

Rack-mount Power Distribution Units and UL 60950-1



Overview

The intent of this document is to define UL-60950-1, provide an overview of this standard as it applies to rackmount power distribution units (PDUs). In addition the document will discuss the impact of products that may or may not comply with this standard as they relate to end-user implementation.

Introduction

As data centers become more complex and as more companies invest millions of dollars into data center integrity and safety, the need for equipment that has been tested to applicable standards is widely recognized. These standards ensure uptime, network and human safety. Standards such as UL 60950-1 are beginning to make an impact on design and implementation of IT equipment in the data center, yet products are still widely available that have not been redesigned to be compliant with this standard or have not been tested to this standard.

What is UL 60950-1?

UL 60950-1 Information Technology Equipment - Safety - Part 1.

This standard is applicable to mains-powered or battery-powered information technology equipment, including electrical business equipment and associated equipment.

[<http://ulstandardsinfontet.ul.com/scopes/scopes.asp?fn=60950-1.html>]

UL-60950-1 is a relatively new Underwriters Laboratory (UL) standard that applies to Information Technology Equipment installed and implemented in the data center. "Rackmount powerstrips", analogous to some as power distribution units (PDUs), fall into this category of equipment as defined by UL. Potentially the most impacting piece of the standard, as it applies to PDUs in relation to data center safety, is the branch circuit protection. Branch circuit protection requires that all outlets and receptacles be protected by an Overcurrent Protection Device such as a circuit breaker or fuse rated at or set at no more than the rating of the outlet or receptacle. This allows for compliance with the National Electric Code and engenders one of the main characteristic of differentiation

between PDUs that comply with the standard –vs. – PDUs that may only be UL Recognized, comply with legacy standards or may have no UL Certification.

Why is UL-60950-1 important when implementing PDUs in data centers?

It is important to note that non-UL certified PDUs, and PDUs that do not comply with applicable standards, may work for specific applications and within certain environments. However, it is equally important to understand that if approved branch circuit protection is not used within the data center environment, the following may happen:

- *Claims Payment:* Fire or damage created or contributed by a rackmount PDU that is not certified by an applicable agency in compliance with its intended use may be denied or reduced by the provider issuing property and/or casualty insurance
- *Local Code Violations:* Building inspectors who seek to enforce compliance of NEC codes and local or state civil codes may find PDUs that have not been designed to UL 60950-1 standards in violation of branch circuit protection safety requirements.
- *Insurance Risks:* An organization that installs, sells, manufactures or distributes PDUs that do not meet UL 60950-1's requirements for branch circuit protection and/or have not sought the appropriate listing to verify compliance may increase limitations of liability, may face reductions of coverage, may incur higher premiums or may face losing general liability insurance, altogether.

The Technicalities of UL 60950-1

- All products, utilized for Information Technology Equipment, submitted for UL certification, must meet the standards of UL 60950-1. PDUs fall into this classification
- PDUs certified to the standard & the National Electric Code (NEC) must have branch circuit protection for the receptacles
- The standard requires that all outlets and receptacles be protected by an Overcurrent Protection Device such as a circuit breaker or fuse rated at or set at no more than the rating of the outlet or receptacle
- The standard does not allow for the use of "supplementary" Overcurrent Protection Device for the

branch circuit. Supplementary Overcurrent Protection Device is defined as any device not integrated into the PDU or upstream of the PDU, between the primary distribution panel and the PDU, that is intended to provide some type of overcurrent protection to multiple branch circuits.

- The Overcurrent Protection Device such as a fuse or circuit breaker must be compliant with the NEC, ANSI/NFPA 70
- For PDUs with multiple branch circuits, an overload protection device such as an approved fuse or circuit breaker must reside inside the PDU for each branch circuit.
- 30-amp PDUs must have a UL 489 breaker or a UL #248 fuse complying with JDDZ categorization. This coupled with the need for individual branch circuit protection intrinsically adds more component cost to the PDU itself.

Why are many rack and enclosure manufacturers demanding that their ODM/OEM suppliers of PDUs now be compliant with UL 60950?

In order to provide insight prior to developing an answer to this question, one must first understand the difference between UL recognized and UL Listed. UL recognized is a component to be used in the construction of another product. A UL Listed product is complete in its entirety and can be used by the purchaser.

An example of this may be the purchaser of an Uninterruptible Power Supply (UPS) who examines the UPS and finds a UL Listing Mark on the product indicating the product meets the standards outlined in UL 1778, Uninterruptible Power Systems (UPS).

[\[http://ulstandardsinfolnet.ul.com/scopes/scopes.asp?fn=1778.html\]](http://ulstandardsinfolnet.ul.com/scopes/scopes.asp?fn=1778.html)

The same customer may purchase another brand of UPS and after careful evaluation notice the unit does not have a UL Listing mark, however, recognizes the fan inside the unit and digital display have the UL Recognized Component marks. The purchaser decides to contact the manufacturer to inquire about the safety of the product and the manufacturer claims that the product was built with UL Recognized components, therefore "must" meet the requirements to be UL Listed. But this is not necessarily the case, because the UL Recognized component means the component alone meets the requirement for a specific, limited use.

This concept has impacted many data center enclosure manufacturers who have obtained and/or are seeking UL 60950-1 certification for their newest products. In the ultra-competitive data center enclosure industry, many manufacturers are starting to differentiate by offering value-added services such as installing PDUs into the cabinet prior to shipping, which benefits the customer by decreasing the mean time of installation. Thus, if installed in the unit prior to shipping, the PDU becomes part of the UL 60950-1 enclosure "system",.

Herein lies the crux of the issue: Does the enclosure now have to remove its UL Listed label if the PDU, that has been installed prior to shipment, is not UL 60950-1 Listed? Arno Zandbergen, Product Manager for Great Lakes Case and Cabinet believes so:

"We have spent considerable time and effort pursuing and obtaining the most applicable data center safety standard for our enclosures, UL 60950-1. We have discussed this with our UL liaisons and have been advised that installing PDUs without the associated UL 60950-1 listing would require the removal of the UL Listing sticker from the enclosure prior to shipment. Not only does UL 60950-1 offer improvements in branch circuit protection that directly affects safety, we believe our customers should be afforded the ability to know that the enclosure has obtained this standard by viewing the UL Listing mark. We believe in providing the added value of installed PDUs and it would not make sense for us to offer anything other than a PDU that has obtained this listing. Therefore, we now require and have obtained this certification for our entire PDU offering."

This demand by these enclosure producers may not only be based solely on the attraction to the extra branch circuit protection afforded by the standard, but may also be because the producers are desirous to be in complete compliance with UL and its guidelines at all times, regardless of local interpretation.

Why aren't many manufacturers offering power strips or PDUs with the UL-60950-1 certification?

- Cost – Redesign costs may include new UL fees, potential case redesign, more costly component costs associated with branch circuit protection requirements and the need to utilize UL 489 breakers are potentially viewed as decreasing product margins.
- Market Awareness/Complexity- Many companies find it difficult to navigate through the maze of design and safety standards, therefore applicable certifications may not be pursued, may not be understood and may not be required.

- Timing – Many products may currently be undergoing development and testing to the standard, however, may not be available for shipment to customers

Summary and Availability

The market is still flooded with PDUs that are UL Recognized Components and may only be compliant with UL 1363 or may have no certification at all. Based upon safety requirements for branch circuit protection and potential avoidance of liability, it may be prudent that UL 60950-1 PDUs be required. Para Systems, Inc. manufacturer of a variety of power technology products, offers a full line of vertical, horizontal, amp-metered and non-amp-metered PDUs in various amperages that are UL-60950-1 listed and provide the industry-leading "cost to features ratio".