A simple guide to installing surge protection devices (SPDs) to BS7671 amendment 1

When do I need to fit a surge device?

According to the standard, if the installation has anything to do with human safety (i.e. a hospital or surgery or care home) or public service (i.e. library, IT datacentre, transport) or commercial activity (i.e. trade park, industrial unit, work shop, hotel, farm etc.) then fitting surge devices is a default- yes it must be done, there is no need to do a risk assessment. Surges occur not just because of lightning strikes but often due to other electrical devices in the neighbourhood. This is because insurance companies have identified these areas as being the highest risk and most costly to pay out - a surge device mitigates against damage due to those damaging surges.

What sort of device do I need?  Firstly we need to ask what is the supply on the site?

For overhead supplies a type 1 surge device must be used. The supply is likely to be a TT network and if it has been upgraded it maybe TNCS, in any event the same type of SPD can be fitted.

The section 534.2.2 of the new BS7671 shows two connection types the CT2 is for TT and can also be used for TN supplies.

The devices that can be used on overhead lines are for the CT2 connection method. They have a gas tube in the neutral pole to stop earth faults.

- Three phase TPN supplies have either 951 315 or 941 310 type 1 and 2 combined surge devices
- Single phase SPN supplies have either 951 115 or 941 110 type 1 and 2 combined surge devices

The other applications for TT supplies, but which are not overhead, are caravan parks and yacht marinas- in these cases you just need a type 2 surge device

- Three phase TPN (TT) supplies have 952 315 type 2 surge devices
- Single phase SPN (TT) supplies have 952 115 type 2 surge devices

In all other cases the UK is served mainly via PME or TNS/TNCS supplies, in this case a surge device can be used that meets the CT1 connection method in BS7671 section 534.2.2.

Please note if there is any doubt as to the supply type then the CT2 surge devices above are suitable for the TNS/TNCS supplies.

Also note that the devices for TNS/TNCS or CT1 cannot be used in TT supplies or the CT2 method, this is not safe to do as the surge device may trip the RCD if it had a fault and that is a real pain and there is also the chance of risk to human life with leakage currents from the surge device on the wrong side of the RCD.

So for the most common supply, TNS/TNCS the options are,

- Three phase TPN (TNS/TNCS) supplies have 952 405 type 2 surge device.
- Single phase SPN (TNS/TNCS) supplies have 952 205 type 2 surge device.

The last type of installation is if the building has a lightning protection system fitted, if the quality of this fitted LPS system is not known and the supply is TNS/TNCS then the default surge devices are:

- Three phase 951 405 or the 941 400
- Single phase 951 205 or the 941 200

This is the situation for most retail parks, industrial units and other metal framed structures.

Is one surge device at the incomer is enough?

No, the surge device at the incomer protects from induced lightning strike currents onto the supply lines or man-made surges down the grid.
The standard in section 534.2.3.1.1 mentions the 10m rule. This protects in internal installation from local inductive load surges/switching events conducted on the supply lines within a building but also bear in mind, one SPD is not 100% effective.

Even the best surge devices at the incomer leave a let through voltage and after 10m of cable inductance this voltage could rise and need to be dealt with again with a second SPD closer to the end equipment we need to protect. So either a second surge device of the same type in sub distribution board is fitted or the SPD can be a type 3 device. Typical type 3 surge devices are either the 13amp surge protected trailing sockets or it may be OK to fit the surge device into an extra deep socket box. The compact type 3 device 924 396 is ideal for alarm panels and cash machines etc, otherwise there are options for DIN mounted surge devices.

- Three phase (TT and TNS) type 3 is 953 405
- Single phase (TT and TNS) type 3 is 953 205

Please note that as the type 1 and 2 surge devices are wired across the supply, no current flows through them. The type 3 surge devices are series wired with “dirty” as the input from the supply and “clean” from the SPD to the end equipment, it is important to ensure the maximum load current rating of the SPD is not exceeded. If it helps, consider the installing of SPDs or over voltage devices as you would for fuses or MCBs as over current devices.

The type 1 SPD is with the main incomer, the type 2 is with the sub board and the type 3 where you may expect to see a plug top fuse or similar device. This means that there will be many SPDs within the installation as there will already be fuses or circuit breakers. This also follows the LPZ or lightning protection zone concept of breaking down the electrical system into zones where SPDs are to be fitted. It is also important that all SPDs within the installation are from the same supplier to ensure coordination in use, see section 534.2.3.6. This may mean removing the existing SPD in an installation if you come across and old device not complying with the standard.

Don’t forget that you may have other cables/services coming into the building. Don’t forget to refer to the manufactures installation guide and the content of BS7671 amendment 1 section 443 and 534.

Do I need a surge device fitted in a domestic house consumer unit?

According to the standard BS7671 in section 443 the domestic home will not need an SPD for the protection of surges due to lightning strikes if the supply is buried or overhead when a risk assessment is carried out, however the most popular source of surges is all man made so if you have a surge and have damage then the insurance company will pay out once and then ask you to fit SPDs.

Notes*
Part number:
The 951/952 XXX series are pluggable with remote monitoring option
The 941 XXX series are not pluggable but do have visual status indication on the front of the device as per 534.2.8.
For the non-remote monitored 951/952 XXS series just replace the 5 at the end of part number with a 0.
Other non LV mains SPDs are available.

For any further guidance please contact the technical team at Europa direct on 01582 692 444.

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