Material Properties of Molded Cable Trays

Overview

The material properties of an alloy depend on the distribution of each type of element present, giving each alloy specific weight, strength, toughness, hardness, corrosion and fatigue attributes.

Key Takeaways

Molded cable trays are typically made from fiberglass-reinforced polyester or vinyl ester resins, offering high strength, corrosion resistance, and lightweight durability suitable for harsh environments. Common MaterialsFiberglass-Reinforced Plastic (FRP): Molded cable trays are often fabricated using pultruded fiberglass with polyester or vinyl ester resin. This material provides excellent corrosion resistance, particularly in acidic, alkaline, or high-humidity environments, and maintains structural integrity under high temperatures and chemical exposure.

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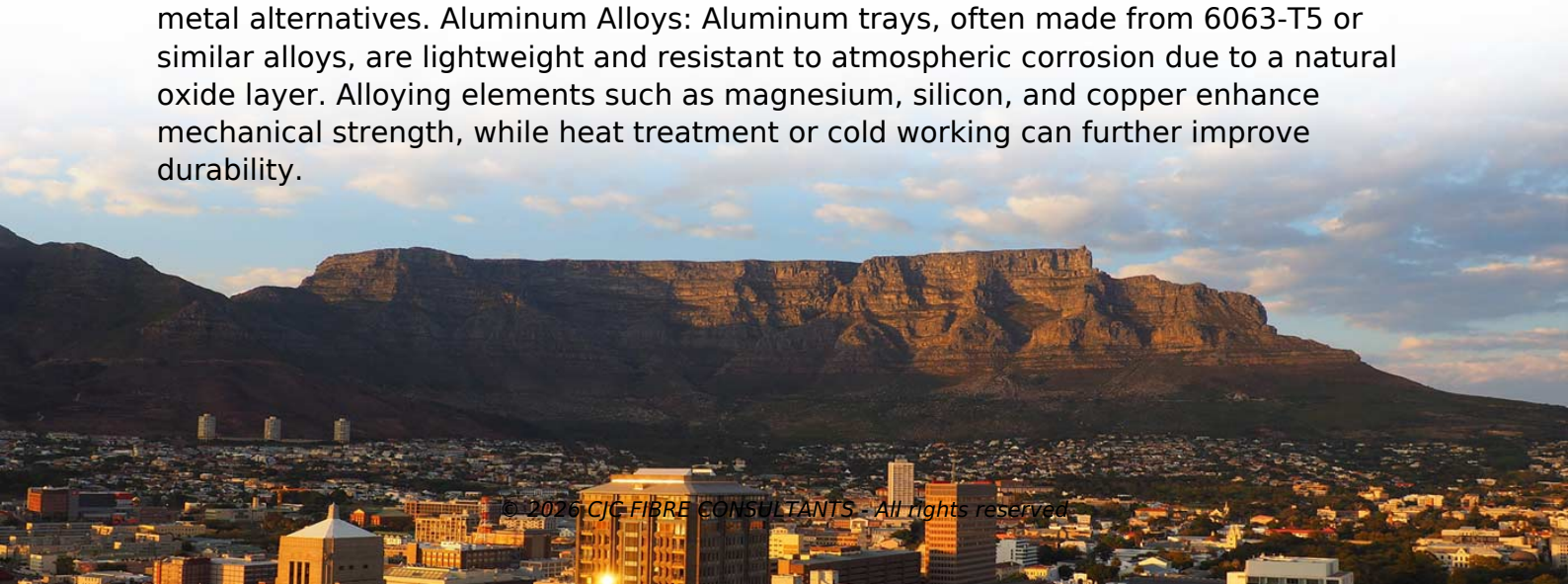
P trays have a high strength-to-weight ratio, making them easier to handle and install compared to steel trays, while still providing mechanical strength comparable to metal alternatives. Aluminum Alloys: Aluminum trays, often made from 6063-T5 or similar alloys, are lightweight and resistant to atmospheric corrosion due to a natural oxide layer. Alloying elements such as magnesium, silicon, and copper enhance mechanical strength, while heat treatment or cold working can further improve durability.



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Aluminum trays are ideal for environments where weight reduction and moderate corrosion resistance are priorities. Steel and Stainless Steel: Steel cable trays are commonly manufactured from hot-dip galvanized or pre-galvanized steel, providing high mechanical strength and cost-effective corrosion protection. For more aggressive environments, stainless steel (AISI 316L) is used, offering superior resistance to pitting, stress corrosion, and chemical attack due to its chromium and molybdenum content.

Steel trays are heavier but provide excellent load-bearing capacity and long-term durability.

Mechanical and Environmental Properties

Strength: FRP molded trays can withstand significant loads while remaining lightweight. Steel and aluminum provide higher absolute load capacity but are heavier. Corrosion Resistance: FRP and stainless steel excel in corrosive environments, while aluminum resists atmospheric corrosion.

Galvanized steel offers moderate protection. Thermal Stability: FRP trays maintain performance in elevated temperatures, while metals conduct heat and may require additional insulation in high-temperature applications. Electrical Insulation: FRP is non-conductive, providing inherent electrical insulation, which is advantageous in certain industrial or chemical installations.

Surface Treatments and Enhancements

Galvanization: Steel trays are often hot-dip galvanized to extend service life in C4 or similar corrosive environments.

Nano-

Ceramic Coatings: Applied to aluminum or steel trays to improve salt spray resistance and durability. Pultrusion Process: Ensures consistent mechanical properties and dimensional stability for molded FRP trays.

Summary

Molded cable trays are engineered to balance mechanical strength, corrosion resistance, and ease of installation.

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P trays are preferred for highly corrosive or chemical environments, aluminum trays for lightweight and moderate corrosion resistance, and steel or stainless steel trays for heavy-duty load-bearing applications. Material selection should consider environmental conditions, load requirements, and long-term maintenance costs to ensure optimal performance.

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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 of Canadian Electrical Code, Part I and the National Electrical Code®

Ultimate Guide to Cable Tray Selection – Types, Materials & Best

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Learn how to choose the best cable tray system for your needs. Explore types, materials, installation tips, and NEC compliance in this expert guide.

Type of Cable Tray Introduction Cable Tray Materials Electrical

Cable trays fabricated of extruded aluminium are used for their high strength to weight ratio, superior resistance to certain corrosive environments, and ease of installation.

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The global cable tray market size was valued at $6.41 billion in 2025 & is projected to grow from $7.34 billion in 2026 to $16.14 billion by 2034.

Cable Tray Environmental Factors and Material Selection

Material property changes: Chemical attacks can make cable tray materials lose strength, become brittle, swell up, or even completely dissolve. This stops them from being able to hold cables

Cable Tray Technical Guide A practical guide to product selection and ...

Cable Tray Technical Guide A practical guide to product selection and installation This guide for engineers and installers has been developed by ABB as a practical reference regarding cable tray

Type of Cable Tray

Cable Tray Materials: Most cable tray systems are fabricated from a corrosion-resistant metal (low-carbon steel, stainless steel or an aluminium alloy) or from a metal with a corrosion-resistant finish

GUIDE CABLE TRAYS TECHNICAL

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FRP Cable Tray Refurbishment Technical Specification

Technical specifications for FRP cable tray refurbishment, including supply, erection, and cable re-laying. Compliant with NEMA FG-1 & ASTM standards.

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