Overview

This standard identifies the competences you need to mount electrical components in enclosures, in accordance with approved procedures. The final enclosure could be used for distribution equipment, switchgear or control systems. The rated operating voltage of the completed assembly will not exceed 1,500 volts DC, or 1,000 volts AC, at frequencies not exceeding 1,000 Hertz. You will be required to select the appropriate tools and equipment to use, based on the operations to be performed and type of components to be installed and to check that they are in a safe and serviceable condition.

In carrying out the operations, you will be required to follow laid-down procedures and specific assembly techniques, in order to mount various components into enclosures, such as component panels, isolator switches, fuses/MCBs, contactors, relays, bases for plug-in devices, rail-mounted terminal blocks, trunking, earthing bonding and sub- assemblies such as power supplies, card racks and process controller units. The mounting activities will also include making all necessary checks and adjustments to ensure that components are correctly positioned and free from damage.

Your responsibilities will require you to comply with organisational policy and procedures for the assembly activities undertaken and to report any problems with the activities, components or equipment that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work with a minimum of supervision, taking personal responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work and will provide an informed approach to applying assembly techniques and procedures to the mounting of electrical components in enclosures. You will understand the distribution equipment, switchgear or control systems being assembled, their application and the assembly techniques used. You know about the components used, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

You will understand the safety precautions required when mounting electrical components in enclosures. You will be required to demonstrate safe working practices throughout and you will understand the responsibility you owe to yourself and others in the workplace.
**Performance criteria**

**You must be able to:**

- **P1** work safely at all times, complying with health and safety, environmental and other relevant regulations, directives and guidelines
- **P2** follow the relevant instructions, assembly drawings and any other specifications
- **P3** ensure that the specified components are available and that they are in a usable condition
- **P4** use the appropriate methods and techniques to assemble the components in their correct positions
- **P5** secure the components using the specified connectors and securing devices
- **P6** check the completed assembly to ensure that all operations have been completed and the finished assembly meets the required specification
- **P7** deal promptly and effectively with problems within your control and report those that cannot be solved
Knowledge and understanding

You need to know and understand:

K1 the health, safety and environmental requirements of the area in which the electrical assembly activity is to take place and the responsibility these requirements place on you

K2 the importance of wearing protective clothing (PPE) and other appropriate safety equipment during electrical component mounting activities

K3 the hazards associated with the type of assembly being undertaken and how to minimise the risks

K4 the use of grounded wrist straps and other electrostatic discharge (ESD) precautions, when required

K5 how to obtain and interpret drawings, circuit and physical layouts, charts, specifications, graphical electrical symbols, wiring regulations and other documents needed for the electrical component mounting activities

K6 how to deal effectively with victims of electric shock in the workplace (to include methods of safely isolating the power source and methods of first aid resuscitation)

K7 what constitutes a hazardous voltage and how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)

K8 the assembly methods and techniques to be used when mounting electrical distribution equipment, switchgear or control systems (such as soldering, lacing/strapping of wires, crimping)

K9 the type of components and sub-assemblies that are used in the assembly activities (such as contactors, relays, circuit breakers/fuses, solenoids, switches, transformers, ballast chokes, terminal blocks, sub-assemblies)

K10 the basic operating principles of the electrical components being assembled

K11 preparations to be undertaken on the components and enclosure, prior to the mounting activities

K12 how the components are to be aligned and positioned prior to securing and the tools and equipment that are used

K13 methods of attaching identification markers/labels during electrical assembly activities

K14 how to conduct any necessary checks to ensure the accuracy and quality of the assembly produced

K15 the visual checks and preparation requirements for components to be used in the electrical assembly activities

K16 how to recognise and identify any orientation requirements for all electrical distribution equipment, switchgear or control system components used in the assembly activities

K17 the methods and equipment used to transport, handle and lift the
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- Components into position and how to check that the equipment is within its current certification dates

K18 The methods and techniques used to prepare enclosures and the electrical distribution equipment, switchgear or control systems, equipment to be used in the assembly activities (such as removing and storing enclosure doors, cleaning parts, removing packaging, adding protective covers)

K19 How to check that tools and equipment are free from damage or defects, are in a safe and usable condition and are configured correctly for the intended purpose

K20 The reporting and documentation requirements relating to enclosure assembly and how to use them

K21 The extent of your own responsibility and whom you should report to if you have problems that you cannot resolve
Additional Information

Scope/range related to performance criteria

You must be able to:

1. carry out all of the following during the mounting of the electrical components:
   1.1 use the correct assembly drawings, specifications and job/order instructions
   1.2 adhere to risk assessment, COSHH and other relevant safety standards
   1.3 ensure that the components are free from damage, foreign objects, dirt or other contamination
   1.4 check that all tools and equipment are within calibration date (where appropriate) and serviceable
   1.5 prepare the electrical components and enclosures for the assembly operations
   1.6 use safe and approved techniques to mount the electrical components in the enclosures
   1.7 leave the work area in a safe and tidy condition

2. mount electrical components into enclosures, to include twenty of the following items:
   2.1 enclosure partitions
   2.2 bases for plug-in devices
   2.3 soft starters
   2.4 component mounting plates
   2.5 switches (push button, toggle)
   2.6 variable speed drives
   2.7 capacitors
   2.8 limit switches
   2.9 trunking
   2.10 resistors
   2.11 sensors
   2.12 conduit
   2.13 rectifiers
   2.14 programmable controllers
   2.15 contactors
   2.16 timers
   2.17 plugs/sockets
   2.18 overload protection relays
   2.19 relays
   2.20 power supplies
   2.21 grommets/grommet strip
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2.22 transformers/chokes
2.23 circuit boards
2.24 lighting fixtures
2.25 circuit breakers/fuses
2.26 thermistors/thermocouples
2.27 batteries
2.28 panel meters (voltage, current)
2.29 indicators (lamps, LEDs)
2.30 connector rails
2.31 terminal blocks/junction boxes
2.32 thermostats
2.33 solenoids
2.34 safety interlocks
2.35 busbars
2.36 other specific components

3. carry out eight of the following activities during the mounting of the electrical components:
   3.1 setting working clearance
   3.2 aligning components
   3.3 measuring
   3.4 applying sealants/adhesives
   3.5 drilling
   3.6 torque setting
   3.7 clamping
   3.8 filing
   3.9 earth bonding
   3.10 crimping
   3.11 riveting
   3.12 securing using mechanical fasteners/threaded/locking devices
   3.13 component marking/labelling
   3.14 sawing/cutting
   3.15 making belt connections
   3.16 forming
   3.17 punching
   3.18 making screw connections

4. carry out quality checks, to include seven of the following:
   4.1 positional accuracy
   4.2 alignment
   4.3 freedom from damage and foreign objects
   4.4 dimensions
   4.5 component security
   4.6 operating clearance
   4.7 orientation
   4.8 completeness
   4.9 electrical continuity/earthing checks
5. assemble electrical components in enclosures, to one of the following quality and accuracy standards:
   5.1 organisational drawings and procedures
   5.2 customer drawings and requirements
   5.3 wiring regulations
   5.4 BS and ISO standards
   5.5 other international standards

6. complete the relevant documentation, to include one of the following and pass it to the appropriate people:
   6.1 job/order cards
   6.2 work authorisation documents
   6.3 assembly records
   6.4 acceptance/test documentation
   6.5 other appropriate media
## SEMEEE3-31
### Mounting electrical components in enclosures

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