

# SEMEM3-81 - SQA Unit Code H2B4 04

## Assisting in the installation of electrical/electronic equipment



### Overview

This unit identifies the competences you need to assist in the installation of electrical/electronic equipment, in accordance with approved procedures. You will be required to assist in the installation of various electrical power supplies, such as single phase, three-phase, direct current and low voltage. The installation will also include fitting and connecting a range of electrical components, such as switchgear and distribution panels, motors and starters, control systems, safety devices, luminaires, and wiring enclosures.

This unit does not involve maintenance/repair type activities, such as removal and replacement of existing equipment, or the installation of simple, self-contained items of equipment requiring minimal installation.

You will be required to use the appropriate tools and equipment throughout the installation, and to apply a range of installation methods and techniques to install various electrical components, wires, cables, enclosures and connectors that make up the electrical system/circuit. In addition, you will be expected to make electrical connections to sensors/activators and other devices, as appropriate to the equipment being installed, which could include mechanical, fluid power, water or fuel supplies. The installation activities will include making checks and adjustments, in line with your permitted authority, and assisting others to ensure that the installed equipment functions to the required specification.

Your responsibilities will require you to comply with organisational policy and procedures for the installation activities undertaken, and to report any problems with the activities, tools or equipment used that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You must check that all tools, equipment and materials used in the installation activities are removed from the work area on completion of the work, and that the necessary job/task documentation is completed accurately and legibly. You will be expected to work to instructions, alone or in conjunction with others, taking personal responsibility for your own actions, and for the quality and accuracy of the work that you carry out.

The installation activity may be carried out as a team effort, but you must demonstrate a significant personal contribution to the installation activities, in order to satisfy the requirements of the standard, and you must demonstrate competence in all the areas required by the standard.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will enable you to adopt an informed approach to applying electrical/electronic installation procedures. You will have an understanding of

## **SEMEM3-81** - SQA Unit Code H2B4 04

### Assisting in the installation of electrical/electronic equipment

---

the equipment being installed and its installation requirements, in adequate depth to provide a sound basis for carrying out the installation process safely and effectively.

You will understand the safety precautions required when carrying out the installation activities, especially those for ensuring the safe isolation of services. You will be required to demonstrate safe working practices throughout, and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

## SEMEM3-81 - SQA Unit Code H2B4 04

### Assisting in the installation of electrical/electronic equipment

---

#### Performance criteria

*You must be able to:*

- P1 work safely at all times, complying with health and safety and other relevant regulations and guidelines
- P2 follow all relevant instructions/documentation for the installation being carried out
- P3 use the correct tools and equipment for the installation operations, and check that they are in a safe and usable condition
- P4 assist in the installation, positioning and securing of the equipment, using appropriate methods and techniques
- P5 carry out and/or assist in checking the installation, and make any adjustments in accordance with the specification
- P6 deal promptly and effectively with problems within your control and report any that cannot be solved
- P7 dispose of waste items in a safe and environmentally acceptable manner
- P8 assist in the completion of installation documentation

## SEMEM3-81 - SQA Unit Code H2B4 04

### Assisting in the installation of electrical/electronic equipment

---

#### Knowledge and understanding

*You need to know and understand:*

- K1 the health and safety requirements of the area in which the installation activity is to take place, and the responsibility these requirements place on you
- K2 the isolation and lock-off procedure or permit-to-work procedure that applies
- K3 the specific health and safety precautions to be applied during the installation procedure, and their effects on others
- K4 the hazards associated with installing electrical/electronic equipment, and with the tools and equipment used, and how to minimise them and reduce any risks
- K5 the importance of wearing protective clothing and other appropriate safety equipment during the installation
- K6 how to obtain and interpret information from job instructions and other documentation used in the installation activities (such as installation drawings, specifications, manufacturers' manuals, BS7671/IEE regulations, symbols and terminology)
- K7 the basic principle of operation of the equipment/circuits being installed
- K8 the different types of cabling used in the maintenance activities, and their methods of termination
- K9 the care, handling and application of electrical measuring instruments (such as multimeter, resistance tester, earth-loop impedance tester)
- K10 methods of lifting, handling and supporting the equipment during the installation activities
- K11 how to check that components meet the required specification/operating conditions (such as values, tolerance, current carrying capacity, voltage rating, power rating, working temperature range)
- K12 the techniques used to terminate electrical equipment (such as plugs, soldering, screwed, clamped and crimped connections)
- K13 methods of attaching markers/labels to components or cables, to assist with identification
- K14 the tools and equipment used in the installation activities (such as cable stripping tools, crimping tools, soldering irons and torches, gland connecting tools)
- K15 how to make adjustments to components/assemblies to ensure that they function correctly
- K16 how to check that tools and equipment are free from damage or defects, and are in a safe and usable condition
- K17 the importance of making 'off-load' checks before proving the equipment with the electrical supply on
- K18 why electrical bonding is critical, and why it must be both mechanically and electrically secure

## **SEMEM3-81** - SQA Unit Code H2B4 04

### Assisting in the installation of electrical/electronic equipment

---

- K19 the calibration/care and control procedures for tools and equipment
- K20 the problems that can occur with the installation operations, and how these can be overcome
- K21 the fault-finding techniques to be used if the equipment fails to operate correctly
- K22 the recording documentation to be completed for the activities undertaken
- K23 the extent of your own responsibility and to whom you should report 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 installation of the electrical/electronic equipment:
  - 1.1 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations
  - 1.2 confirm that authorisation to carry out the installation activities has been given
  - 1.3 check that safe access and working arrangements for the installation area have been provided
  - 1.4 confirm that services have been safely isolated, ready for the installation (such as mechanical, electricity, gas, air or fluids)
  - 1.5 check that all required installation consumables are available
  - 1.6 leave the work area in a safe condition and free from foreign object debris
2. assist in the installation of **six** of the following electrical modules/components:
  - 2.1 switchgear
  - 2.2 control devices
  - 2.3 emergency/standby batteries
  - 2.4 alarm devices
  - 2.5 communication equipment
  - 2.6 overload protection devices
  - 2.7 programmable controllers
  - 2.8 cable connectors
  - 2.9 sensors and actuators
  - 2.10 power factor correction devices
  - 2.11 encoders or resolvers
  - 2.12 electronic modules/units
  - 2.13 motors and starters
  - 2.14 conduit
  - 2.15 trunking
  - 2.16 luminaires
  - 2.17 bus bars
  - 2.18 traywork
  - 2.19 panels or sub-assemblies
  - 2.20 safety devices
  - 2.21 other electrical equipment (specify)
3. carry out **four** of the following installation methods and techniques:
  - 3.1 marking out the location of components/modules
  - 3.2 positioning and securing equipment and components
  - 3.3 securing by using mechanical fixings

## SEMEM3-81 - SQA Unit Code H2B4 04

### Assisting in the installation of electrical/electronic equipment

---

- 3.4 drilling and hole preparation
- 3.5 levelling and/or alignment
- 3.6 securing by using masonry fixings
- 3.7 making installation connections (such as mechanical, electrical, fluid power, utilities)
4. carry out **four** of the following cable termination activities:
  - 4.1 stripping cable insulation/protection
  - 4.2 attaching suitable cable identification
  - 4.3 routing and securing wires and cables
  - 4.4 heat shrinking (devices and boots)
  - 4.5 terminating cables and wires
  - 4.6 crimping (such as tags and pins)
  - 4.7 making mechanical/screwed/clamped connections
  - 4.8 sealing and protecting cable connections
  - 4.9 soldering and de-soldering
  - 4.10 adding cable end fittings
5. assist in the connection of equipment to **two** of the following types of electrical supply:
  - 5.1 single phase
  - 5.2 three phase
  - 5.3 direct current
  - 5.4 low voltage (up to 115V) SEMTA Non-ECRS Unit
6. use **two** of the following instruments during the installation activities:
  - 6.1 multimeter
  - 6.2 earth-loop impedance tester
  - 6.3 insulation resistance tester
  - 6.4 other specific test equipment
7. carrying out **three** the following checks on the installed equipment:
  - 7.1 making visual checks for completeness and freedom from damage
  - 7.2 polarity
  - 7.3 insulation resistance values
  - 7.4 earth-loop impedance
  - 7.5 continuity
8. assist in dealing with **two** of the following conditions during the installation process:
  - 8.1 installations with no faults
  - 8.2 partial equipment malfunction
  - 8.3 complete malfunction of equipment
9. assist in using fault location methods and techniques on the installed equipment, to include **one** of the following:
  - 9.1 diagnostic aids (such as company records/history, manufacturers' manuals, fault analysis charts, troubleshooting guides)
  - 9.2 fault finding techniques (such as six point, half-split, unit substitution)

## SEMEM3-81 - SQA Unit Code H2B4 04

### Assisting in the installation of electrical/electronic equipment

---

- 9.3 functional testing the installation/running equipment self-diagnostics
- 10. produce installations which comply with **all** of the following, as appropriate to the equipment being installed:
  - 10.1 equipment manufacturer's operation range
  - 10.2 BS7671/IEE wiring regulations
  - 10.3 BS, ISO and/or BSEN standards
  - 10.4 customer (contractual) standards and requirements
  - 10.5 company standards and procedures
- 11. assist in the completion of the relevant paperwork, to include **one** of the following:
  - 11.1 installation records
  - 11.2 company-specific documentation
  - 11.3 job card



## SEMEM3-81 - SQA Unit Code H2B4 04

### Assisting in the installation of electrical/electronic equipment

---

<b>Developed by</b>	SEMTA
<b>Version number</b>	1
<b>Date approved</b>	August 2008
<b>Indicative review date</b>	December 2014
<b>Validity</b>	Current
<b>Status</b>	Original
<b>Originating organisation</b>	SEMTA
<b>Original URN</b>	O45NEM3-81
<b>Relevant occupations</b>	Engineering Professionals; Engineering; Manufacturing technologies; Engineering Technicians; Process Operatives; Plant and Machine Operatives; Assemblers and Routine Operatives
<b>Suite</b>	Engineering Maintenance Suite 3 2008
<b>Key words</b>	Installation, mechanical equipment, tools and equipment, techniques, marking out, drilling, electrical, electronic