

TECHNICAL NOTE

Need for Surge Protection when Direct-strike Protection is Installed

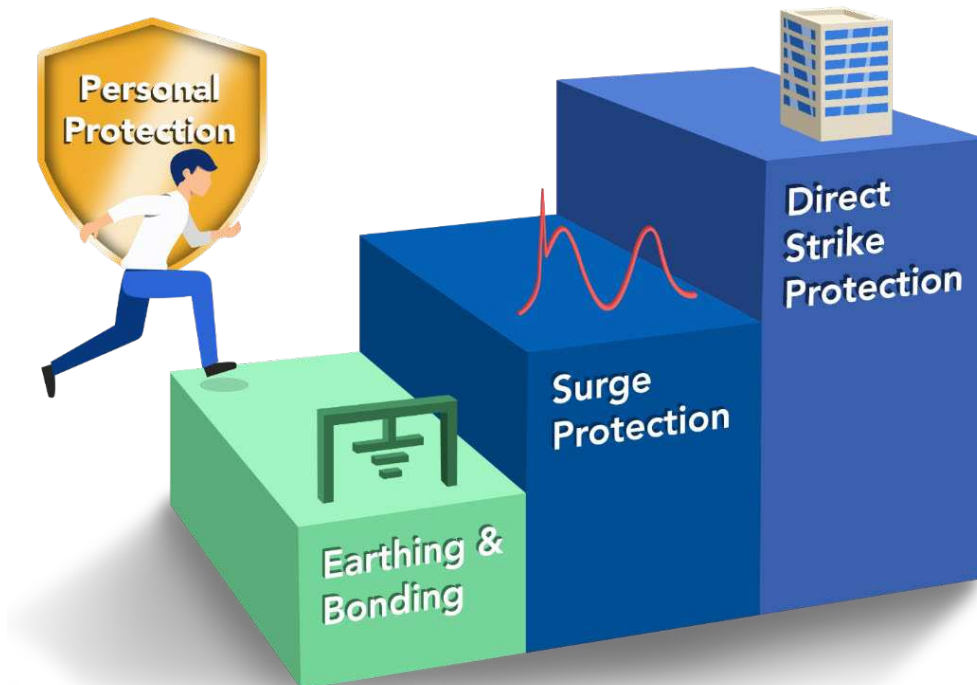
Background

The aim of this Technical Note is to clarify the relationship between direct-strike protection and surge protection for any building, facility or site, as this topic is often misunderstood, ignored, or accidentally overlooked.

Comprehensive lightning protection necessitates the implementation of all four of the following key steps together, in a holistic manner:

- I. Protect critical assets against direct lightning strikes.
- II. Protect equipment against incoming surges and transients.
- III. Provide a low impedance reference earth / ground and bond all conductive elements to minimise voltage differences.
- IV. Protect people.

These steps are conceptualised in the figure below. This approach is applicable across all industry sectors and any system, structure, site or facility where maintaining operational efficiency, minimising losses and keeping personnel safe is required.



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Need for Surge Protection

Typically, the need for direct-strike protection and surge protection (steps I and II) is determined with a risk assessment tool, such as the spreadsheet calculator in AS 1768.

However, the guidelines in various standards are very explicit when it comes to the relationship between these two steps, viz. *if direct-strike protection is, or is to be, installed, then surge protection must also be installed*. For example:

- IEC 62305-3 (2010), Clause 6.2 “Lightning equipotential bonding”, for structures being protected against direct strikes, states “All the conductors of each line should be bonded directly or with an SPD. Live conductors shall only be bonded to the bonding bar via an SPD”.
- AS 1768 (2021), Section 4 “Protection of Equipment”, states “Whenever an LPS is fitted to a structure, equipotential bonding shall be applied to incoming metallic and electrical services. For electrical services, equipotential bonding is achieved through the application of SPDs”.
- Also, IEC 60364-4-44 (2018) outlines the requirements for protecting electrical installations against transient overvoltages caused by atmospheric influences. It states that surge protection must be applied (without carrying out a risk assessment) if transient overvoltages could have an impact on human life, public and cultural institutions, and industrial or trade activities.

In conclusion, ***if direct-strike protection is installed, surge protection must also be installed***. The technical explanation behind this requirement is simply that a lightning strike to a structure will unavoidably induce significant overvoltages within the structure. These overvoltages need to be mitigated with surge protection devices.

References

1. AS 1768, 2021, “Lightning Protection”, Standards Australia Technical Committee EL-024, Sydney, Australia.
2. IEC 60364-4-44, 2018, “Low-voltage electrical installations - Part 4-44: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances”, Geneva, Switzerland.
3. IEC 62305-3, 2010, “Protection against lightning – Part 3: Physical damage to structures and life hazard”, Edition 2, Geneva, Switzerland.