

Article Overview

Instrumentation cable trays are structured systems designed to safely support, organize, and protect signal, control, and communication cables while minimizing interference and ensuring compliance with industry standards.

Overview of Instrumentation Cable Trays

Instrumentation cable trays are specialized channels used to route and support low-level signal, control, and communication cables in industrial and commercial facilities. Unlike power cable trays, they are dedicated and separated from power systems to prevent electromagnetic interference (EMI) and signal degradation. They are designed to allow future expansion without disrupting existing operations and are critical for reliable system performance, safety, and maintenance efficiency .

Types of Cable Trays

Common types of instrumentation cable trays include:

- o Ladder Trays: Ideal for long cable runs requiring good airflow and heat dissipation.
- o Perforated Trays: Suitable for medium loads, offering partial protection and ventilation.
- o Solid Bottom Trays: Provide maximum protection against dust, moisture, and mechanical damage.
- o Wire Mesh Trays: Lightweight, flexible, and easy to install, often used in complex routing scenarios .

Materials and Corrosion Resistance

Cable trays are manufactured from various materials depending on environmental conditions:

- o Steel: Pre-galvanized or hot-dip galvanized for cost-effective corrosion protection.
- o Stainless Steel (AISI 316L): Offers high resistance to corrosion, including stress corrosion and pitting, suitable for chemical or marine environments.
- o Aluminum: Lightweight with excellent corrosion resistance due to a natural oxide layer.
- o Fiberglass Reinforced Plastic (FRP): Provides high resistance-to-weight ratio and good corrosion resistance in harsh environments .

Installation Best Practices

Proper installation is crucial to prevent signal interference, mechanical stress, and safety hazards:

- o Support Spacing: Typically 1.5-2 meters depending on tray type; use rust-resistant brackets, clamps, and

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bolts.

- o Grounding and Bonding: Ensure the tray is properly grounded to prevent EMI and ground loops; use certified conductors for bonding.
- o Separation of Signals: Keep analog (4-20 mA) and digital communication cables (Fieldbus, Profibus, Ethernet) separate to avoid interference.
- o Drainage and Moisture Management: Outdoor or washdown areas should have sloped trays or drainage holes to prevent water accumulation.
- o Integration with Plant Systems: Route trays to avoid conflicts with HVAC ducts, pipes, and access ways .

Design Considerations

Key factors in designing instrumentation cable trays include:

- o Load Capacity: Ensure trays can support the weight of cables and environmental loads.
- o Thermal Expansion: Account for expansion and contraction in long runs.
- o Cable Width and Fill: Determine tray width based on cable quantity and type to avoid overcrowding.
- o Compliance with Standards: Follow IEC 61537 for mechanical strength, corrosion resistance, and electrical continuity; NEC Article 392 provides additional guidance in the U.S. .
- o Corrosion and Environmental Factors: Select materials and coatings suitable for temperature extremes, chemical exposure, or offshore applications .

Maintenance and Inspection

Regular inspection ensures long-term reliability:

- o Check for rust, sagging, loose bolts, or rodent damage.
- o Verify grounding and bonding integrity.
- o Use preventive maintenance checklists to reduce downtime and cable replacement costs.
- o Digital tools like BIM or 3D modeling can optimize routing and asset tracking .

Standards and Compliance

- o IEC 61537: International standard for metal cable tray systems, covering construction, testing, and performance.
- o NEC Article 392: U.S. standard for cable tray installation and safety.
- o CE, UL, NEMA Certifications: Ensure compliance with regional safety and quality requirements .

Conclusion

Instrumentation cable trays are essential for safe, organized, and interference-free cable management in industrial and commercial facilities. Selecting the right tray type, material, and installation method, while



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adhering to IEC and NEC standards, ensures reliable signal transmission, safety, and long-term operational efficiency. Proper design, grounding, and maintenance are critical to prevent costly downtime and signal issues.

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Cable trays are components of support systems for power and communications cables and

Learn how to avoid common mistakes in instrumentation cable tray installation. Follow IEC standards and EPC best

Snap Track transitions control, power, data, and instrument cables from ladder tray to point of use, i.e., instruments and motor control

Cable Tray Technical Guide A practical guide to product selection and installation This guide for engineers and installers has been

Pan tray Available in the Middle East and Asia regions, the B-Line series perforated and solid bottom cable pan tray system is ideal

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SOLID-BOTTOM CABLE TRAY Providing additional cable protection, solid-bottom cable tray is sometimes preferred to support and

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NEMA VE 1-2017 Specifies requirements for metal cable trays and associated fittings designed for use in accordance with the rules

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