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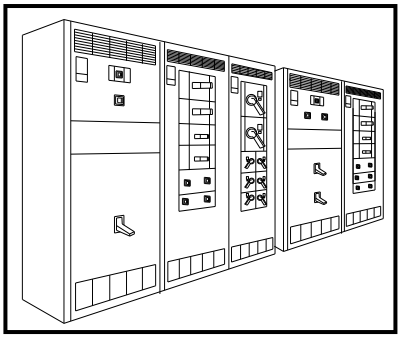
Why Cascade Surge Protection?

A **cascaded** installation with Surge Protective Devices (SPDs) at the Service Entrance and downstream at the protected equipment Distribution and Branch Circuit panelboards is required for effective surge protection. This coordination using multiple SPD units, provides a protective barrier at the Service Entrance to protect from **externally generated transients**, i.e. lightning, utility grid switching, high winds causing power line arcing, and electrical accidents. These sources represent a low percentage (less than 20%) of all transient activity, but can be of typically higher magnitude causing immediate hardware damage to electrical systems and destroying sensitive electronic equipment.

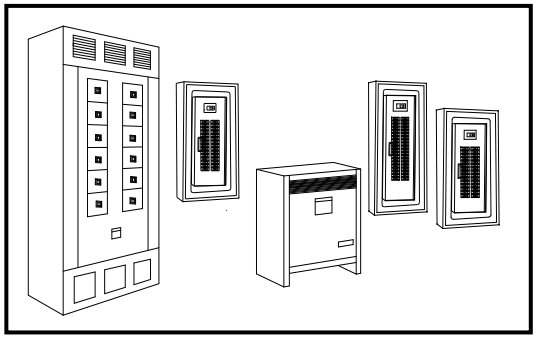
Ref. Standards:
- *UL 1449 4th Ed.*
- *UL 1283 5th Ed.*
- *C62.41.1: 2002 IEEE*
- *C62.41.2: 2002 IEEE*
- *C62.45: 2002 IEEE*
- *C62.62: 2010 IEEE*
- *C62.72: 2007 IEEE*
- *NEMA*
- *NEC 2014*
- *NFPA 70*
- *FIPS 94*
- *MIL-STD 220A*

Internally generated transients are created by changes in electrical demand, involving inductive and capacitive loads (starting and stopping of electrical motors, machine processes, pumping equipment, HVAC systems, etc.) Internal transients are normally smaller in magnitude, but a far greater number of such transient events accounts for 80% of all voltage transient problems, including hardware failures for no apparent reasons, time and material losses caused by unnecessary restarts and rebooting of equipment. These more prevalent internal transients require distributed surge protection barriers throughout the electrical distribution system to provide protection for critical equipment and processes.

The SPD applications should coordinate the surge protection to the installation parameters, requiring evaluation not only of the Surge Protective Devices but the electrical environment of the facility.



Application Shown:
Service Entrance/Main Distribution



Application Shown:
Distribution/Sub-distribution/Branch Circuit Panel

Susceptibility and **Risk Assessment** are often referred to when describing the ability of an installation to be affected by surge events. **Electrical system size**, **geographical location**, **distribution system voltage/configuration**, **available Short Circuit Current**, **equipment location** and **criticality of equipment to be protected** are all factors to be evaluated during coordination of multiple Surge Protective Devices (SPDs) and locations. (Suggest SPD coordination using **Site Risk Assessment Spreadsheet**, available at www.ThorSystems.us.)

Modular designs are specifically for the more harsh Service Entrance, Main Distribution, and where protected equipment criticality is a vital consideration. **Non-modular** designs are typically applied for lower ampacity distribution, sub-distribution, and branch circuit panels.

Often the Risk Assessment Spreadsheet will define the selection of modular or non-modular by recommended surge current rating per mode, typically reducing the required surge protection rating as the applications move from Service Entrance to the Distribution, Sub-distribution, and Branch Circuits.

Ref. Documents:

SA-004	*Risk Assessment/Sizing SPD*
SA-006	*Define Effective Surge Protection*
TSI 0119	*Site Risk Assessment Spreadsheet*
TSI 068	*Product Overview*
3G TSr	*Product Spec Sheet*
3G TSn	*Product Spec Sheet*

THOR SYSTEMS offers products and services that provide protection from the more *obvious external* to the more *frequent internal* transient voltage sources. Should you have any questions, please feel free to contact us (804.355.1100) or visit our Web site, www.ThorSystems.us.