What are the small busbars of the high-voltage switchgear



Overview

Copper busbars offer excellent electrical conductivity and can carry high current with a smaller cross-section.

Key Takeaways

Small busbars in high-voltage switchgear are secondary or branch conductors that distribute power from the main busbars to individual circuit breakers or equipment, ensuring compact, reliable, and safe connections.

Function and Purpose

Small busbars, often called branch or tap busbars, serve as the intermediate conductors that connect the main busbars to outgoing feeders, circuit breakers, or protective devices inside high-voltage switchgear. While main busbars carry the bulk of the system current, small busbars handle lower currents for specific circuits, allowing for flexible power distribution and easier integration of additional equipment without redesigning the main bus structure.

Design Considerations

Material: Typically made of copper or aluminum, small busbars are chosen for their conductivity, mechanical strength, and cost-effectiveness. Copper is preferred for high conductivity and compact size, while aluminum is lighter and more economical but requires larger cross-sections. Shape and Size: Small busbars are usually flat or rectangular strips, sometimes laminated or insulated, to fit within compact switchgear layouts and reduce heat buildup.

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Their cross-sectional area is smaller than main busbars, designed to safely carry the branch current without overheating. Insulation and Safety: Depending on the voltage level and spacing constraints, small busbars may be bare, insulated, or enclosed to prevent short circuits and allow tighter layouts inside the panel. Mechanical Stability: Even though they carry less current than main busbars, small busbars must withstand electromagnetic forces, vibration, and thermal expansion during normal operation and fault conditions.

Integration in Switchgear

Small busbars are strategically placed to: Distribute power efficiently from the main bus to multiple outgoing circuits. Support protective devices like circuit breakers, relays, and fuses. Allow modular expansion, enabling additional feeders or metering panels to be added with minimal disruption.

Maintain thermal and electrical stability, ensuring reliable operation under varying load conditions.

Summary

In high-voltage switchgear, small busbars are essential for branching power from the main busbars to individual circuits, providing a compact, safe, and flexible distribution network. Their design balances electrical conductivity, mechanical strength, thermal performance, and space constraints, making them a critical component in modern switchgear systems.

Article Content

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IEC 61439 Low Voltage Switchgear Design: Complete 2026 Guide

Figure 1: High-performance VIOX industrial low voltage switchgear assembly, demonstrating modern compartment design, reliable circuit protection, and clear busbar phase

Bus bars are simple in principle, complicated in practice: part 3

Not every design needs large bus bars; some only need smaller, localized ones or PC board-mounted bus bars. This part looks at these situations, as well as testing of high

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