Lightning protection measures for computer room power distribution boxes

Article Overview

Power distribution boxes in computer rooms must be protected against lightning-induced surges using a combination of external lightning protection, surge protection devices (SPDs), proper grounding, and bonding in accordance with IEC 62305 and NEC/IT room standards.

External Lightning Protection

Computer rooms should be part of a building-wide lightning protection system (LPS) if the risk assessment indicates potential exposure to lightning strikes. According to IEC 62305, the LPS should include:

o Air termination systems to intercept lightning strikes.
o Down conductors to safely route lightning currents to earth.
o Earth termination systems with low resistance to dissipate energy.
o Bonding and shielding to prevent lightning electromagnetic impulses (LEMP) from affecting internal systems . The LPS design should consider the Lightning Protection Level (LPL I-IV), which determines the expected lightning current and the required protection measures .

Surge Protection Devices (SPDs)

Power distribution boxes must include SPDs to limit transient overvoltages caused by lightning:

o Type I SPDs: Installed at the main distribution board, upstream or downstream of the electricity meter, to handle direct lightning currents and limit voltage below 6 kV .
o Type II SPDs: Installed in sub-distribution boards to protect downstream circuits, limiting voltage below 4 kV. If no external LPS exists, Type II SPDs may be installed at the main distribution board .
o Type III SPDs: Installed directly upstream of sensitive devices, limiting voltage below 2.5 kV, often in DIN rail or socket-mounted configurations . All SPDs must have a short, low-impedance connection to the equipotential bonding system to minimize residual voltage and ensure effective protection .

Grounding and Bonding

o Equipotential bonding is critical: all metallic parts, including distribution boxes, racks, and cable trays, should be bonded to the main grounding system .
o Grounding conductors should be as short and thick as possible to reduce voltage drop during a surge .
o Circuit breakers and fuses must be rated to withstand the lightning current without damage, ensuring continuity of protection .

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IT Room-Specific Considerations

According to NEC Article 645 and NFPA 75:

o IT rooms must be fire-rated and isolated from other building areas.
o Only equipment and wiring associated with IT operations are allowed inside the room.
o Dedicated grounding and bonding for IT equipment is required, and SPDs should be coordinated with the room's power distribution system .
o Compliance with listed equipment standards ensures that SPDs and distribution boxes are suitable for IT environments .

Installation and Maintenance

o Installations must be neat, workmanlike, and compliant with standards (NFPA 780, UL 96A) to ensure proper dissipation of lightning energy .
o Periodic inspections are required to verify SPD status, grounding integrity, and conductor connections .
o Proper training and certification of installers are essential to maintain system effectiveness .

Summary

To protect power distribution boxes in computer rooms from lightning:
o Implement a building-wide LPS if risk assessment indicates exposure.
o Install Type I, II, and III SPDs according to IEC 62305 and insulation coordination requirements.
o Ensure equipotential bonding and low-impedance grounding.
o Follow NEC Article 645 and NFPA 75 for IT room-specific wiring and equipment protection.
o Maintain the system with periodic inspections and certified installation practices. This integrated approach ensures that both direct lightning strikes and induced surges are safely managed, protecting sensitive IT equipment and maintaining operational continuity.

Lightning Protection Lightning has the potential to cause significant damage to buildings and other assets, whether by direct strike or

In order to better defend against lightning electromagnetic pulses, not only should the location of computer rooms be

Install lightning rods, grounding, surge protectors, shielding, and follow standards for

Learn how lightning protection and risk assessment help secure digital infrastructure. Discover tools,

standards like

Data processing centres (DPCs) are essential infrastructures that require protection against lightning and surges.

"Due to these many factors, most modern data centers pursue a multi-faceted approach to protecting against lightning

Properly made ground connections are essential to the effective functioning of a lightning protection system, as they serve to

Protection for both direct strokes and induced flashovers Limit voltage by shunting the lightning surge to ground Performance based

We equip data centres for all measures relating to lightning and surge protection as well as shielding and earthing.

Despite implementing advanced protection measures, the simplest approach often provides the most reliable

The third-level lightning protection of the power supply: M40B2 AC power lightning protection is used, and it is installed in the

Equipment on both systems is typically the primary target of protection; however, the distribution lines can also be a focus of lightning

Protection measures, at an appropriate lightning protection level (LPL), are then implemented to reduce the risk to or below the

Second, we quantitatively examined the effect of lightning protection measures by lighting surge analysis while

Learn lightning protection systems, grounding, bonding, surge protection, standards, inspection checks, and common

Complete IEC 62305 lightning protection guide covering risk assessment (Part 2), LPS classes I-IV, rolling sphere

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