IMPORTANT CHANGES TO UL 1449 SAFETY STANDARDS FOR SURGE SUPPRESSION

COMPONENT PROTECTION NOTE 4

BY JT SHEEHAN, TECHNICAL SERVICES SUPERVISOR

INTRODUCTION

Since 1985, Underwriters Laboratory (UL) 1449 standard has been providing safety guidelines for Surge Suppression, a topic found in the past to have very little structure or commonality across the standard. Originally titled "The Standard for Safety for Transient Voltage Surge Suppressor," this standard was initially created to provide structure to a rapidly developing and growing industry and was largely based on waveforms and testing methods from IEEE C62.41. Over time, new developments and enhanced technology has driven the need for more rigorous standards. As a result of these advances, UL responded on September 29, 2009 by making significant revisions to standard 1449 updating it to the 3rd Edition. Most notably impacted are the terminology, test program, and specifying requirements.

Some key facts about UL 1449 3rd Edition which have an impact on specifiers and the supply chain:

- New performance tests use more surge current, resulting in increased clamping voltages
- New test results are numerically higher, thus not meeting old style specifications
- Lost time of Electrical & General Contractors and Distributors trying to source SPDs that cannot meet an out-dated specification
    - In frustration, old/obsolete TVSS product may be submitted, which may or may not be UL Listed, or supported in the future
- Lost time of Specifying Engineers evaluating submittals that do not meet the new standard
- Specifying Engineers may find significant industry confusion; unable to specify what is needed or receiving products with improper technology

POINTS OF INTEREST

- On September 29, 2009, UL updated standard 1449 to the 3rd Edition. Impacted in this Edition of the revision are important terminology, testing programs, and specifying requirements.
- Surge devices used to be referred to as transient voltage surge suppressors (TVSS). This terminology has been replaced with Surge Protective Device (SPD).
- Prior to UL 1449 3rd Edition, UL96A required surge suppressors to be evaluated as secondary surge arresters. With the new revisions made to 1449, secondary surge arrestors are now classified as a Type 1 SPD.

IMPORTANT CHANGES TO UL 1449 SAFETY STANDARDS FOR SURGE SUPPRESSION

IMPORTANT NEW TERMINOLOGY FOR UL 1449 3RD EDITION:

Along with new test methods, terminology has been added to UL 1449 3rd Edition.
In the past most surge devices were referred to as transient voltage surge suppressors (TVSS). This old terminology has been replaced with Surge Protective Device (SPD), reflecting the changes made to the NEC and International standards terminology. Along with TVSS, the 2nd Edition secondary surge arrestors (SSA's) have been consolidated into the new 3rd Edition. Most 3rd Edition Type 1 devices will replace obsolete old secondary surge arresters on the market. Having this new terminology creates an industry umbrella for all surge categories together under one common test criteria.

MORE RIGOROUS TEST REQUIREMENTS IN UL 1449 3RD EDITION:

When specifying a surge product in today's industry, there is often confusion with the significant number of previously used terminologies to address surge protection. However, there are a few critical concepts to understand to sort through the values of importance when selecting a SPD. Previously, UL 1449 2nd Edition referred to the clamp voltage test as the suppressed voltage rating (SVR) which consisted of a 500A, 6000V surge. Updated in UL 1449 3rd Edition, the clamp voltage test is referred to as the voltage protection rating (VPR) and consists of a 3,000A, 6,000V surge – more than 6 times more surge current required than that of the previous 2nd Edition test requirements. This means the VPR for an SPD will be higher than the SVR of an identical SPD. Higher current levels equal higher clamp voltages.

Standard	UL 1449	
	3rd Edition	2nd Edition
Test	3kA/6kV	0.5kA/6kV
Title	Volt Protection Rating	Suppressed Voltage Rating
Reference	VPR	SVR

Table 1: The above table shows the comparison between VPR and SVR test requirements.

The change from SVR to VPR is the single most important change in the UL 1449 3rd Edition relating to specifiers. The SVR listed in current specifications will be obsolete since comparing a VPR rating to a SVR rating would provide no information of value. To be sure there is an accurate performance comparison, the VPR of one device must be compared with the VPR of another device.

NEW IMPACT ON UL96A:

Prior to UL 1449 3rd Edition, UL96A required surge suppressors to be evaluated as secondary surge arresters. However, with new revisions made to 1449, secondary arrestors are now classified as a Type 1 SPD. This means that UL96A will now accept Type 1 or Type 2 SPDs having 20kA In ratings, explained later in this paper.

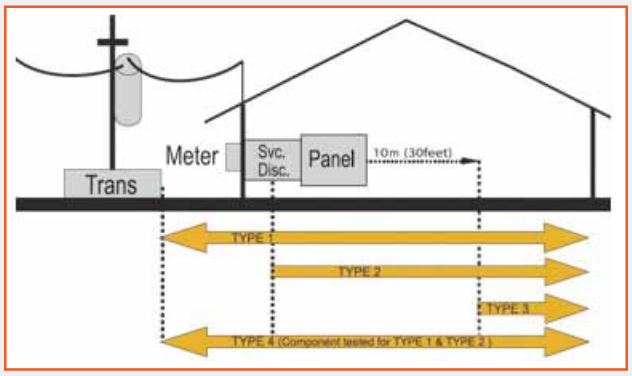

Figure 1: The above picture shows the locations within the electrical distribution and the associated Type device.

IMPORTANT CHANGES TO UL 1449 SAFETY STANDARDS FOR SURGE SUPPRESSION

LOCATION AND OR TYPE DESIGNATIONS:

UL 1449 3rd Edition assigns type designations to SPDs (1,2,3,4) based on the installation location within the electrical distribution system.

Type 1 – Installed on line or load side of the main Overcurrent Protection (OCP), in the past this was referred to as SSA. The difference with UL 1449 3rd Edition is the new more rigorous safety testing which was not required in the previous Editions.

Type 2 – Installed on the load side of the main OCP. In the past these devices may have been associated with, or referred to as hardwired TVSS, and in some cases may not require external OCP.

Type 3 – Point of utilization, direct plug-in-type devices. These components are similar to surge strips. They are required to be installed 10 meters from the panel (rational based on IEEE Cat. A location).

Type 4 – Surge suppression components, which could be a basic component or a complete module. Type 4 components can be tested to Type 1 or Type 2 applications.

NEW TEST REQUIREMENT ADDED TO UL1449 3RD EDITION:

New to UL 1449 3rd Edition standard is the nominal discharge current test (I_n). This new test requirement originates from the International Electrical Code (IEC) surge testing criteria, mandating that a SPD must remain functional after being subjected to 15 repetitive impulses of a specific value. During the In test, every mode of protection is tested, including any required overcurrent protection device. During this test the unit is tested at its rated voltage or what is referred to in UL 1449 as the maximum continuous operating voltage (MCOV). The In testing is performed in conjunction with the VPR test, so it is crucial to understand the testing conditions for the SPD. The In values which a device must be tested at are as follows:

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

Important to note is that the manufacturer has the ability to chose which In value the device is tested at, which means that SPD products need to be investigated in detail to understand the published ratings. In the event a device cannot pass at any given value, it is permitted by UL that the SPD manufacturer can re-test at a lower level until a stable value is obtained to pass the test. This means that a manufacturer has a number of In values they are able to test to achieve compliance.

WHAT DO THE CHANGES TO UL 1449 MEAN?

Since the effective date of September 29, 2009 all surge products that do not meet UL 1449 3rd Edition are to be considered obsolete. UL updated the standard to drive consistency and commonality to the SPD market, recognizing that it can be

Figure 2: The above picture is of a holographic label from an obsolete 2nd Edition device. Please note the TVSS wording.

Figure 3: The above picture is of a holographic label from a UL 1449 3rd Edition device. Please note the SPD wording, which is accepted in today's industry.

confusing to determine the published values of importance. It is also important to understand there are many SPD's on the market that no longer meet the standard but are still offered for sale. The simplest way to know if a SPD product is in compliance is to look for a UL holographic label on the device. If it has a UL "SPD" holographic label, it is in compliance and if it does not, it does not meet the new UL 1449 3rd Edition standard. Please keep in mind, some 2nd Edition products did incorporate a UL "TVSS" holographic label. Figures 2 and 3 illustrate the difference between obsolete and acceptable labels seen on products in today's industry.

ADDITIONAL RESOURCES - TECH TOPICS

- Arc Flash Note 1: Multiple Hazards of Arcing Faults (part no. TT-AFN1)
- Arc Flash Note 2: Reducing Arc Energies with Current-limiting Fuses (part no. TT-AFN2)
- Arc Flash Note 3: Arc Flash Hazard Analysis (part no. TT-AFN3)
- Arc Flash Note 4: Reduce Arc Flash Energy by Upgrading to Class RK1 Fuses (part no. TT-AFN4)
- Component Protection Note 2: Enhancing Short Circuit Safety with Type 2 Protection of Motor Starters (part no. TT-CPN2)

OTHER APPLICATION LITERATURE & RESOURCES

- Type 2 Motor Starter Protection Fuse Selection Guide
- Amp-Trap 2000 Brochure (part no. BR-AT2000)
- Advisor: Selectivity Between Fuses (See Application Section)
- Arc Flash Info Center: ep-us.mersen.com/arcflash

CONTACT

USA
374 Merrimac Street, Newburyport, MA 01950
T 978 462 6662 | F 978 462 0181
info.nby@mersen.com

CANADA
6200 Kestrel Road, Mississauga, ON L5T 1Z1
T 905 795 0077 | F 905 795 2508
technicalservices.mis@mersen.com

TT-CPN4-002 | PDF | 3.16 |