

Selection of Low-Voltage Switchgear with Busbars

Article Overview

Selecting low-voltage switchgear busbars requires careful consideration of current rating, short-circuit withstand capacity, material, thermal performance, and compliance with IEC 61439 standards.

Key Selection Parameters

1. **Rated Current (I_r)** The busbar must carry the continuous load current without exceeding the permissible temperature rise. IEC 61439 specifies maximum temperature rise limits for copper (typically 70°C above ambient) and aluminum (typically 55°C above ambient) under continuous load conditions, ensuring insulation integrity and preventing overheating . 2. **Short-Circuit Withstand Capacity (I_{sc})** Busbars must withstand fault currents for a specified duration (usually 1-3 seconds) without mechanical deformation or failure. This ensures safety during short-circuit events and protects connected equipment . 3. **Material Selection** Copper and aluminum are the most common materials. Copper offers higher conductivity and better thermal performance, while aluminum is lighter and more cost-effective. Material choice affects cross-sectional sizing, heat dissipation, and mechanical strength . 4. **Thermal Performance and Temperature Rise** Busbar sizing must account for ambient temperature, enclosure type, and mounting orientation. Horizontal or vertical positioning affects airflow and cooling efficiency. Proper sizing prevents excessive heat buildup, which can degrade insulation and reduce equipment lifespan . 5. **Mechanical Strength and Support** Busbars must resist bending, vibration, and mechanical stress. Adequate support, proper bending, and anti-corrosion treatments are essential for long-term reliability . 6. **Enclosure and Environmental Considerations** The enclosure's IP rating, ventilation, and space constraints influence busbar geometry. Designers often standardize busbar widths and adjust thickness or layering to optimize thermal performance and space utilization . 7. **Compliance with IEC 61439** IEC 61439 provides comprehensive rules for low-voltage switchgear, including verification of temperature rise, dielectric properties, short-circuit strength, and protection against electric shock. All busbars must meet these safety and performance benchmarks, regardless of assembly type . 8. **Diversity Factor and Load Distribution** Busbars rarely operate at maximum load continuously. Applying a diversity factor allows designers to calculate the main busbar current requirement based on the total equipment load, optimizing sizing and material usage .

Practical Design Considerations

- o **Standardization:** Use a limited family of busbar widths and adjust thickness or layering for different current ratings to simplify manufacturing and improve thermal efficiency .
- o **Phase Identification:** Clear marking of busbar phases enhances safety and maintenance efficiency .
- o **Connection Practices:** Proper punching, bending, and termination techniques reduce electrical resistance and prevent hotspots . By considering these criteria, engineers can ensure that low-voltage switchgear busbars are safe, reliable, and efficient, meeting both operational and regulatory requirements.

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Key factors in busbar selection include rated current, short circuit withstand capability, ambient temperature, and enclosure

The three basic functions provided by low voltage switchgear for the related electrical circuit are: Electrical protection

The main functions of switchgear are: Electrical protection Electrical isolation of sections of an installation Local or remote switching

Learn how low voltage switchgear design balances busbar current rating, cabinet space,

This standard covers busbars used for low-voltage assemblies, power distribution, photovoltaic power systems, and

It's not just about the sizing LV panels are metal-enclosed switchgear that provides a three-phase power distribution

Mounting designs for SIVACON S8 low voltage switchgear Test verification under arcing fault conditions in

Choosing the right busbar material is a key step in switchgear design. Material choice affects electrical performance,

MV metal-enclosed switchgear This technical article will shed some light on the standard design of medium voltage

The document discusses low voltage switchgear and cable sizing. It provides information on governing standards, system

Learn the fundamentals of medium voltage switchgear. Topics include "what is switchgear?, types of

This document provides an overview of low voltage switchgear and panel selection, covering technical aspects and considerations

Main Busbars The MNS main busbar system is arranged in the rear of the switchgear. This assures a maximum distance between

Low voltage switchgear example (SIVACON S8, busbar position at rear HxWxD: 2200x4800x600 mm) Up to

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Switchboard Busbar: Design, Standards, and Selection Guide Busbars are the backbone of a low-voltage

Busbar systems are the backbone of industrial low-voltage panels, switchboards, and distribution assemblies. A correctly designed

Web: <https://bssoda.pl>

