



Setting Standards for Excellence

April 2, 2010

NEMA Comments on Energy Star UPS Framework Document

Thank you for the opportunity to provide the following comments on the behalf of the Power Electronics Section of the National Electrical Manufacturers Association (NEMA).

NEMA is the trade association of choice for the electrical manufacturing industry. Its 400 member companies manufacture products used in the generation, transmission and distribution, control, and end-use of electricity. These products are used in utility, medical imaging, industrial, commercial, institutional, and residential applications. Domestic production of electrical products sold worldwide exceeds \$120 billion.

NEMA's Power Electronics Section represents U.S. companies manufacturing and selling Uninterruptible Power Supply units worldwide. Section members are the authorities on UPS products and we should serve as a primary resource for the Environmental Protection Agency (EPA) in the development of the Energy Star program requirements.

Definitions

We are pleased that "EPA prefers to make use of existing definitions that are generally accepted by industry."

As discussed on the March 24 teleconference with stakeholders, the International Electrotechnical Commission (IEC) is developing a revised version of the comprehensive international standard for UPS, IEC 62040-3.

Only "performance classifications" from IEC 62040-3 (eg: VFI, VI, VFD, etc.) should be defined and used. This enables innovation and keeps the specification current. All other definitions should come from IEC 62040-3 CDV and, if necessary, IEC 60050 (IEV).

Topologies should only be included in the Energy Star specification to the extent that they provide examples of technologies that implement the IEC 62040-3 performance classifications.

Question 3 - "Eco-Modes"

EPA expresses interest in learning more about various "eco-modes" and if and how they should be referenced in the Energy Star program. Typical eco-modes are usually the equivalent of running the UPS in bypass. If the eco-mode can be shown to provide the same performance characteristics as full blown UPS operation, it can be considered to be a normal mode. However, Energy Star definitions of "eco-mode" will only serve to limit the industry and not enhance its ability to create more efficient UPS units.

NEMA recommends that a UPS unit's energy efficiency be evaluated by Energy Star in its highest performance classification mode only.

Question 4 - Standard Load Conditions

Efficiency/losses and input power factor data should be gathered at 0, 10, 25, 50, 75 and 100 percent of output power rating (in watts) using balanced resistive loading.

Question 5 - Measuring and Quantifying Power Conditioning

There isn't an "industry accepted" method to measure and quantify power conditioning because the "right size" always comes as a customer request to meet the consumer needs and margins.

The IEC62040-3 document does not specify power conditioning but does specify the range of the output voltage and classifies it. Using the definitions in the latest draft of IEC 62040-3, one can get a feel for the types of UPS available and how they function as far as output performance and dependence upon utility parameters. Right-sizing would depend upon the types of loads being fed (and their power requirements) and the type of redundancy / fault tolerance required by the particular application.

Question 6 - Environmental Requirements

Energy Star should not have any environmental requirements in Version 1.0 of the specification. A multi-year effort is just beginning at the international level (IEC 62040-4) to define such requirements for UPS units. Upon completion of this standard, it would be appropriate for Energy Star to consider harmonization with it.

Eligible Product Categories

In principle, NEMA is comfortable with an Energy Star program that would cover all types of low-voltage AC UPSs (i.e. 600 volts and below, static and rotary) only, provided that sufficient data is collected for each type.

Special categories, such as for medical or industrial, should not be considered for the Energy Star program at this time. These types are not relevant for data centers, small/home office and home entertainment, which are the current focus for the Energy Star program.

Modular UPSs need to be included in the version 1 specification. Ideally, for systems that use varying numbers of identical components operating in the same mode simultaneously, if a small configuration and a large configuration pass, then all intermediate system configurations (of the same redundancy level) should be deemed as passing without requiring testing of every possible permutation.

Question 1 - Market Segmentation

EPA asks, “Aside from output rating, what are some other means of segmenting the UPS market? Would market segmentation by input power phase (single- versus three-phase) more effectively classify devices according to end-use application?”

NEMA recommends that Energy Star should first segment by performance classification. The second segmentation could be by output-power rating. The data Energy Star receives may indicate additional segmentation, such as by output voltage and single-phase vs. multi-phase.

Question 2 - Biggest Opportunities for Energy Savings

There are wide variations in topology, base technology, and load range for UPS devices.

Energy Star should include small UPS units, but there are greater opportunities for energy savings in the larger units.

Question 3 - Upcoming Technologies

In the future, Energy Star may want to consider inclusion of the solar or wind power assist for stored energy recharge/input power reduction. However, upcoming technologies should be included in the Energy Star specification only after they have been introduced into the market, not before.

By basing the Energy Star specification on performance categories rather than topologies, Energy Star will be much better able to accommodate future technologies without change.

Energy Efficiency Criteria and Test Procedures

As noted above, Energy Star should adopt the test methods from IEC 62040-3 CDV.

All testing should be with nominal voltage and frequency input and balanced resistive load output (most typical and repeatable, other conditions will only have a slight effect on efficiency).

Only normal mode(s) should be tested. This is the mode that typically has the most losses, so is the most amenable to achieving energy savings. Other modes, like stored energy and failure bypass, are only used less than 1 percent of the time, so they are not relevant from an energy savings perspective.

Products that operate at multiple input voltages should have to be tested at every name plate voltage on this list: 120V-60Hz, 208V-60Hz, 230V-50Hz, 208/120V-60Hz, 400/230V-50Hz, 415/240V-60Hz, 480/277V-60Hz, 600/346V-60Hz. These values represent the middle points of typical voltage ranges and will serve to limit costly testing.

Disconnecting the stored energy subsystem during testing must be allowed, since this avoids issues related to battery state of charge and gives results similar to long term energy testing in a fraction of the time.

Question 2 - Energy Consumption Across Operational States

As noted above, 99 percent of the time the UPS operates in the Normal Mode as defined in the framework document. Therefore, normal mode represents the best opportunity for savings.

Question 3 - Oversizing

EPA notes that “research indicates that UPSs designed for partial loads are typically oversized. What requirements can be put in place to avoid over sizing and improve energy efficiency?”

There are valid reasons for oversizing (e.g. extended run-time, reliability, future load growth). Energy Star should seek to increase efficiency at all load points to mitigate the effects of “oversizing”.

Question 4 - Modularity and Scaling

See comments in previous section.

Questions 5 & 6 - Additional Test Procedures

Energy Star should follow the procedures in IEC 62040-3 CDV and those made in the test procedure section of these comments.

Question 7 -Typical Loading Ranges

See our comments above on over sizing.

Question 8 - Value Added Resellers (VARs)

Resellers account for a sizable percentage of sales in the market and they may make system modifications which may impact the overall energy performance of the system, but not typically the UPS.

Information and Management Requirements

Energy Star should refer to Annex J, clause J4 of IEC 62040-3 CDV, Test Report, and elements of Annex D.6, Purchaser Specification Guidelines, UPS Technical Data Sheet.

Question 4 - Measurement and Communication

There is a wide variety of ways to communicate, from very basic to very advanced. Most of this is based on intended market. Capabilities vary widely and there is no dominant protocol or list of measurements. Thus, we recommend that this not be a concern in Version 1 of the specification.

Question 5 - Defining Utilization

Utilization could be defined as percentage of load that is being used: the higher of output watts over rated watts or output VA over rated VA.

Conclusion

Thank you for the opportunity to provide comments on the draft framework. We at NEMA look forward to further and frequent opportunities to communicate with Energy Star on this important initiative and provide our member companies' expertise as UPS manufacturers.

If you have any questions or other follow-up needs regarding any of the comments above, please contact Craig Updyke at NEMA at cra_updyke@nema.org or 703 841 3294.