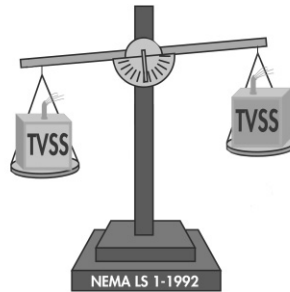


# Comparison Shopping for Surge Protection Devices Using NEMA LS 1-1992



Are you an impulsive consumer when you shop for major ticket items or do you stop to compare values and features? When it comes to durable goods like automobiles and refrigerators, do you really know how to compare or do you trust the manufacturer's word?

In recent years, consumers have come to expect a little help in making fair comparisons. Automobiles and refrigerators are good examples; both use expensive energy and consumers are demanding more truth up front. Standardized labeling stating gasoline consumption or energy usage is commonplace on these products along with the calculated annual operating costs. Side-by-side comparisons of many products, including food, are simpler now because of standardized labeling demanded by the consumer.

## A uniform standard

As a specifying engineer, you too live in world of comparison shopping. You have extreme time and cost restraints associated with your projects. When approving substitutions, you don't have time to analyze the "spin" manufacturers impose on their products. You and your colleagues in the electrical design industry uphold certain standards and expect manufacturers to present their product data and features in a uniform way that facilitates the design process and ensures quality.

The National Electrical Manufacturers Association (NEMA) creates standards to guide manufacturers in the creation of uniform specifications by defining terminology, methodologies and physical parameters associated with each type of electrical product. The net result is that the manufacturer accurately describes its own product. Indirectly, end users benefit because the playing field is leveled and similar products can be compared accurately.

But you knew that. Would you even think of specifying or approving the purchase of switchgear, motor control centers or circuit breakers that are not manufactured or presented in accordance with NEMA guidelines? Probably not. Life is too short to reinvent the wheel in the midst of a design project.

### **What about Surge Protective Devices (SPDs)?**

Let's ask the same question about another type of equipment: Would you specify or approve the purchase of an SPD that was not manufactured or presented in accordance with NEMA guidelines? You probably would not do so intentionally. But are you really sure? Are you familiar with NEMA LS 1-1992?

### **NEMA LS 1-1992**

The NEMA LS 1-1992 standard is the consensus of the Technical Committee of NEMA's Low Voltage Surge Protective Device Section. The Technical Committee has 24 members representing all phases of SPD manufacturing. The gamut includes members who manufacture only SPDs, those who manufacture in all electrical sectors and those who manufacture only the components within SPDs.

### **NEMA LS 1-1992 Technical Committee Members**

APT	General Electric	MCG
American Electric	GTE	Northern Technologies
Atlantic Scientific	Harris Corp. Semi.	Pass & Seymour/Legrand
Bryant Electric	Hubbell	Square D
Cooper Power Systems	Innovative Technology	General Semi-Conductor
Current Technology	Joslyn Electronic	Transtector
Delta	LEA Dynatech	Winders & Geist
FL Industries	Leviton	Wiremold

### **What are the main features of NEMA LS 1-1992?**

The standard has essentially two parts:

- Specification Introduction and Definitions
- Test and Evaluation Procedures.

The standard does not attempt to introduce new standards, methodology or terminology. Extensive reference is made to terminology and procedures already embodied in ANSI, IEEE and other technical publications. Consequently, the LS 1 standard is brief and to the point.

How simple. Just look for the NEMA LS 1 parameters and compare! Unfortunately, it is not that simple. Few manufacturers present their data according to NEMA guidelines. Contrary to the spirit of the LS 1 standard, most manufacturers continue to find creative ways to misrepresent data. They know many specifiers are not as well informed about surge protection as they are about other facets of their work. Buyers beware!

### **What are some important things to look for?**

The well-informed specifier can find blatant departures from the NEMA LS 1 standard simply by reading an SPD's product literature. Further into the specification, submittal and approval process the specifier can find even more misinformation. Several examples follow.

#### *Protection modes (Section 3.2, NEMA LS 1-1992)*

NEMA LS 1 recommends rating an SPD's capacity "per mode" instead of "per phase." The "per phase" expression of capacity is usually twice the "per mode" value and unrealistically assumes a surge will follow two paths equally. Confusion between the two methods of rating can result in an SPD being improperly sized by a factor of two. All Current Technology® products use the lower "per mode" rating recommended by NEMA. Using the larger inflated "per phase" number is misleading and is a common ploy used by many of the companies represented on the NEMA LS 1-1992 Technical Committee.

#### *Maximum surge current (Section 3.9, NEMA LS 1-1992)*

It makes sense to validate the performance of an electrical device with independent testing. Would you buy a device that is not tested? NEMA LS 1 recommends that an SPD be subjected to its maximum rated surge current to see if it continues to function within specified limits. NEMA LS 1 is clear that the entire device, including fuses and disconnect survive the test intact – not just a module. Current Technology offers test data from an independent lab proving that their SPDs, including fusing and disconnects, can live up to their advertised ratings. No other SPD manufacturer represented on the NEMA LS 1-1992 Technical Committee has been able to provide similar data.

#### *Clamping voltage (Section 3.10, NEMA LS 1-1992)*

Clamping voltage is an important measure of how well an SPD fulfills its root purpose. Manufacturers clamor to present the lowest clamping voltage. Of all the common SPD tests, none are easier to manipulate than the

clamping voltage test. For example: according to NEMA LS 1-1992, SPDs should be tested while energized with their rated AC line voltage. Be leery of "static" tests that test an un-energized unit. Furthermore, per NEMA LS 1 a positive test pulse is to be injected at the positive peak of the sine wave. Injecting the pulse elsewhere on the sine wave produces too low a reading. Per NEMA LS 1, the clamping voltage is measured from zero volts to the peak of the pulse, not from the peak of the sine wave to the peak of the pulse. Buyers beware; if the clamping voltage is too good to be true, it probably is. Current Technology presents their clamping voltages in strict accordance with NEMA LS 1-1992.

#### *EMI-RFI noise rejection (Section 3.11, NEMA LS 1-1992)*

High-frequency noise attenuation measurements are meaningless if reported as a single number. To have meaning, an attenuation measurement must be associated with a specific frequency. If a single frequency is specified, the attenuation level either side of that frequency is left to question. NEMA LS 1 recommends that multiple attenuation levels be reported over a range of frequencies. Surprisingly, some of the manufacturers represented on the NEMA LS 1 Technical Committee furnish only a single measurement – some furnish a single number at no specific frequency.

#### *Safety agency approvals (Section 3.12, NEMA LS 1-1992)*

NEMA LS 1-1992 recommends that safety approval agency ratings (e.g. UL 1449, 2nd Edition) be listed in accordance with agency requirements. Measurements such as the UL 1449, 2nd Edition "Suppressed Voltage Ratings" are incidental to the mandated safety testing and are generally adhered to well. However, since the UL 1449, 2nd Edition test is identical for all sizes and ratings of surge suppressors, the UL 1449, 2nd Edition test is not intended to compare the surge-handling performance of SPDs. It is not appropriate to use the UL 1449, 2nd Edition test to prove that two products are "equal."

#### **Demand NEMA LS 1 compliance**

"Show me the data!" should be your mantra. Now that you know how to ask embarrassing questions, demand that SPD data be presented in accordance with NEMA LS 1-1992!



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