Munich RE

The Locomotive

Implementing Electrical Preventive Maintenance – A Guide for Business and Industry

By Ron Behrens, P.E., The Hartford Steam Boiler Inspection and Insurance Company

Introduction

Most people think they have adequate surge protection because they've installed surge protection devices on their personal computers. But is it really working and is it adequate? Is it providing protection against lightning and other line disturbances?

Failures, Fires and Property Damage

Unlike older electro-mechanical equipment, over-voltages can progressively degrade most electronic equipment so that failure may not be immediate. Also, line disturbances and failures of electrical equipment frequently result in fires and extensive property damage. The technical specialists at Hartford Steam Boiler strongly recommend that electrical surge protection equipment, also known as transient voltage surge suppressors (TVSS), be installed in all homes and commercial locations. The following tips can help you select surge protection devices that offer the best performance for your investment.

What to Look for in Surge Protection

– Purchase only devices that comply with Under-writers Laboratories Inc. standard UL-1449, 2nd Edition and/or IEEE (Institute of Electrical and Electronics Engineers, Inc.) standard C62.41.™

UL 1449 Listed Second Edition

(Courtesy Underwriters Laboratories Inc.)

1866

Hartford Steam Boiler

- Surge suppression equipment should have a **visual indication** on the device indicating protector status; or as an alternative, have electrical contacts on the surge protection device for remote monitoring.

Indicators of Protection Status (Courtesy TEGG Corp.)

- The manufacturer should provide an **extended warranty** or guarantee and this should not contain any exclusions for lightning.

Installing Surge Protection

- Power surges can originate from outside and inside a building. The best way to protect your electrical equipment is with zones of protection.
    1. The first level of defense is surge protection on the main electrical equipment where the utility power comes into the building. This protects against high energy external surges such as lightning or utility transients.
    2. The second zone of protection is at circuit breaker panels and distribution panels within a facility.
    3. The third zone of protection is “point-of-use” surge protection devices for specific or nearby groups of equipment such as computers and computer-controlled equipment. Zone 2 and 3 devices protect against both internally and externally generated surges. Commercial locations should have at least two zones of protection: electrical service entrance and point-of-use.
- Surge suppression devices that are connected to the building’s main electrical entrance require a large conductor. This conductor must meet the device manufacturer’s specifications, and should be as short and straight as possible. Lengths of this conductor greater than 18 inches will allow a higher than designed voltage surge to get through, which is undesirable.
- It is critical that your home or facility be connected to a good, low-resistance ground. A surge protection device is designed to divert surge current to ground and bypass your equipment. Without a proper grounding system, there is very little that can be done to protect against surges. Testing may be needed to verify a **low-resistance ground**.
- Surge protection devices are also rated by their surge energy level, either in “joules” - a measure of energy - or the maximum surge current rating. In our opinion, the most accurate and realistic performance measurement is the “Let-Thru Voltage”. A surge device that is slow to respond will allow (let –through) more voltage. Consequently the lower the **let-thru rating**, the better the performance rating of the surge protection device. Similar to fuses, surge protection devices may not provide an adequate level of protection when subjected to energy levels that exceed their ratings.
- If **data and communication lines** are connected to critical equipment, these lines also **must be protected**. Every metallic conductive connection that a piece of equipment has to the outside is a potential path for surge energy and must be separately protected. Low voltage communications circuits can be damaged by a voltage spike that might not be severe enough to damage AC power circuits of the same equipment.
- It’s desirable to **coordinate the different zones of protection**. The service entrance surge protection diverts outside surges to ground and lowers the let-through voltage and energy level of the surge entering the building to a level that can be handled by other surge protection devices closer to the load.

Zone 1 Protection (Courtesy TEGG Corp.)

(Courtesy TEGG Corp.)

Monitoring and Maintenance

- When selecting surge protection equipment, specify and install surge **current** counters. Although these optional devices provide no additional level of protection, they provide assurance that surge protection is, in fact, doing its intended job. The counters also provide a tangible measure for justification of the surge protection equipment. In some installations the counters can help pinpoint the source of undesirable electrical surges. Surge **voltage** counters are also available, but are not a good measure of surge suppression activity, only of the presence of voltage impulses.
- Maintenance should include **checking the protection status** of all surge protection devices every two months. Replace devices or modules that have done their job and are no longer providing protection.

We Can Help

Take steps now to evaluate the level of electrical surge protection for equipment critical to your home or business. Make any needed improvements without delay. Surge suppression devices can help prevent equipment breakdowns, fires and property damage. Surge suppression and other measures such as backup power sources and uninterruptible power supplies (UPS) that provide temporary power for an orderly shutdown of operations also can help avoid or minimize business interruptions and loss of income. Additional information about surge protection and other loss prevention techniques are available on Hartford Steam Boiler's website (**www.hsb.com**).

Summary

Most people think they have adequate surge protection because they've installed surge protection devices on their personal computers. But is it really working and is it adequate? Is it providing protection against lightning and other line disturbances?

About the Author

Ron Behrens, a Director of Risk Management Services for The Hartford Steam Boiler Inspection and Insurance Company in Chicago, has more than 23 years of insurance and engineering experience. He is a licensed Professional Engineer (Illinois) and earned an Electrical Engineering degree from Valparaiso University . Ron also received the Associate in Loss Control Management and Associate in Reinsurance designations from the Insurance Institute of America, is a certified infrared thermographer and a member of the Institute of Electrical and Electronics Engineers, Inc. (IEEE).