What type of wire is used for wiring in the electrical cabinet



Overview

NEC Guide to Types of Electrical Wiring: Code & Standards ExplainedThermoplastic High Heat-resistant Nylon-coated (THHN) wire is the backbone of commercial.

Key Takeaways

For wiring inside electrical cabinets, THHN/THWN copper wires or multi-core insulated wires with appropriate insulation and gauge are typically used.Wire Material and Conductor Type

Copper is the preferred conductor for cabinet wiring due to its high conductivity, durability, and stable joint contact resistance, making it ideal for medium-to-high voltage and safety-critical applications . Aluminum can be used in cost-sensitive or large-scale installations but requires special handling due to oxidation and lower mechanical strength . Solid conductors are suitable for stationary connections, while stranded wires provide flexibility for connections that may require movement or frequent adjustments .

Insulation and Safety

Inside electrical cabinets, wires are often exposed to heat and confined spaces. THHN (Thermoplastic High Heat-Resistant Nylon-coated) or THWN (Thermoplastic Heat and Water-Resistant Nylon-coated) wires are widely used because they are heat-resistant, durable, and suitable for dry or damp indoor environments . For enhanced fire safety, wires with FR (Flame Retardant) or FRLS (Flame Retardant Low Smoke) insulation are recommended, especially in commercial or industrial cabinets .

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Wire Configuration
• Single-core wires are commonly used for individual circuits and are easy to route inside cabinets .

• Multi-core wires are preferred for complex control panels or when multiple conductors need to be bundled together, reducing clutter and improving organization .
Voltage Rating and Gauge

Select wire gauge based on the current load of the circuit. Thicker wires are required for higher loads to prevent overheating. Standard cabinet wiring often uses 12–14 AWG for control circuits and 10–8 AWG for power circuits, but this depends on the specific application and load requirements . Ensure the wires comply with BIS or local electrical safety standards.

Additional Considerations
• Use color-coded insulation for easy identification: typically black/brown/red for live, blue/white for neutral, and green/yellow for ground .

• Maintain proper separation between high-voltage and low-voltage circuits to reduce interference.

• Ensure wires are neatly routed and secured with cable ties or ducts to prevent mechanical stress and facilitate maintenance. In summary, copper THHN/THWN wires, either single-core or multi-core, with appropriate gauge and flame-retardant insulation, are the standard choice for electrical cabinet wiring, providing safety, durability, and compliance with electrical codes .

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