensure that the ENERGY STAR label is associated only with those products that meet minimum expectations for materials toxicity, recyclability, and recycled content where existing standards can be referenced. Adding this type of requirement extends a longstanding ENERGY STAR practice of addressing issues where existing standards can be leveraged, such as mercury in compact fluorescent lamps (CFLs). EPA anticipates that a manufacturer declaration would be required to demonstrate compliance with this requirement along with the maintenance of relevant quality assurance documentation.

The proposed toxicity requirement and compliance approach are consistent with the European Union RoHS Directive, which applies to IT and telecommunications equipment. The RoHS Directive, formally known as Directive 2002/95/EC of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment, was amended by 2005/618/EC and went into effect in 2006. Accordingly, products that currently meet the EU RoHS Directive would satisfy this toxicity requirement.

EPA has not identified any standards that address recyclability and/or including recycled content for this product category and, therefore, seeks additional feedback from stakeholders on whether any existing standards that address recycled content in and/or design for recyclability of products could apply to UPSs.

3.6 Standard Information Reporting Requirements

3.6.1 A standardized Power and Performance Data Sheet (PPDS) shall be completed for each ENERGY STAR qualified Uninterruptible Power Supply and posted with other product configuration information on the Partner's website. Partners are encouraged to provide one PPDS per qualified configuration.

3.6.2 If one PPDS is used to represent a Product Family, Partners are encouraged to provide a link to a more detailed power calculator where information on the power consumption of specific system configurations can be found.

Note: The PPDS for UPS products is still under development but a draft form has been released for review and comments from stakeholders. The draft PPDS is based in large part on Table D.1 in IEC 62040-3 Ed. 2.0 with the following EPA additions.

EPA encourages manufacturers to adopt typical 'best practices' that will minimize power consumption and increase the efficiency of data centers, such as designing UPSs that enable placement of batteries in the cooled data center areas while separating power consuming electronics outside in a utility room, where they can take advantage of free-air cooling. EPA proposes requiring manufacturers to include information in the PPDS about the separability of the UPS and battery.

EPA continues to evaluate the environmental impacts of UPS systems and understands that regulations and requirements for disposal of used batteries vary by country, state, and/or municipality. Considering the variation of requirements, EPA proposes that manufacturers report their own battery recycling programs within the U.S. on the ENERGY STAR Power and Performance Data Sheet.

Further, EPA welcomes suggestions regarding:

1. The best method for manufacturers to provide notification of battery recycling programs to their customers via the ENERGY STAR Power and Performance Data Sheet.

2. How to promote separable battery systems that decrease the air-conditioning burden of the UPS electronics.

3.6.3 Templates for the PPDS can be found on the new ENERGY STAR product specification development web page for Uninterruptible Power Supplies at http://www.energystar.gov/index.cfm?c=new_specs.uninterruptible_power_supplies. The PPDS contains the following information:

i. General Characteristics (e.g., manufacturer, model number, UPS configuration);

ii. Input Electrical Characteristics;

iii. Output Electrical Characteristics;

iv. Battery/Stored Energy Device; and

v. Power Profile.

Note: EPA is aware of the development of an International Electrotechnical Commission (IEC) lifecycle carbon assessment (LCA) standard (IEC 62040-4), the goal of which is to promote the reduction of environmental impact during the UPS unit life cycle.

3.6.4 EPA may periodically revise this template, as necessary, and will notify Partners of the revision process. Partners should always use the most recent version of the data sheet posted to the ENERGY STAR Web site.

3.7 Communication and Measurement Requirements

Note: EPA's ENERGY STAR commercial buildings program has been working for the past 4 years with the world's leading authorities on data center operations, as well as the leading operators of data centers, to explore ways to improve efficiency in these facilities. At the request of the data center industry, EPA developed an energy performance scale for data centers that now allows data centers to earn ENERGY STAR certification. EPA's consultations with the industry indicated that the ENERGY STAR scale should be based on the power usage effectiveness (PUE) metric, which requires the measurement of IT power or energy. Through further discussions, it was determined that the measurement of PUE should be of energy, not power, and that it should be taken at the output of the UPS to enable the largest number of data center operators to participate in the program. Since that time, both U.S. and global task forces of leading organizations in the data center industry have also agreed that these measurements should be of energy, and should be taken, at a minimum, at the output of the UPS. Despite this agreement though, this measurement remains difficult for many data center operators due to the lack of energy measurement capabilities embedded within the UPSs themselves.

EPA received many comments on the communication and energy measurement capabilities of UPS products. Most stakeholders indicated that in Consumer and Commercial applications either no metering is required or the display on the UPS is adequate for consumer needs. UPSs for these applications either do not provide metering or require an additional data interface card. Stakeholders indicated that a communication requirement has the potential to burden smaller UPS products with additional cost.

Communications capability is common in Datacenter UPSs; however, stakeholders commented that requiring meters to be placed on the output of UPS units could also lead to additional costs and power consumption.

EPA has heard these concerns and plans on holding a further discussion with UPS manufacturers about the ENERGY STAR Buildings and Plants program and the measurement of data center PUE. There are a number of options available in this area, such as including an efficiency level incentive for UPSs that are sold with a power meter, asking for information on ENERGY STAR Buildings to be provided to customers along with the option to purchase a meter, and others. This discussion will provide valuable input that will enable EPA to consider all the available options and come to a final decision that works for all concerned parties.

Additionally, EPA proposes that partners report the communication and measurement capability (either as-shipped or following installation of any necessary data interface cards) on the Power and Performance Data Sheet for all ENERGY STAR qualified UPS products.

EPA continues to welcome stakeholder suggestions for how to promote datacenter best practices within the ENERGY STAR UPS specification. For further details regarding the EPA ENERGY STAR Buildings Program for data centers, please visit www.energystar.gov/datacenters.

4 TESTING

4.1 Test Methods

4.1.1 When testing UPSs, the test methods identified in Table 4 shall be used to determine ENERGY STAR qualification.

Table 4: Test Methods for ENERGY STAR Qualification

Product Type	Test Method
All UPSs	ENERGY STAR Test Method for Uninterruptible Power Supplies, Rev. Oct-2011
AC-output UPSs	International Electrotechnical Commission (IEC) Standard 62040-3: Method of Specifying the Performance and Test Requirements. Ed. 2.0.
DC-output UPS/Rectifiers	ATIS Standard 0600015.2009: Energy Efficiency for Telecommunication Equipment: Methodology for Measurement and Reporting – General Requirements AND ATIS Standard 0600015.04.2010: Energy Efficiency for Telecommunication Equipment: Methodology for Measurement and Reporting DC Power Plant – Rectifier Requirements

Note: EPA has consulted with DOE regarding the applicability of the DOE Battery Chargers test method to Consumer UPS systems in the ENERGY STAR UPS specification. EPA and DOE believe that the scopes of the two programs differ: the DOE test method is designed to test the battery charging aspects of Consumer UPSs, while the ENERGY STAR test method evaluates the functionality of the full UPS product. Accordingly, the DOE Battery Chargers test method will not be incorporated into the ENERGY STAR UPS specification.

4.2 Number of Units Required for Testing

4.2.1 Representative Models shall be selected for testing per the following requirements:

i. For qualification of an individual product model, a product configuration equivalent to that which is intended to be marketed and labeled as ENERGY STAR is considered the Representative Model;

ii. For qualification of a Modular UPS, both the maximum and minimum configurations that are intended to be marketed and labeled as ENERGY STAR are considered Representative Models.

Note: EPA received stakeholder comments concerning Representative Models and the potential for manufacturing variation from unit to unit within the same model, leading to efficiency differences. In particular, stakeholders noted that this variation may affect a model's ability to meet efficiency requirements. EPA welcomes further information regarding potential efficiency variation from unit to unit within the same model. EPA also welcomes stakeholder suggestions on ways to minimize the impacts of testing variation within the constraints of the Third Party Certification process described at www.energystar.gov/testingandverification, including testing multiple units during qualification.

5 EFFECTIVE DATE

5.1.1 Effective Date: The Version 1.0 ENERGY STAR UPS specification shall take effect on the date specified in Table 5. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on its date of manufacture. The date of manufacture is specific to each unit and is the date (e.g., month and year) on which a unit is considered to be completely assembled.

5.1.2 Future Specification Revisions: EPA reserves the right to change this specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through stakeholder discussions. In the event of a specification revision, please note that the ENERGY STAR qualification is not automatically granted for the life of a product model.

i. Power Factor: Although EPA has found that currently existing UPSs have high power factor and no power factor requirements are necessary, EPA will continue to evaluate the power factor of UPSs and may consider requirements in the future if necessary to promote energy savings.

ii. Life-cycle Assessment: EPA has decided to omit LCA reporting requirements from Version 1.0 of the ENERGY STAR specification but may reconsider them in future revisions once IEC 62040-4 has been finalized.

Table 5: Specification Effective Date

Effective Date
October 14, 2011