

Facility Electrical Protection from Lightning and Power Surges

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There are different methods of protecting an electrical system. This article will address key points in protecting a system from lightning strikes and voltage surges. Lightning strikes close to a facility and voltage surges that result from these strikes or utility system fluctuations can cause sensitive electronic components, such as computers, copiers and fax machines to malfunction or even worse can cause permanent damage.

While there is no true means of protecting a system from a direct lightning strike, the electrical system and the sensitive electronic components within a facility can be protected following these six main points:

1. Capture the lightning strike.
2. Conduct energy to ground.
3. Dissipate energy into ground.
4. Bond all grounds.
5. Protect from surge on incoming power line.
6. Protect from surge on data/signal line.

Lightning is not only a beautiful, captivating natural phenomenon; it can also cause millions of dollars in damage to electronic equipment each year due to high-voltage surges and transients. A systematic approach, includes complete grounding and bonding, lightning and surge protection that will safeguard almost any facility and the electrical equipment inside.

The first step of this plan involves capturing the lightning strike at a preferred strike point. This means that a facility has dedicated lightning protection air terminals installed at strategic points. Once a strike is captured, the second step addresses conveyance of the large amount of energy to the ground using a down conductor. This down conductor is a special cable that can hold the large energy as it moves to earth.

During the third step, the lightning energy is dissipated into the ground through a low impedance grounding system. This is different from a low resistance earth system, because lightning currents are impulses of very short time duration, but very large in energy.

The fourth step involves bonding all the separate earth points, electrical equipment, electronic devices and metal objects together to create one common equipotential ground plane. So during a lightning strike, when the earth potential rises, all the equipment will rise to the same potential ensuring that no equipment-damaging differential voltages exist.

For the fifth and sixth point, each and every service entry points to the facility need to be protected. This involves the protection of all outside lines that feed into the facility that may convey dangerous lightning voltages into the building, causing damage. These can be overhead or underground lines. So for the fifth step, protect the AC power feeders that run into the facility with suitable surge protectors. Additionally the electrical equipment can include surge protection and each level within the system for greater protection. This is known as a cascaded approach and requires the proper application of devices with different rating at each point within the electrical system.

The sixth step is to safeguard the equipment from surges and transients traveling on incoming telecommunications and signal lines to prevent damage and downtime. This includes telephone lines, antenna coaxial feeders from roof mounted antennas, or computer lines linked to a wide area network.

Other items include grounding and bonding raised floors, metallic equipment, steel beams and other components that could effect how the lightning surge travels into or through a facility.

These points that will help you establish a cost-effective solution to protect your facility and the sensitive electronic equipment inside. The money spent on this protection will pay for itself should a facility experience a power surge and damage any computer or electric based equipment.