Lightning protection grounding requirements for cable trays

Overview

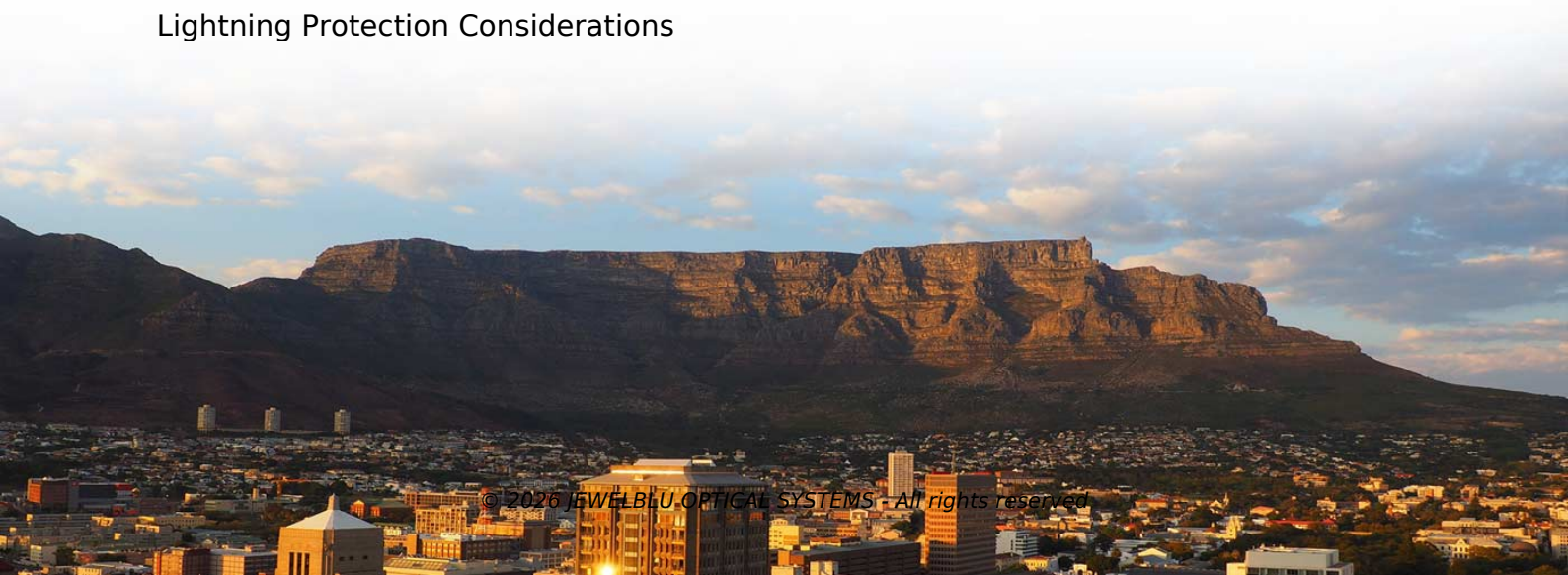
Lightning Ground Flash Density (Ng) The number of ground flashes per square kilometre per annum for lightning.

Key Takeaways

Cable trays exposed to lightning must be properly bonded and grounded to the building's lightning protection system to ensure safety and minimize electrical hazards.Grounding and Bonding Principles

Cable trays, especially metallic ones, can serve as Equipment Grounding Conductors (EGC) if they meet NEC requirements, ensuring electrical continuity across sections and connections . All tray sections should be electrically continuous, bonded through bolts, splice plates, clamps, or bonding jumpers where gaps exist . Both side rails of ladder or trough trays must be bonded together and connected back to the power source or main grounding system . For non-metallic trays, a separate EGC can be installed within the tray to provide grounding continuity .

Lightning Protection Considerations



When cable trays are located on rooftops, outdoors, or in areas exposed to lightning, they should be integrated with the building's lightning protection system as per NFPA780 standards . This involves connecting the tray system to the overhead lightning protection conductors and ensuring the grounding resistance is low enough to safely dissipate lightning currents. Overhead cable systems can provide additional protection by diverting lightning away from sensitive circuits .

Material and Installation Guidelines
• Metallic trays: Steel, aluminum, or copper trays can be used, but care must be taken to avoid electrolytic corrosion when using bare copper conductors in aluminum trays; insulated conductors with proper bonding connections are recommended .

• Tray covers: Solid-bottom or fully enclosed trays provide some shielding against EMI/RFI, which is beneficial for sensitive circuits .

• Separation of circuits: Power and signal cables should ideally be separated in different trays or by barriers to reduce electrical noise coupling .
Inspection and Maintenance

Regular inspection is critical. Check bonding jumpers connecting tray sections with a multimeter; a low resistance reading (less than 0.01 ohms) indicates proper grounding . Pay attention to joints, bolts, and splice plates, as vibrations or loose connections can compromise grounding. Aluminum trays form a protective oxide layer but still require proper bonding to prevent shock hazards .

Summary

To ensure effective lightning protection for cable trays:

• Bond all tray sections electrically and connect to the main grounding system.

• Integrate trays with the building's lightning protection system following NFPA780.

• Use insulated conductors for aluminum trays to prevent corrosion.

• Maintain separation between power and signal circuits.

• Inspect bonding connections regularly to ensure low-resistance continuity.
Following these practices ensures that cable trays safely handle lightning currents and maintain compliance with NEC and NFPA standards .

Article Content

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NEC Standards for Cable Trays: Grounding, Fill Capacity

This article provides a comprehensive framework that governs various aspects of cable tray installations, including

Grounding & Bonding Wire Mesh Cable Trays

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