



KNOWe

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Module: Electrical Safety for Skilled Workers



Training Objectives

- Identify electrical hazards in HT, LT, capacitor panels, and battery banks
- Follow safe work practices for electrical installations
- Select appropriate protective devices
- Apply safety practices for joints, terminations, and cable glands
- Prevent electrical shock, arc flash, and fire incidents



Why Electrical Safety Is Critical

- Electrical hazards are invisible
 - Mistakes can lead to fatal injuries
 - Most accidents occur due to:
 - Assumption equipment is dead
 - Bypassing safety procedures
 - Improper tools or PPE



Electrical Hazard Categories

- Electric shock & electrocution
 - Arc flash & arc blast
 - Fire due to overheating or short circuit
 - Explosion due to batteries and capacitors





High Voltage (HT) Systems

➤ Electrical systems operating between 1.1 kV to 33 kV

Found in:

- HT panels
- Switchgear
- Transformers



Safe Working Practices: HT Panels

- Treat all circuits as LIVE until proven dead
 - Only authorized & qualified persons allowed
 - Follow LOTO procedures
 - Wear proper PPE
 - Minimum two authorized persons required



HT Panel Clearances & Interlocks

- Minimum clearance:
 - 2.6 m for up to 12 kV
 - 2.8 m for 33 kV
 - Never bypass interlocks:
 - Door interlock
 - Shutter interlock
 - Breaker interlock



Vital Precautions for HT Panels

- Switch off remotely whenever possible
 - Never open panel door when energized
 - Do not rack breakers with door open
 - Discharge residual energy
 - Prove each phase dead using HV tester



Low Voltage (LT) Panel Hazards

- Arc flash possible even at low voltage
 - High fault current causes severe burns
 - Live work increases risk



Safe Working on LT Panels

- Avoid live work wherever possible
 - Use arc-flash PPE if live work is unavoidable
 - Use double-insulated tools
 - Do not drop tools
 - Follow LOTO



Testing & Instruments (LT Panels)

- Never test at:
 - Main bus bar
 - Incoming feeders
 - Always test at:
 - Output of protective devices
 - Use CAT III / CAT IV rated meters



Capacitor Panels: Hidden Danger

- Store electrical energy
 - Remain charged after isolation
 - Can cause fatal shock



Safe Working on Capacitor Banks

- Discharge using grounding hook
 - Use grounding hook even with auto discharge
 - Grounding hook must be voltage-rated
 - Wait minimum 5 minutes before access



Capacitor Fire Prevention

- Internal failures are common
 - Protective devices must be rated 1.5 times capacitor current
 - Use capacitor duty contactors



Battery Installations: Hazards

- Shock due to stored energy
 - Fire & explosion risk
 - Acid electrolyte burns



Battery Safety Precautions

- No jewellery or metallic objects
 - No sparks, flames, or smoking
 - Ensure ventilation
 - Restrict unauthorized access
 - Check voltage to ground



Required PPE for Battery Work

- Safety goggles / face shield
 - Insulated gloves
 - Apron & safety shoes
 - Acid neutralizer
 - Class-C fire extinguisher



Earth Leakage Protection (RCCB / RCBO)

- Protects against electrocution
 - Detects earth leakage current
- Ratings:
- 30 mA – Personal protection
 - 100 mA – Fire & indirect contact
 - 300 mA – Fire protection



MCB Selection Basics

- Overload protection
 - Short circuit protection
- Selection factors:
- Rated current
 - Breaking capacity (I_{cu})
 - Utilization category



MCB Utilization Categories

- Type B – Lighting, resistive loads
 - Type C – Motors, pumps
 - Type D – Transformers, high inrush loads
 - Type K – Heavy motor loads
 - Type Z – Sensitive electronics



Electrical Joints & Fire Risk

➤ Heating

- Insulation damage
- Short circuits
- Fire



Good Jointing Practices

- Remove insulation
 - Clean conductor
 - Twist & splice properly
 - Solder
 - Insulate correctly



Cable Termination Safety

- Correct stripping length
 - Use lugs for multi-strand cables
 - Correct die size for crimping
 - Tighten with specified torque



Cable Glands

- Mechanical holding
 - Earthing continuity
 - Environmental protection
 - Selection based on:
 - Armoured / unarmoured
 - Cable size
 - IP rating
 - Single or double compression



Key Takeaways

- Electrical safety saves lives
 - Never assume equipment is dead
 - Follow procedures, not shortcuts
 - Correct selection prevents accidents



Quick Knowledge Check

- Why grounding is required for capacitors?
 - Why 30 mA RCCB is mandatory?
 - Why interlocks must not be bypassed?



Closing Message

- “No job is so urgent that it cannot be done safely.”
- Thank participants and encourage them to apply safety practices daily.