Cross-section of PE wire in primary distribution box

Overview

This document provides instructions and materials for assembling a single overhead guy wrapped type distribution line.

Key Takeaways

The minimum cross-sectional area of a PE conductor depends on the phase conductor size, material, and installation type, typically ranging from 2.5 mm² to 16 mm² for copper and 16 mm² for aluminum.General Requirements

The PE (protective earth) conductor is used solely for safety purposes and should not carry current under normal operation. Its sizing must ensure mechanical robustness and thermal stability under fault conditions, preventing overheating or breakage during earth faults .

Minimum Cross-Section Guidelines
• Single-conductor PE lines:
• Copper: ≥ 2.5 mm² with mechanical protection, ≥ 4 mm² without protection.

• Aluminum: ≥ 16 mm² regardless of protection .

• PE conductors in multi-core cables or enclosed raceways: Mechanical strength requirements may be reduced due to the protection provided by the cable sheath .

• PEN conductors (combined protective earth and neutral):
• Copper: ≥ 10 mm²

• Aluminum: ≥ 16 mm² .

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Sizing Relative to Phase Conductors

For low-voltage installations, the PE conductor is often sized relative to the phase conductor:

• Phase conductor ≤ 16 mm²: PE = phase conductor cross-section.

• Phase conductor 16–35 mm²: PE = 16 mm².

• Phase conductor > 35 mm²: PE ≥ 50% of phase conductor cross-section . This ensures that the earth-fault loop impedance is low enough for protective devices to operate correctly, particularly in TN and TT systems .

Installation Considerations

• PE connections in distribution boxes are typically made via screw terminals on the module casing, ensuring secure attachment of PE lines and cable shields .

• In TN-C-S systems, the PE conductor may originate from the separation of the PEN conductor into protective and neutral conductors .

• Thermal stability is critical: PE conductors must withstand high fault currents without degradation, even if they normally carry negligible current .

Summary

When designing or inspecting a primary distribution box:

• Use copper PE conductors ≥ 2.5–10 mm² depending on protection and system type.

• Use aluminum PE conductors ≥ 16 mm².

• Ensure PE sizing is proportional to phase conductors to maintain safety and compliance with IEC 60364 standards .

• Verify secure connections and mechanical protection to prevent accidental damage or overheating. This approach ensures effective fault protection, compliance with international standards, and long-term reliability of the protective earth system.

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It references a table from IEC 60364-5-54 that offers two methods for determining the cross-sectional area of

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The following minimum cross-sections for the protective conductor are obtained from the previously mentioned installation regulation,

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Therefore, the IEC Standard has provided a simplified equation 3 below to determine the minimum cross-sectional area of a PE

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Pages in this section Connection and choice for protective earthing conductor Sizing of protective earthing conductor

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It depends on the actual wiring diagram and how to arrange the switch and arrange the routing of the primary switch. If all miniature

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To incorporate the door and/or cover into the safety measure “protection from indirect contact via automatic deactivation”, you will

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This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

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