

Requirements for Copper Busbar Connection Process



Overview

It is usually necessary to joint busbars on site during installation and this is most easily accomplished by bolting bars together or by welding.

Key Takeaways

Copper busbars are connected using bolted joints with controlled torque, appropriate washers, and sometimes forming or rivet techniques to ensure low-resistance, high-reliability electrical connections.

Bolted Joint Connections

The most common method for connecting copper busbars is bolting with proper torque and washers. Key steps include: Stacking and Alignment: Busbars are stacked one above the other, with phase and neutral through-busses aligned for easy access and serviceability. Washers: Use Belleville washers or other spring washers to maintain consistent contact pressure and compensate for thermal expansion.

Bolts: High-strength steel bolts (e.g., Grade 5) are recommended. Bolt size depends on busbar width; for copper busbars wider than 40 mm, M12 bolts spaced 30–50 mm apart are typical. Torque Control: Proper torque ensures stable, low-resistance contact.

For example, a torque of 70 N·m (50 lb-ft) is commonly applied to M12 bolts. Torque consistency is critical because the overall joint resistance is influenced by the torque applied to each bolt. Contact Area: Electrical current concentrates under the pressure washers, so increasing overlap width without increasing contact pressure does not significantly reduce resistance.

Splice Plates

Splice plates are often used to join adjacent busbar sections: Plates are bolted with washers and nuts to the busbars. They allow easy installation and maintenance while ensuring high contact pressure at the joint.

Alternative Joining Methods

In addition to bolted connections, forming and riveting techniques can be used:

Forming Process: Progressive tool systems perform lancing, bending, and forging to create high contact pressure along the overlap without auxiliary elements. Riveting: Machined dovetail and countersunk holes allow semi-tubular rivets to mechanically interlock busbar sheets, providing a secure, low-resistance connection.

Design Considerations

Material: Copper is preferred for its high conductivity and thermal performance, but its softness requires careful torque control to prevent loosening. Thermal Cycling: Proper torque and washer selection help maintain low resistance under temperature variations. Standards Compliance: Modern standards (e.g., IEC 62271-301) emphasize verified performance outcomes rather than fixed overlap dimensions, allowing optimization based on real-world testing.

Summary

A reliable copper busbar connection requires correct bolt size, torque, and washer selection, proper alignment, and consideration of thermal and mechanical stresses. Bolted joints are standard, but forming and riveting methods offer alternatives for high-pressure, low-resistance connections. Following international standards and manufacturer specifications ensures long-term performance and safety.

Article Content

Copper for Busbars

It is usually necessary to joint busbars on site during installation and this is most easily accomplished by bolting bars together or by welding. For long and reliable service, joints need to be carefully made

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Cut out details, dimensions and drilling plans are provided with the customer drawings and it is the responsibility of the switchgear manufacturer to provide the opening, drill fixing holes, connecting

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Efficient joints in copper busbar conductors can be made very simply by bolting, clamping, riveting, soldering or welding. Bolting and clamping are

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