

What National Standards Are Applicable to SPDs?

Listing

In the USA, with the exception of utility and rail industries, all AC power connected SPDs must be installed in accordance with NEC wiring rules. This requires that the product be listed for such a purpose. To be "listed", an SPD must be approved by a Nationally Accredited Testing Laboratory (NTL). One example of a NTL listing service is Underwriters Laboratories Inc. (UL).

UL 1449 Edition 2

The primary concern of UL is safety. To this end they have developed a Standard "UL 1449 Edition 2 Standard for Safety, Transient Voltage Surge Suppressors" for the testing of TVSS/SPDs. Under Edition 2 of this Standard, an SPD is taken through an extensive test regimen to ensure that it will not pose a safety hazard under normal operations as well as under potential failure modes, such as abnormal utility supply events.

UL 1449 is not considered a performance standard, but it does assign a Suppressed Voltage Rating to the SPD being tested. To some extent this allows the performance of two SPDs to be compared, however it is important to note that this test is conducted at a very low energy level to accommodate the smaller SPDs on the market. It does not adequately demonstrate performance for branch and service entrance products.

A shortcoming of UL 1449 is that it only requires products to remain operational on voltages up to 110% of nominal. SPDs are allowed to (safely) permanently fail if voltage exceeds this. To limit the possibility of frequent SPD replacements due to TOV, it is recommended that customers additionally specify that the Maximum Continuous Operating Voltage be at least 125% of nominal. Further reliability can be gained by using products with CRITEC TD technology, which extends the MCOV to between 140-200% of the nominal supply voltage.

It is also important to note that UL 1449 does not test that an SPD meets the manufacturer's claimed surge rating. While this may appear a severe oversight on the part of the Standard, it becomes more understandable when we consider that the primary concern of UL is safety and not

performance. The onus is left to the customer to seek from the SPD manufacturer, evidence supporting claimed surge ratings. This may be provided in the form of in-house test results or preferably independent third party test certificates.

ANSI/IEEE C62.41

In addition to considering the SVR figure provided for an SPD under UL 1449, customers should also request let-through voltages in accordance with ANSI/IEEE C62.41 Location categories A3 & B3 Ringwaves and B3 & C3 Combination waves. This will test the SPD's clamping performance with currents up to 10kA 8/20 μ s.

ANSI/IEEE C62.45

Compliance with life cycle testing in accordance with ANSI/IEEE C62.45 should also be requested. This will ensure that products have been tested with at least 10-1000 sequential impulses.

NEMA Standards Publication No. LS1

NEMA Standards Publication No. LS1 "Low Voltage Surge Protective Devices" defines a method of specifying SPD performance. Potential customers wishing to compare the relative performance of SPDs should require that all data and specification sheets be supplied in NEMA LS1 format.

An important requirement under NEMA LS1 is that the claimed surge rating of an SPD be based on tested results and not simply extrapolated or theoretical values. This requirement ensures that the SPD's surge rating is what it has demonstrated it can withstand, and is not simply based on the aggregate surge rating of MOV material. This type of testing truly exercises all aspects of the SPD design including important criteria such as the ability of the terminals and PCB tracks to handle the claimed current rating. It is not uncommon in the unregulated market of SPDs, to find products that claim certain ratings but use internal series fuses that will rupture at levels well below those claimed for the device. All too often, claimed ratings are based on the aggregate of MOVs or extrapolations of testing portions of parallel circuits at lower amplitude.

