

ENERGY STAR® for UPS Final Draft - APC by Schneider Electric Comments

Jim Spitaels – April 24, 2012

Introduction

Thank you for allowing APC by Schneider Electric to provide input into the ENERGY STAR for UPS specification development process. This document summarizes our comments and suggestions on the Final Draft specification and the associated Test Method. We are appreciative for the consideration shown to our earlier comments and the collaborative process used by EPA and its consultants throughout the entire specification and test method development process. We look forward to continued productive dialog with EPA on the PPDS and the selector tool.

Comments and Suggestions

1. We support the changes to the loading profiles for VI and VFI UPSs rated $\leq 1.5\text{kW}$

We believe that the new loading profiles more accurately reflect the largely commercial usage of these products.

2. We appreciate the revised efficiency requirements for VFD UPSs rated $\leq 1.5\text{ kW}$ and VI UPSs rated $\leq 10\text{ kW}$ and the retention of Draft 3 requirements for VFI UPSs rated $> 10\text{ kW}$

- The revised requirement for VFD and VI UPS will go a long way toward addressing our concerns about test repeatability and unit-to-unit variation.
- Increasing the VFI requirements below 10 kW, and not penalizing VFI UPSs rated $> 10\text{ kW}$, was the most appropriate solution to the potential over qualification issue for VFI UPSs.

3. We agree with the proposed change that only UPSs that qualify by use of multi mode averaging should have to ship in their highest input dependency mode

However, we believe that the language in the Final Draft doesn't appropriately consider tri-mode (VFD, VI, VFI) UPSs. As written, it seems that if such a UPS shipped in VI mode, it could qualify based on only its VI and VFD performance. To address this issue, and avoid conflict with language elsewhere in the specification and test method, we suggest changing the word "default" on line 228 of the specification to "lowest".

4. We agree that manufacturers should be allowed to define the minimum and maximum system configurations for modular UPSs

This change will allow subsets of product lines to qualify and avoid testing of configurations that aren't sold.

5. We agree with the proposed Power Factor requirements and definitions

Testing only at full resistive load for VI and VFI UPSs is in keeping with IEC 62040-3 Ed. 2 and avoiding such testing for VFD UPSs seems logical.

6. We believe that the final metering and communications requirements are a good compromise

- The external metering requirements are reasonable and clearly stated.
- The integral metering requirements are also appropriate, achievable and clearly stated.

7. We don't support the inclusion of 415Y/240 V ac at 50 Hz in the test method

Table 1 has multiple purposes: (1) to ensure that products only have to be tested at one voltage and frequency combination, (2) to ensure that all manufacturers test similar products at the same voltage and frequency combination and (3) to ensure that the voltage and frequency combination used for testing is the most relevant choice for the market in which the product is sold. Because most UPSs intended for sale in Europe can operate at 415Y/240 V ac and 50 Hz, but will most likely be used at 400Y/230V ac and 50 Hz, the inclusion of 415Y/240 V ac 50 Hz in Table 1 violates purpose (3) above. Additionally, it is likely that the European Union will require UPSs to be tested at 400Y/230V ac and 50 Hz, so the retention of 415Y/240 V ac 50 Hz in Table 1 could require separate and redundant testing for European ENERGY STAR. Note that if a UPS were capable only of operating at 415Y/240 V ac and 50 Hz, section 3.B.1 would still allow it to be qualified, even if this combination is not included in Table 1.

8. We suggest the following Specification edits

- Replace the phrase “output power” with “rated output power” in all text and tables for clarity
- Omit the RUPS definition (as it is not referenced elsewhere) or reword it as follows: A rotary UPS that supplies power to the load during an input power failure without the use of an integral diesel engine.
- Omit the DRUPS definition (as it is not referenced elsewhere) or reword as follows: A rotary UPS that supplies power to the load during an input power failure via the use of an integral diesel engine.
- Replace the word “component” with “subsystem” on line 31 as a rectifier is not a single component.
- Refer to the standard as 62040-3:2011 in footnote 1 for clarity
- Remove section 1.C as redundancy is only relevant for modular UPSs in the current version of the specification. Alternatively add a definition for “Parallel UPS” and reword section 1.C to apply equally to parallel, modular and parallel modular UPS systems.
- Line 94 should reference section 3 of the test method. A footnote citation for the test method might be useful for clarity here as well.
- On Line 100 replace “Redundancy” with “Redundancy level”. Alternatively redundancy may not need to be included in the product family definition as it probably achieved by the already permitted variation in the number of installed modules.
- Line 101 should read “Type and quantity of input and output filters” to be more general
- Lines 148-9 should be reworded as follows to cover additional applications such as nuclear power plants and oil rigs “Industrial UPSs specifically designed to protect critical control, manufacturing or production processes or operations.”
- Please consider expanding section 2.2.2 to exclude UPSs designed for mobile, ship board, marine or airborne applications as these UPSs have unique features and requirements which may adversely impact their efficiency and/or complicate their testing.
- For consistency and to avoid confusion, the definition of P in Table 1 should be in Watts like Table 2, and the ranges in column 1 should be adjusted accordingly.
- All percentage columns in Table 1 should show 2 decimal places for consistency.
- Line 239 should be reworded “... for the specified **output power and lowest** input dependency characteristic.” Alternatively, section 3.2.2.iii should be separated into sections 3.2.2.iii and 3.2.2.iv covering the meter allowance variants of sections 3.2.2.i and 3.2.2.ii respectively.
- On Line 307, insert the word “tested” before the word “maximum” for clarity.

9. We suggest the following Test Method edits

- Line 89 should be reworded "... at both their **the vendor specified** maximum and minimum ..." to avoid conflict with the specification
- Section 4.2.C should be reworded "Modular UPSs tested at their minimum and maximum non-redundant configurations shall be tested with redundant components (e.g., fans, controllers, etc.) **of** **for** the vacant module slots functioning according to the unit's as-shipped default behavior."
- Section 4.2.D should be reworded "Back-feeding the **UPS source** may be used in place of a test load during testing of UPS systems larger than 100 kW output, **provided that an output power factor ≥ 0.99 is maintained at all times.**" to be consistent with Section J.2.2.d of IEC 62040-3 Ed. 2.
- Sections 4.2.E and 4.2.G.2 are potentially in conflict. To rectify this, we suggest that section 4.2.E be reworded "The UPS's ~~firmware~~ shall not be modified **or adjusted** to disable energy storage charging features ~~such as energy storage self test and trickle charging~~. Note that some UPSs require that automatic battery tests be disabled to ensure that the UPS stays in normal mode during testing.
- Section 4.2.G.1 should allow other documents besides the user manual to give guidance on battery disconnection during testing. We suggest the following changes to line 111 "... the user manual **or other public documents** ~~does do~~ not advise ..."
- Line 128 should be clarified "... after the ~~charge indicator~~ **fully charged indication** is present."
- Line 129 should be clarified "If there is no **state of** charge indicator ..."
- Section 4.2.G.3.b should be reworded "For battery operated UPSs, if the UPS is shipped with a battery, that battery shall be used for testing. Otherwise, the manufacturer may select ~~which battery is used for the test a~~ **battery for testing**, ~~which~~ **Details regarding the selected battery** shall be ~~referenced~~ **included** in the PPDS and documented in the test reporting template. These ~~units will~~ **batteries are** not be required to ship with the ~~battery chosen for testing~~ **UPS.**"
- Section 5.B.1 strike "using a power meter" as it is incorrect and redundant.
- Section 5.B.2 reword as follows for clarity and accuracy "Calculate the unit's average **input and output** power in watts (W) ~~over the 5 minute period~~ using Equation 1."
- Section 5.B.3 reword as follows for clarity and accuracy "Calculate the unit's efficiency ~~over the 5 minute period~~ using Equation 2."
- Section 5.B.3 reword as follows for clarity and accuracy "Repeat steps 1 to 3 ~~for another 5 minute measurement~~ **to get another efficiency calculation.**"
- Section 5.B.7 should have formulas and possibly an example.
- Section 5.B.8 reword as follows for clarity and accuracy "If the ~~absolute value of the difference between the efficiency calculations is greater than or equal to one percent of their average~~ **unit is not at steady-state**, repeat steps 4 to 6 until the unit is ~~considered to be~~ at steady-state. Record the appropriate values in the test reporting template.
- Section 5.C.1 reword as follows: "Test the UUT at the following reference test load conditions **in the specified order:**"
- Section 5.C.2 reword as follows: "The test shall be performed at each of the reference test loads by simultaneously ~~accumulating~~ **measuring** the unit's total input and output energy in Wh over a 15 minute test period, then ~~determining~~ the unit's **average input and output powers** for the period **shall be calculated** using Equation 1 **and the unit's efficiency shall be calculated using Equation 2.**
- Section 5.B.3 reword as follows for clarity and accuracy "Measure and record all the applicable parameters listed in the test reporting template for each Ac-output/Dc-output UPS test performed, ~~including the~~ **For** Ac-output UPSs, **also record the declared** input dependency characteristic (AAA) in the tested modes, as specified in Section 5.3.4 of IEC standard 62040-3, Ed. 2.0."

10. We still believe that further work on the data reporting forms and PPDS is required and we support EPA's stated objectives in this regard

These documents should continue to evolve until a few products are piloted through the CB test and submittal processes, the data is analysed and EPA's proposed electronic comparison tool is at least prototyped.

11. We continue to support EPA's decision to focus the Version 1 specification primarily on efficiency and use phase energy

We believe that other issues such as material content, recycling and embedded carbon will be more comprehensively dealt with by the emerging IEC 62040-4 standard.

Conclusion

Thank you again for allowing APC by Schneider Electric to provide input into the ENERGY STAR UPS Specification and Test Method. We have enjoyed working closely with EPA on these initial documents and we look forward to further collaboration on future revisions.

Please contact Jim Spitaels via email at jspitael@apcc.com with any questions or concerns you may have regarding these comments or any of our earlier presentations or correspondence.