

Surge Protective Devices UL 1449 from 2nd to 3rd Edition

The Underwriters Laboratories (UL) standard for Surge Protective Devices (SPDs) has been the primary safety standard for surge protection since the first edition was published in 1985, and updated to the second edition in 1996.

The objective of UL 1449 has always been to increase safety in terms of surge protection. Thus, major changes have recently been made to the surge protection standard.

The latest edition, known as UL 1449 3rd Edition, was published on September 29, 2006 and took effect September 2009, and is now also an ANSI standard. A revision was made on February 8, 2011.

To avoid confusion, the objective of this paper is to explain and summarize the major changes made to the standard.

The key updates are:

- Change in the standard's name
- The different Type designations of Surge Protective Devices
- The measured voltage protection level
- The Nominal discharge current

Change in the standard's name: From TVSS to SPDs

Prior to UL 1449 3rd Edition taking effect, the devices this standard covers were known as Transient Voltage Surge Suppressors (TVSS), operating on power circuits not exceeding 600 V. With the inception of the 3rd Edition, these devices are now known as Surge Protective Devices (SPDs), and may operate on power circuits not exceeding 1000 V.

This new designation moves the UL standard closer to the International designation and to IEC standards. The new edition is now renamed UL Standard for Safety for Surge Protective Devices, UL 1449.

The different Type designations of Surge Protective Devices

The new UL 1449 3rd Edition places SPDs into five different Type categories based on installation location within an electrical system. While Type 1, Type 2 and Type 3 categories refer to different types of SPDs that can be installed at specific locations, Type 4 and Type 5 categories refer to components used in an SPDs configuration.

Type 1 – "Permanently connected SPDs intended for installation between the secondary of the service transformer and the line side of the service equipment overcurrent device."

Type 2 – "Permanently connected SPDs intended for installation on the load side of the service equipment overcurrent device."

Type 3 – "Point of utilization SPDs, installed at a minimum conductor length of 10 meters (30 feet) from the electrical service panel."

Type 4 – Component Assemblies – "Component assembly consisting of one or more Type 5 components together with a disconnect (integral or external) or a means of complying with the limited current tests."

Type 1, 2, 3 – Component Assemblies – "Consists of a Type 4 component assembly with internal or external short circuit protection."

Type 5 – "Discrete component surge suppressors, such as MOVs that may be mounted on a PWB, connected by its leads or provided within an enclosure with mounting means and wiring terminations."

These new categories are by far the major changes applied to UL 1449 3rd Edition. SPDs installation location is now taken into account. The closer an SPD is installed to the equipment, the better the protection is. This is a push in the direction of providing stepped protection including external and internal surge protection.

The measured voltage protection level

One of the last changes found in the new UL 1449 3rd Edition, is the modification in the measured voltage protection level. The Measured Limiting Voltage (MLV) is the maximum magnitude of voltage measured at the application of a specific impulse wave shape.

When applying a certain surge current on the SPD the measured voltage at the device terminals is the so called "let-through voltage." In UL 1449 2nd Edition, the let-through voltage was referred to as Suppressed Voltage Rating (SVR) and was calculated with a 0.5 kA surge wave form at 6 kV.

The new designation is Voltage Protection Rating (VPR) and is calculated with a 3 kA surge wave form at 6 kV.

The MLV will allow comparison of different types of SPDs with regards to the let-through voltage. However, it is important to



note that the surge current used to measure the let-through voltage is six times higher in the 3rd Edition than in the 2nd Edition. This means that, comparing the obsolete SVR designation with the new VPR ratings will not be valid as VPR ratings will of course be higher than SVR ones.

The Nominal discharge current: I_n

The Nominal discharge current, known as I_n test, is new to UL 1449, coming from the IEC standard.

During the test, the SPD is subjected to 15 impulses at the selected Nominal discharge current. In order to pass, the SPD cannot create a shock or fire hazard during the test, and nothing in the surge path can open during or after the test. The Nominal discharge current values, with a 8/20 μ s wave shape, are selected by the manufacturer as follow:

- Type 1: 10 or 20 kA
- Type 2: 3, 5, 10 or 20 kA

Type 1, Type 2 and Type 4 SPDs (intended for Type 1 or Type 2 applications) are subjected to this test.

Conclusion

With the new UL 1449 3rd Edition, new terms have been introduced: SPDs, VPR, Nominal discharge current (I_n), and installation locations have been determined based on SPDs Type. The result - improved safety and better selection of Surge Protective Devices.

With the OVR NE12 enclosed SPDs designed specifically for the service entrance, and the OVR T2 U DIN Rail SPDs range for integrated internal surge protection, ABB provides a complete surge protection solution.

ABB is a global leader in manufacturing surge protective solutions.

Sources: Underwriters Laboratories Inc., Standard for Safety, Surge Protective Devices (UL 1449 Third Edition, 2011)

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