What is the loss rate of cable trays

Overview

Experimental and numerical analysis of the influence of cable tray. The test results show that the burning behaviour and the fire spreading highly depend.

Key Takeaways

Cable trays typically reduce cable ampacity by 5% to 40% depending on cable grouping, tray type, and ventilation conditions.

Overview of Cable Tray Derating

When cables are installed in trays, their current-carrying capacity (ampacity) is reduced due to several factors: Mutual heating: Cables in close proximity generate heat that cannot dissipate efficiently, raising conductor temperature and reducing safe current capacity. Tray material and geometry: Metallic trays can induce eddy currents and proximity effects, increasing AC resistance, while open ventilated trays allow better cooling. Ventilation and spacing: Solid-bottom trays or tightly packed bundles restrict airflow, increasing thermal resistance and requiring greater derating.

Typical Derating ValuesSingle-layer, ventilated trays: Minimal derating, often 5–10%, as airflow is sufficient to dissipate heat. Multi-layer or grouped cables: Derating can range from 30–40%, depending on the number of circuits and spacing. For example, IEC 60364-5-52 Table B.

52. 17 specifies that six circuits in a single layer on a perforated tray may require a correction factor of 0. 57, meaning each cable carries only 57% of its free-air rating.

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Covered or solid trays: Ampacity may drop further due to reduced convective cooling, sometimes requiring up to 30% additional derating. Proximity effect in metallic trays: AC resistance increases due to magnetic field interactions, which can reduce ampacity by 5–15% depending on tray depth and cable configuration. Standards and GuidelinesIEC 60364-5-52: Provides correction factors for grouped cables and installation methods, ensuring safe operation under thermal constraints.

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C Article 392: Limits fill ratios and specifies derating for stacked or grouped cables to maintain current-carrying capacity. ICEA/NEMA P54-440: Suggests derating factors of 78–85% for cable fill depths of 1–4 inches in metallic trays.

Practical Recommendations

Use ventilated or ladder-type trays to minimize derating. Maintain spacing between cables where possible to reduce mutual heating. Apply grouping correction factors from IEC or NEC standards to ensure compliance.

Consider tray surface treatment (matte paint) to improve emissivity and slightly increase ampacity. In summary, standard loss for cable trays is not a fixed value but typically ranges from 5% for single, well-ventilated cables to 40% for densely packed or multi-layer installations, with exact values determined by standards, tray type, and cable arrangement.

Article Content

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The test results show that the burning behaviour and the fire spreading highly depend on the cable arrangement of the cables on the cable tray, in combination with other boundary conditions.

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The cable tray calculator determines the required tray width and type based on the number and size of cables to be installed, ensuring adequate fill levels and derating compliance.

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