# The Proper Installation of AC Power Surge Protection Devices

AC power surge protection devices (SPD) should only be installed when the “installation conditions” are proper and sustainable. If they are installed when the proper and sustainable conditions are not in place they will not function properly, therefore they cannot protect as they are designed.

The conditions required by SPD are low impedance and resistance diversion paths. The possible paths are defined as:

Line to Neutral
Line to Ground
Line to Line
Neutral to Ground

Not all SPD will have all the possible “paths” of diversion. They can be as basic as Line-Neutral or have all the above paths. The key is no conditions prevent them from diversion of the over voltage and the “installation conditions” make it as easy as technically possible.

To understand the previous statement, consider how an AC power SPD functions. They are designed to divert over voltage events to the limits of their design and ratings. When not properly installed (improper and unsustainable conditions) the SPD are forced to absorb and dissipate the overvoltage event(s). They will in all probability fail prematurely and not provide the surge protection they are capable of by design.

An analogy will assist your understanding of the statements made in the prior paragraphs. Think of a surge protection device (SPD) as a toilet for over voltages. When a toilet is installed on the proper drainage line that has no restrictions (resistance) to the flow when it is flushed if works properly. Now, imagine the toilet is designed to be installed on a 4” drain line and it was connected to a 1” drain line. The 1” drain line is a “resistive” line that impedes the flow in the drain line. The toilet overflows as it cannot “flush” properly.

Now do you have a better understanding of the function of a surge protection device? To understand the consequences of a SPD’s restricted flow to Neutral (utility ground) and electrical system’s ground ask yourself where could the energy being diverted possibly go? The answer is simple, electric voltage is the pressure that creates the current. I=E/R. Some of the flow is going to be into the electrical system the SPD was installed to protect. Installation of SPD without the proper and sustainable conditions is equal to shooting yourself when you are trying to protect yourself and/or those you care about.

Do you get the idea now?