What specifications are the flexible wires in the distribution box



Overview

Flexible Cords and Fixture Wires, based on the 2023 NECThe requirements for flexible cords and fixture wires differ from those of Chapter 3 wiring methods.

Key Takeaways

Flexible connection wires in distribution boxes must meet NEC, UL, and CSA standards, have appropriate insulation, ampacity, and protection, and be installed to prevent mechanical stress and ensure safety.

Wire Type and Standards

Flexible wires used in distribution boxes are typically multi-stranded conductors enclosed in a flexible insulation jacket. They must conform to UL Appliance Wiring Material (AWM) standards, such as styles 1015, 1028, 1283, and 1284, and may also comply with CSA C22. 2 No.

127 for Canadian installations. Temperature ratings are generally 90°C continuous, with some wires rated up to 105°C for limited use. Flexible cords should be selected based on the voltage rating of the distribution box, commonly up to 600 V for switchgear and control panels.

Ampacity and Conductor Size

The cross-sectional area of flexible wires must be sufficient to handle the normal working current with a safety margin.

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C Table 400. 5 provides ampacity ratings for individual conductors and overall cord assemblies, considering ambient temperature and number of current-carrying conductors. For three-phase systems without a neutral, grounding wires should have a minimum cross-section of 4 mm^2.

Installation and Protection

Flexible wires must be installed continuous without splices or taps in applications such as connecting appliances, luminaires, or portable equipment. Connections should be made so that tension is not transmitted to joints or terminals. Wires should be neatly arranged, labeled, and free from dust or debris inside the box.

For explosion-proof or pressurized enclosures, wires must be routed through flexible conduits and sealed with rubber rings, washers, and compression nuts to maintain enclosure integrity.

Grounding and Safety

Metal distribution boxes must be reliably grounded, with the grounding wire connected to the cabinet's outer shell. Flexible wires with conductor stranding other than Class B or C require terminals specifically rated for the stranding. Wires should not be exposed directly to air or physical damage, and routing should avoid sharp bends or contact with screws and fasteners that could compromise insulation.

Color Coding and Identification

Flexible wires are often color-coded for easy identification: black, red, green/yellow, blue, brown, grey, and white, with additional options available on request. Proper labeling ensures secure connections at terminals and facilitates maintenance.

Summary

When selecting and installing flexible connection wires in distribution boxes: Use UL/CSA-approved flexible wires rated for the system voltage and temperature. Ensure adequate ampacity and conductor size. Install wires without splices, avoiding mechanical stress on terminals.

Protect wires using conduits, seals, and proper routing. Maintain neat, labeled, and grounded wiring for safety and maintenance. These practices ensure compliance with NEC standards, operational safety, and long-term reliability of the distribution system.

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Article Content

Flexible Cords and Fixture Wires, based on the 2023 NEC

The requirements for flexible cords and fixture wires differ from those of Chapter 3 wiring methods. Article 400 covers the general requirements and applications for

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What''s the difference between a distribution box and a sub-panel? A distribution box typically refers to the main electrical panel that receives power from the utility service. A sub-panel is

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