What materials cannot be used to make electrical distribution boxes

Overview

Electrical boxes must provide sufficient space for conductors and devices to prevent overheating and insulation damage. Overcrowding restricts heat dissipation and increases fire risk.

Key Takeaways

Materials that are flammable, electrically conductive without proper grounding, mechanically weak, or unable to withstand heat and surge voltages cannot be used for electrical distribution boxes.

Key Material Restrictions

Flammable Materials: Materials that are not flame-retardant or fail the Glow Wire Flammability Index (960°C as per IEC 60695) are unsuitable because they can allow fire to spread inside or outside the box. Ordinary wood, untreated plastics, or paper-based composites fall into this category. Poor Electrical Insulators: Materials that cannot provide adequate electrical insulation or are prone to tracking under voltage stress are unsafe.

For example, low-grade plastics that melt or degrade at 70°C or cannot withstand surge voltages of 2kV should not be used. Mechanically Weak Materials: Materials that crack, deform, or break under impact are unsuitable. Fragile plastics, thin untreated metals, or brittle composites cannot protect internal wiring from physical damage.

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Corrosion-

Prone Metals: Metals that rust or corrode easily, such as untreated iron or low-quality steel, are not recommended for outdoor or damp environments. Corrosion can compromise mechanical strength and electrical safety.

Non-

Standard or Non-Listed Materials: Any material not listed or certified for electrical enclosures under NEC or OSHA standards is prohibited. This includes materials that cannot be properly grounded, bonded, or fail to meet mechanical and thermal safety requirements.

Summary of Unsuitable Materials

Wood, cardboard, or paper-based composites – flammable and weakLow-grade or non-engineered plastics – poor heat resistance, low impact strength, or insufficient flame retardancyUntreated metals prone to corrosion – compromise durability and safetyMaterials not certified for electrical use – fail NEC/OSHA compliance Safe alternatives include thermoset plastics like Sheet Molding Compounds (SMC), engineering thermoplastics such as Polycarbonate (PC) and Acrylonitrile Styrene Acrylate (ASA), and epoxy-coated steel, which meet flame retardancy, mechanical, and electrical performance requirements. Choosing the right material ensures the distribution box is fire-resistant, mechanically robust, electrically safe, and compliant with standards.

Article Content

A Complete Guide to NEC Article 314 on Electrical Boxes and Conduit

Electrical boxes must provide sufficient space for conductors and devices to prevent overheating and insulation damage. Overcrowding restricts heat dissipation and increases fire risk.

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Distribution Box Guide: Types, Components & Solutions

Understand distribution boxes (DB boxes) in 5 minutes. Learn about types, components, functions, and uses. Find the perfect DB box for your needs.

The installation requirements for the distribution box

Understanding Distribution Box Components Before installation, it''s important to know what makes up a distribution box. Let''s break it down into two

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