

Article Overview

A 35 kV busbar system typically uses single, double, or sectionalized bus configurations with copper conductors, insulated for medium-voltage operation, designed to handle rated currents and short-circuit conditions according to IEEE and IEC standards.

Common Busbar Configurations

For 35 kV substations, the most common busbar arrangements include:

- o Single Bus: One main bus energized at all times; simplest but lowest reliability. A fault on the bus or breaker failure results in total outage .
- o Double Bus, Single Breaker: Two buses with a single breaker per circuit; allows maintenance on one bus without interrupting supply .
- o Double Bus, Double Breaker: Each circuit has two breakers connecting to two buses; provides high reliability and flexibility .
- o Ring Bus or Breaker-and-a-Half: Offers redundancy and allows isolation of faults without affecting other circuits . The choice depends on reliability requirements, space, and cost.

Busbar Design Considerations

- o Material: Copper is standard for 35 kV busbars due to high conductivity; joints are silver-plated for low contact resistance .
- o Insulation: Flame-retardant, non-hygroscopic materials rated for continuous operation at 120°C; under-oil or fluid insulation may be used for switchgear .
- o Current Rating: Busbars must carry the continuous rated current without exceeding permissible temperature rise; IEC 61439 and ANSI C37.23 provide sizing guidelines .
- o Short-Circuit Withstand: Busbars and joints must withstand fault currents; bolted connections are torqued to maintain uniform pressure and prevent overheating .
- o Mechanical Support: Supports must resist electromagnetic forces during faults and allow for thermal expansion/contraction .
- o Grounding: Ground return conductors should match the size of voltage conductors; interleaved grounds can improve shielding and reduce noise .

Switchgear Integration

35 kV busbars are often integrated into underground or pad-mounted switchgear, using sectionalizing switches and drawout fuses for protection . The busbar layout must accommodate:

Standard 35kV busbar configuration

- o Source and tap connections
- o Loadbreak switches
- o Adequate spacing for creepage and clearances
- o Accessibility for maintenance

Sizing and Thermal Management

- o Cross-Sectional Area: Determined by current-carrying requirements; a traditional basis is ~400 circular mils per ampere for single conductors, adjusted for laminated or multiple conductors .
- o Temperature Rise: Maximum hotspot rise should not exceed 55°C above 50°C ambient; forced cooling is generally avoided unless approved .
- o Airflow and Heat Dissipation: Low-profile busbar arrangements can improve natural convection; busbars may also act as heat sinks .

Summary

A standard 35 kV busbar system balances electrical reliability, mechanical strength, and thermal performance. Typical designs use copper conductors with flame-retardant insulation, bolted joints, and configurations such as single, double, or sectionalized buses. Compliance with IEEE C37.23, C37.74, and IEC 61439 ensures safe operation under continuous and fault conditions, while proper mechanical support and grounding maintain system integrity and minimize operational risks .

For all metering installations (secondary, 15kV, 25kV, & 35kV), refer to Section AOJ in the APCO Company Specific Section of the

ABB busbar systems enable safe and easy cross-wiring of miniature circuit breakers, residual current devices and other Modular DIN

This technical article explains six most common bus configurations used for distribution, transmission, or switching

Busbar Layouts In this publication, a serious attempt has been made to cover the basic requirements and illustrations

Section 2.3 in this policy outlines general Busbar configuration rules for substation development works at new, existing, and planned

Learn the IEC standard for busbar sizing as per IEC 61439, including current-carrying

Standard 35kV busbar configuration

Bus bars shall be insulated with flame-retardant, non-hygroscopic insulating material rated for continuous operation at 120 °C.

Busbar design in switchgear ensures safe, reliable power distribution by balancing current capacity, thermal

When a breaker on any circuit of a single busbar system fails, there will be complete shutdown of the station, for however; re

Here, we provide an overview of common substation busbar configurations--Single Bus, Main and Transfer, Double Breaker/Double

These busbar systems are like standard products for a manufacturer and are not required to be custom-built for every application

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Other busbar arrangements, reliability principles and tripping criteria which support the functionality of busbar protection (check zone

Comparison of bus configurations This technical article explains six most common bus

Our busbar systems for electrical installations offer a particularly easy way of fitting distribution systems with electrotechnical

Busbars are used within electrical installations for distributing power from a supply point to a number of output circuits. They may be

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