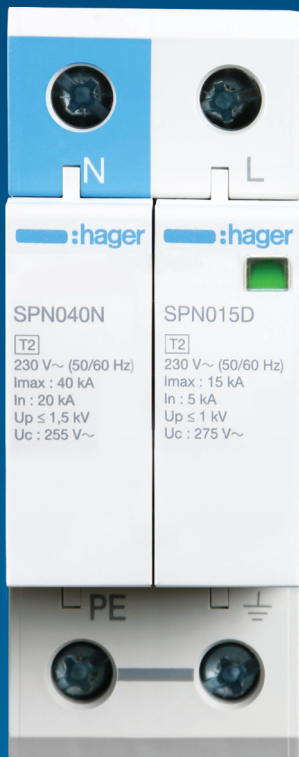


# Surge Protection Devices



At a  
Glance

:hager

# Surges & The Dangers



The whole nature of how electrical equipment is used in homes and at work has evolved; with everyday activities relying on electronic equipment.

Products such as computers, printers, TVs, industrial control equipment such as PLC's, alarms, microwaves and LED lighting are common place. These can all be vulnerable to transient overvoltages, which can significantly reduce the equipment's lifespan through degradation and damage.

A transient overvoltage or surge is a short duration increase in voltage measured between two or more conductors. In short this means anything from microseconds (millionths of a second) to a few milliseconds (thousandths of a second) in duration.

# Surge Protection Devices

SPD's protect electrical and electronic equipment against transients, originating from lightning, switching of transformers, lighting and motors.

These transients can cause premature ageing of equipment, downtime, or complete destruction of electronic components and materials.



## 18<sup>th</sup> Edition Requirements

The 18th edition BS 7671 now stipulates: Protection against transient overvoltages shall be provided where the consequences caused by an overvoltage could

- (i) result in serious injury to, or loss of, human life, or
- (ii) result in interruption of public services and/or damage to cultural heritage, or
- (iii) result in interruption of commercial or industrial activity, or
- (iv) affect a large number of co-located individuals.

For all other cases, a risk assessment according to Regulation 443.5 shall be performed in order to determine if protection against transient overvoltages is required. If the risk assessment is not performed, the electrical installation shall be provided with protection against transient overvoltages.

For a single dwelling unit it will be a decision for the house owner to make whether they consider the small additional cost of the surge protection device justified to protect their installation and equipment against these damaging overvoltages.

# Selection Criteria

Surge protection devices are classified according to their functions:

## **Type 1**

SPD which can discharge partial lightning current with a typical waveform 10/350  $\mu$ s. Usually employs spark gap technology. This, if required, will be installed in the primary distribution board at the origin of the electrical installation. A Type 1 SPD does not in itself offer the required protection level and must be used in conjunction with coordinated type 2 devices. An installation with a lightning protection system will require a Type 1 SPD.

## **Type 2**

SPD which can prevent the spread of overvoltages in the electrical installations and protects equipment connected to it. It usually employs metal oxide varistor (MOV) technology and is characterised by an 8/20  $\mu$ s current wave. This device would normally be in sub-distribution boards and in the primary distribution board if there was no requirement for a type 1 device.

## **Type 3**

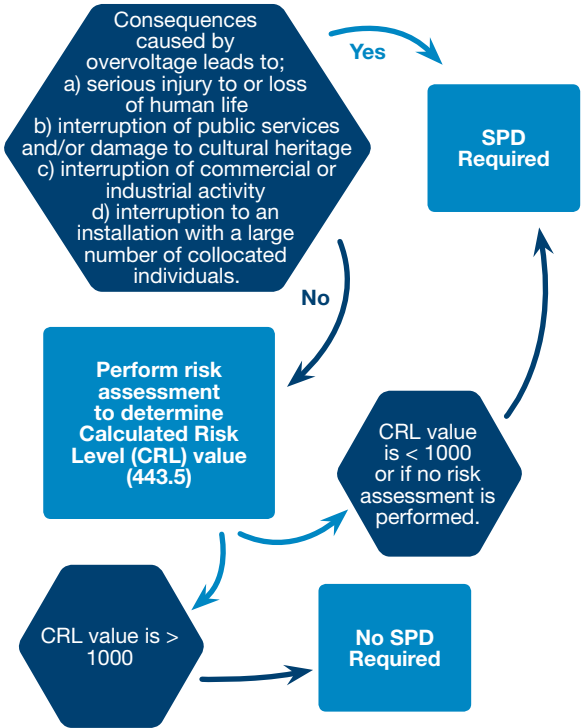
These SPDs have a low discharge capacity. They must therefore only be installed as a supplement to Type 2 SPD and in the vicinity of sensitive loads. Type 3 SPD's are characterised by a combination of voltage waves (1.2/50  $\mu$ s) and current waves (8/20  $\mu$ s).

# Maintenance

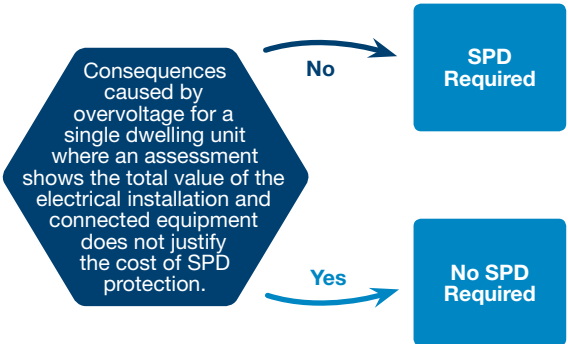
Most SPDs have an indication window that they are operational. If the indicator is green they are providing protection. If they are red then they have reached 'end of life' and will need replacing. Often there is a replaceable cartridge which can simply be withdrawn and replaced with a new operational device.

# SPD Decision Flow Chart

## Non-Dwelling



## Dwelling



For the full SPD decision flow chart for installations, please see Figure 3.7.2.2 in the 18<sup>th</sup> Edition On-Site guide.



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