



Innovative Technology® TVSS Products

Technical Data TD01006005E

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Explanation of Changes to UL® 1449 2nd Edition as of February 9, 2007

Overview

Major updates to Underwriters Laboratories Standard for Safety for Transient Voltage Surge Suppressors (UL 1449) went into effect on February 9, 2007, affecting all Transient Voltage Surge Suppressors (TVSS) manufactured after this date. This document explains the changes to UL 1449 2nd Edition and how they affect users and specifiers of TVSS products. A UL-listed product provides a user with the confidence that their TVSS unit will not create a shock or fire hazard during use.

Background of UL 1449 (1996 and 2007 2nd Edition)

Underwriters Laboratories Standard for Safety for Transient Voltage Surge Suppressors (UL 1449) is the primary safety standard for Transient Voltage Surge Suppressors (TVSS). This standard covers all TVSS products operating at 50 or 60 Hz, at voltages 600 V and below.

The UL 1449 safety standard was first published in August of 1985. As TVSS products have evolved in the marketplace, the standard has been updated to ensure the continued safety of the increasing sizes, options and performance of new TVSS designs. The 2nd Edition of UL 1449 was published in 1996, and revised in February 2005, with compliance required by February 9, 2007. All TVSS products manufactured after February 9, 2007 must comply with the February update to the standard. A 3rd Edition of UL 1449 was published in September of 2006 with compliance required by October of 2009. This article relates to the latest revision of the 2nd Edition of UL 1449, which is currently in effect and is acceptable until October of 2009.

To obtain a UL listing, a suppressor must pass a series of tests designed to ensure it does not create any shock or fire hazards throughout its useful life. Each TVSS product is subjected to the following electrical and mechanical tests: Leakage current, temperature, ground continuity, enclosure impact, adequacy of mounting, and many others. Each test evaluates a different function or potential failure mode of a TVSS. To obtain UL certification, the TVSS unit must pass all tests. Two of the most significant tests performed on a TVSS are the measured limiting voltage test and a series of abnormal overvoltage tests.

The measured limiting voltage test is used to assign each TVSS a Suppressed Voltage Rating (SVR), which appears on all UL-certified units. This rating takes the average let-through voltages of three 6000 volt, 500 ampere combination wave impulses (IEEE 62.41 Cat. C1 test waves) and rounds up to the next highest standard SVR class set by UL. The standard SVR classes are 330, 400, 500, 600, 800, 1000, 1200, 1500, 2000, 2500, 3000, 4000, 5000 and 6000 volt. For example, a 401 V average let-through voltage is rounded up to a 500 volt SVR. The test is conducted with 6 inches of lead length (the length of wire from TVSS to test equipment connection point). Because let-through voltages are significantly affected by lead length, a 6-inch lead length is used to standardize the test. The SVR value allows some comparison from one TVSS to another, but does not represent an expected field-installed let-through voltage since actual installed lead length will vary from installation to installation.

The last major series of tests are the abnormal overvoltage tests. The purpose of these tests is to ensure that the TVSS will not create a shock or fire hazard even if the unit is misapplied or subjected to a sustained overvoltage event. TVSS are designed to prevent high-energy, short duration (typically 2 milliseconds or less) transient voltages from causing damage to an electrical installation. TVSS are not designed to sustain long-term overvoltages. During the abnormal overvoltage test, the TVSS unit is subjected to a voltage higher than its normal operating voltage, typically near double the design voltage. The overvoltage test is performed with current limited to the following current levels: 10, 100, 500 and 1000 amperes. Every mode of the TVSS is subjected to the abnormal overvoltage tests. The testing of each mode is sustained for up to seven hours. During this time, the TVSS cannot create a fire or shock hazard.

Frequently Asked Questions (FAQs)

1. Do Innovative Technology TVSS products meet the updated UL 1449 standard?

Yes. The Protector and Equalizer product families have been tested to the updated standards of UL 1449 2nd Edition, and fully comply with this safety standard. These product families remain UL 1449 listed.

2. What changes are required to comply to the February 9, 2007 update to UL 1449 2nd Edition?

One of the major safety tests contained in UL 1449 is called the abnormal overvoltage test. The purpose of this test is to ensure that a TVSS will not create a shock or fire hazard even when misapplied or subjected to sustained, long-term, overvoltages (i.e., not surge events).

In order to manufacture a UL 1449 listed product after February 9, 2007, a TVSS product design must have passed four additional sustained overvoltage tests with currents limited to 10 amperes, 100 amperes, 500 amperes and 1000 amperes. These tests are run for up to seven hours and to successfully pass the test, the TVSS must not create a fire or shock hazard during or after the test.

3. Do the changes to UL 1449 2nd Edition February 9, 2007 update specifically affect the surge suppression performance of the TVSS?

No. In itself, the changes to UL 1449 do not affect or address the surge suppression performance of the TVSS. Underwriters Laboratories is an organization that addresses the safety of products, not product performance.

However, some manufacturers may have modified their products to meet this updated standard in a way that reduces product life or performance. For example, if a manufacturer uses abnormally small fuses or other limited capacity current interrupters to meet the UL 1449 safety standard, the TVSS may open under a relatively small surge event, providing lower surge suppression capacity.

In considering and evaluating TVSS products, it is important to consider the product performance, specifications and construction along with the applicable safety standards.

4. Do the existing TVSS units manufactured or installed before February 9, 2007 need to be replaced? Are they unsafe?

No. The changes to UL 1449 represent an enhancement to the existing standard based on field experience and research. TVSS units manufactured before February 9, 2007 are still recognized as acceptable products according to NEC® (National Electrical Code®) requirements.

5. Do the updates to UL 1449 2nd Edition ban the use of epoxy in TVSS?

No. UL prescribes the results that are acceptable for complying with standards. UL does not prescribe construction methods. Encapsulation of TVSS components in epoxy provides many benefits such as vibration resistance, corrosion resistance, allows compact design and, in addition, can provide some significant benefit in meeting the updated UL 1449 standards when properly designed and applied.

6. How can I tell whether a particular manufacturer's TVSS comply with the UL 1449 2nd Edition updated standards?

All UL-listed TVSS units must be suitably and plainly marked. These markings include name of the manufacturer, a distinctive catalog number, the electrical rating, Short Circuit Current Rating (SCCR), SVR, and the date or period of manufacture. The TVSS must also be marked with the words "Transient Voltage Surge Suppressor" or "TVSS" and may additionally be marked immediately following in parentheses with the words "(Surge Protective Device)" or "(SPD)."

The best place to get unbiased information is Underwriters Laboratories (UL) website, www.ul.com. UL's Online Certification Directory (OCD) lists, by manufacturer, which models, kA ratings and voltages of products are UL listed. The certification category for TVSS is UL category code "XUHT." An alternate way to verify a vendor's listing is to call UL at 1-847-272-8800.

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