



Explanation of Changes to UL 1449 3rd Edition

Technical Note

UL 1449 3rd Edition – Key Changes

The primary safety standard for surge protective devices (SPD's), also called transient voltage surge suppressors (TVSS) has undergone some major revisions in the past 3 years. In February of 2005 UL 1449 2nd Edition underwent a major revision requiring additional safety testing at medium fault current levels for TVSS.

Compliance to this update became mandatory on February 9, 2007. UL 1449 3rd Edition was published in September 2006 with compliance required by September 2009. This document will describe the major differences between UL 1449 2nd Edition and UL 1449 3rd Edition.

The major differences are:

- Change in terminology from Transient Voltage Surge Suppressors to Surge Protective Devices
- UL 1449 3rd Edition is now an American National Standard (ANSI) standard
- Addition of Nominal Discharge Current to ratings and markings
- Duty cycle test at nominal discharge current
- Measured limiting voltage now performed at 6kV/3kA

Terminology Change

The full title of UL 1449 2nd Edition is, "UL Standard for Safety for Transient Voltage Surge Suppressors, UL 1449". This title has changed in third edition. The new title of UL 1449 is, "UL Standard for Safety for Surge Protective Devices, UL 1449".

"Surge Protective Devices" is a more general description and covers devices besides just what we currently call TVSS today. The term SPD also covers what are referred to as Secondary Surge Arrestors.

UL 1449 3rd Edition now applies to devices used to repeatedly limit transient voltages on 50/60Hz

circuits 1000 Volts and below. This is an increase in voltage from 2nd Edition, which covered devices 600Volts and below.

UL 1449 3rd Edition gives four designations to surge protective devices depending on where in the electrical system the device is connected.

- Type 1 – permanently connected device installed before or after the service disconnect overcurrent device and intended to be installed with no external overcurrent protective device. This type of SPD most closely relates to devices that were called secondary surge arrestors prior to third edition.
- Type 2 - permanently connected device installed after the service disconnect overcurrent device. This type of SPD most closely relates to devices that were called transient voltage surge suppressors prior to third edition.
- Type 3 – point of use SPD's that are installed with a minimum of 30 feet of conductor length from the service panel. These 30 feet of conductor length does not include conductors used to attach the SPD. Some examples of type 3 SPDs are cord connected, direct plug-in, and receptacle type SPDs.
- Type 4 – component SPD's and component assemblies.

UL 1449 3rd Edition is an ANSI Standard

The significance of this designation as an ANSI standard is that UL 1449 3rd edition was reviewed, voted on, and approved by a balanced group of technical advisors including individuals from manufacturers, end-users and other interested parties. Any changes, additions, or new standards must be voted on by this panel. In the past UL 1449 was not an ANSI standard and was not subject to voting upon by the technical advisory group.

Nominal Discharge Current

The addition of the nominal discharge current and the subsequent duty cycle test is a new addition to UL 1449. The nominal discharge current value is selected by the manufacturer and can be either 10kA or 20kA for a Type 1 SPD or 3kA, 5kA, 10kA or 20kA for Type 2 SPDs. The SPD is tested by being subjected to a total of 15 impulses of the manufacturer selected nominal discharge current. In order to pass this test, the SPD can not create a shock or fire hazard during the test and nothing in the surge path can open at any time during or after the test. This includes all internal or external supplementary protective devices or overcurrent devices such as fuses or circuit breakers.

The nominal discharge current test is significant in that the test includes any internal or external overcurrent devices in the test. Many manufacturer's specify and use external overcurrent devices to help protect the surge protector during a sustained overvoltage event or to obtain the Short Circuit Current Rating (SCCR) of the device. To pass this new test, the external or internal overcurrent device (if used) must be in the surge path and is subjected to the same 15 impulses at the manufacturer selected nominal discharge current.

The nominal discharge current level is marked on the label of the SPD.

Measured Limiting Voltage Test

The measured limiting voltage test in UL 1449 3rd Edition uses a 6kV/3kA combination wave surge to determine the Voltage Protection Rating (VPR) of the SPD. This test is similar to

the Suppressed Voltage Rating (SVR) as performed in UL 1449 2nd Edition. The key difference between the tests in 2nd Edition and 3rd Edition is that the magnitude of the current used for the test is six times greater in 3rd Edition versus 2nd Edition. This much higher current level will mean that the measured limiting voltage will likely be significantly higher for the higher current level. For example, the VPR for an SPD will likely be much higher than the SVR of an identical SPD. With higher current levels come higher limiting voltages.

It is important that users are familiar with the difference in testing methods and the subsequent effect on the value of the VPR. Without considering or understanding the differences in the level of currents used in the test, one might assume that a UL 1449 3rd Edition device with a VPR of 700V has a higher limiting voltage than a UL 1449 2nd Edition device with an SVR of 400V. Such a conclusion would be inaccurate. The higher VPR rating of 700V is likely caused by the higher level of surge current during the measured limiting voltage test. In order to make an accurate assessment of devices, the VPR rating of one device must be compared with the VPR rating of another device. Comparing a VPR rating to an SVR rating yields no useful or conclusive information.

There are many other changes and updates within UL 1449 3rd Edition. This document has summarized the most significant changes to the UL 1449 standard. Understanding the key changes in UL 1449 is important for end users, installers, and specifiers of Surge Protective Devices.

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