

ENERGY STAR® for UPS - Draft 3 Initial APC Comments

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Thank you for the opportunity to comment!

- The spec development process continues to work well
- We look forward to continued dialog and cooperation with EPA
- We support the majority of the Draft 3 documents and will submit more detailed written comments by November 22

Loading Assumptions

- Commercial UPSs exist at power levels at or below 1.5 kW
- Because commercial UPSs are optimized for use at higher loads, we believe that commercial UPSs rated ≤ 1.5 kW should have the same weighting factors as (commercial) 1.5 kW to 10 kW UPSs, as shown in this updated version of Table 1

Output Power	Proportion of Time Spent at Specified Proportion of Reference Test Load, $t_n\%$			
	25%	50%	75%	100%
Consumer $P \leq 1.5$ kW	0.2	0.2	0.3	0.3
Commercial $P \leq 1.5$ kW	0	0.3	0.4	0.3
1.5 kW $< P \leq 10$ kW	0	0.3	0.4	0.3
$P > 10$ kW	0.25	0.5	0.25	0

Efficiency Requirements

- We continue to believe that the proposed efficiency requirements are too high for VFD and VI UPS $\leq 1.5\text{kW}$
 - While the percentage of passing UPSs looks acceptable (~25%), the margin of passing is so small that vendors are unlikely to qualify products and risk failing verification tests later
 - Testing accuracy is only 0.5% which is similar to the margin of the average passing UPS
 - VFD and VI UPSs need (at least 0.5%) more margin
- We propose the following changes to Table 2:

Output Power	Input Dependency		
	VFD	VI	VFI
$P \leq 1.5 \text{ kW}$	0.965		$0.0099 \times \ln(P) + 0.805$
$1.5 \text{ kW} < P \leq 10 \text{ kW}$	0.97	0.96	
$P > 10 \text{ kW}$	0.97	0.95	

Metering Credit

- We support the 2% credit for UPS > 10 kW
- We believe that there is value in output energy metering for UPSs of all sizes (you can't minimize what you don't measure)
- Therefore we suggest a 1% credit for UPSs ≤ 10 kW as shown in this updated version of Table 3:

Output Power	Input Dependency		
	VFD	VI	VFI
$P \leq 1.5$ kW	0.955		$0.0099 \times \ln(P) + 0.795$
1.5 kW < $P \leq 10$ kW	0.96	0.95	
$P > 10$ kW	0.95	0.93	$0.0099 \times \ln(P) + 0.785$

Metering Requirements Unclear

- Accuracy and resolution requirements are not stated
 - We recommend power accuracy $\pm 5\%$ of system rating for loads above 10%
- Unclear if meter must include current and/or voltage transducers, power supply and/or enclosure
 - Due to variability of installation, we recommend that only the meter is required
- Unclear if meter must have a display (as opposed to just a communications interface)
 - We recommend that a local kWh display be required
- Unclear if or how the meter must communicate
 - For UPSs > 10 kW we recommend Modbus RTU over 2 wire RS-485, Modbus TCP over Ethernet or SNMP (v1, 2 or 3) over Ethernet
 - For UPSs ≤ 10 kW we recommend no communications requirement (just local display)
- Metering specifications would be documented on the PPDS

Multiple-normal-mode UPSs

- All supported normal modes should be listed on PPDS
 - Including modes not tested
- Efficiency at each load step, for every tested normal mode, should appear on the PPDS
- UPSs that can qualify in their lowest input dependency normal mode, should not have to ship in their highest input dependency normal mode
 - For example, a multiple-normal-mode UPS with VFI performance sufficient to qualify by equation 1, should have to test and report both VFI and VFD performance, but should not have to ship in VFD mode
- If this change is not accepted, some vendors may remove high efficiency normal modes rather than put customers' business critical systems at risk

Modular UPSs

- Manufacturer should be allowed to define min and max system configurations and they should be listed on the PPDS
 - Manufacturers shouldn't have to test configurations they don't sell
 - A system capable of 20 power modules isn't cost effective with 1 or 2
 - Due to the fact that VFI requirements increase with system capacity, it's possible that smaller configurations would pass while larger ones would not
 - For example, a 92.5% efficient modular VFD UPS ranging from 50 – 500 kW would not qualify even though configurations below 250 kW are above the requirements of Draft 3
 - Similar concerns could exist for systems that span requirements boundaries
 - For example, a 95.5% efficient modular VI UPS ranging from 2 – 16 kW would not qualify even though 12, 14 and 16 kW configurations are above the 95% requirement of Draft 3
- Unreasonable to disqualify an entire product family because some members don't qualify
- Could force manufacturers to block or eliminate slots in order to qualify

Power Factor

- Definition should be added
 - Power Factor = $P / S = \text{Watts} / (\text{Volts} \times \text{Amps})$
- The abbreviation PF may also be desirable
 - Section J should be renamed Abbreviations as none of the terms listed are acronyms
- Requirements should be clarified
 - Input power factor with 100% resistive load shall be greater than or equal to 0.90 in every tested normal mode

Test Procedure

- Not identical to IEC 62040-3 but should be possible to gather IEC and ENERGY STAR data simultaneously
 - Small possibility of different results remains
- To ensure repeatability by third parties, the battery part number(s) and quantities, along with their connection status during testing should be documented on the PPDS
- Average power measurement needs to be defined in step 5A:
 - $P_{avg} = \text{Energy} / \text{Time}$
 - Energy integration rate should be specified
- Efficiency needs to be defined in step 5B:
 - Efficiency = Output Average Power / Input Average Power
- Appendix A seems to be missing

Thank you!