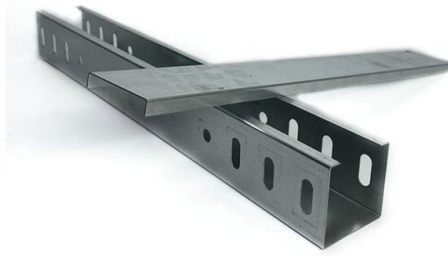


Wiring of the factory s primary power distribution box



Overview

This Course on Primary Electric Distribution is concerned with medium voltage levels at 2.4Kv to 15Kv.

Key Takeaways

The primary power distribution box in a factory distributes high-voltage power from the transformer to internal feeders, using protective devices, bus bars, and structured wiring to ensure safe, reliable, and expandable power delivery. Overview of Primary Distribution

The primary distribution system in a factory operates at voltages higher than the utilization level, commonly 11 kV, 6.6 kV, or 3.3 kV, depending on the factory's power demand and distance from the substation . Power is typically received from a distribution transformer, which steps down high-voltage supply to a level suitable for factory use. The primary distribution box then routes this power to internal feeders that supply machinery, lighting, and other loads .

Key Components

- Incoming Feeders and Circuit Breakers: The main supply enters the distribution box through air circuit breakers (ACBs) or vacuum circuit breakers (VCBs), which protect against overloads and short circuits . These breakers act as the main disconnect and safeguard the system.



- **Bus Bars:** High-conductivity copper or aluminum bus bars distribute power to multiple outgoing feeders. Bus bars are sized according to the maximum load and must allow for future expansion .
- **Protective Devices:** Each outgoing feeder is protected by miniature circuit breakers (MCBs), molded case circuit breakers (MCCBs), or fuses, depending on the load type and rating. RCCBs or earth leakage devices are used for additional safety, especially for sensitive equipment .
- **Feeder Arrangement:** The primary distribution box typically feeds secondary distribution panels or directly powers high-demand machinery. Feeder cables are selected based on load calculations, voltage drop, and environmental conditions such as temperature, dust, or chemical exposure .
- **Monitoring and Control:** Voltage and current transformers (PTs and CTs) are often installed for metering, protection relays, and monitoring. This ensures stable voltage, prevents overloads, and allows for quick fault detection .

Wiring Considerations

- **Phase Configuration:** Most factories use a three-phase, three-wire or four-wire system for primary distribution to handle large loads efficiently .
- **Cable Sizing:** Conductors must be sized to handle peak loads with minimal voltage drop and sufficient insulation for the primary voltage level .
- **Segregation and Labeling:** High-voltage and low-voltage circuits should be physically separated, and all feeders clearly labeled for safety and maintenance .
- **Expansion and Flexibility:** The layout should allow for future addition of machinery or panels without major rewiring .

Safety and Compliance

- Ensure all components comply with national and international electrical standards.
- Include lightning protection, fire prevention, and grounding systems.
- Regular inspection and maintenance are critical to prevent downtime and ensure operational safety .

Summary

The wiring of a factory's primary power distribution box involves receiving high-voltage power from the transformer, distributing it via bus bars to multiple feeders, and protecting each circuit with appropriate breakers and relays. Proper design ensures reliable, safe, and expandable power delivery, minimizes energy loss, and supports continuous factory operations .

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