SEMEM381

Assisting in the installation of electrical/electronic equipment

Overview

This standard 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 standard 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 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.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety legislation and other relevant regulations, directives and guidelines
2. follow all relevant instructions/documentation for the installation being carried out
3. use the correct tools and equipment for the installation operations, and check that they are in a safe and usable condition
4. assist in the installation, positioning and securing of the equipment, using appropriate methods and techniques
5. carry out and/or assist in checking the installation, and make any adjustments in accordance with the specification
6. deal promptly and effectively with problems within your control and report any that cannot be solved
7. dispose of waste materials in accordance with safe working practices and approved procedures and leave the work area in a safe condition
8. complete and store all relevant installation documentation in accordance with organisational requirements

Knowledge and understanding

You need to know and understand:

1. 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
2. the isolation and lock-off procedure or permit-to-work procedure that applies
3. the specific health and safety precautions to be applied during the installation procedure, and their effects on others
4. the hazards associated with installing electrical/electronic equipment, and with the tools and equipment used, and how to minimise them and reduce any risks
5. the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the installation
6. what constitutes a hazardous voltage and how to recognise victims of electric shock
7. how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)
8. how to obtain and interpret information from job instructions and other documentation used in the installation activities (such as installation drawings, specifications, manufacturers' manuals, current wiring regulations, symbols and terminology)
9. the basic principle of operation of the equipment/circuits being installed
10. the different types of cabling used in the maintenance activities, and their methods of termination
11. the care, handling and application of electrical measuring instruments (such as multimeter, resistance tester, earth-loop impedance tester)
12. methods of lifting, handling and supporting the equipment during the installation activities
13. 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)
14. the techniques used to terminate electrical equipment (such as plugs, soldering, screwed, clamped and crimped connections)
15. methods of attaching markers/labels to components or cables, to assist with identification
16. the tools and equipment used in the installation activities (such as cable

stripping tools, crimping tools, soldering irons and torches, gland connecting tools)
17. how to make adjustments to components/assemblies to ensure that they function correctly
18. how to check that tools and equipment are free from damage or defects, and are in a safe and usable condition
19. the importance of making `off-load' checks before proving the equipment with the electrical supply on
20. why electrical bonding is critical, and why it must be both mechanically and electrically secure
21. the calibration/care and control procedures for tools and equipment
22. the problems that can occur with the installation operations, and how these can be overcome
23. the fault-finding techniques to be used if the equipment fails to operate correctly
24. the recording documentation to be completed for the activities undertaken
25. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

Scope/range

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 deal promptly with any problems and report any that cannot be solved

dispose of waste materials in accordance with safe working practices and approved procedures, and leave the work area in a safe condition

1.

Assist in the installation of six of the following electrical modules/components:

1.1 switchgear
1.2 control devices
1.3 emergency/standby batteries
1.4 alarm devices
1.5 communication equipment
1.6 overload protection devices
1.7 programmable controllers
1.8 cable connectors
1.9 sensors and actuators
1.10 power factor correction devices
1.11 encoders or resolvers
1.12 electronic modules/units
1.13 motors and starters
1.14 conduit
1.15 trunking
1.16 luminaires
1.17 bus bars
1.18 traywork
1.19 panels or sub-assemblies
1.20 safety devices
1.21 other specific electrical equipment

2.

Carry out four of the following installation methods and techniques:

2.1 marking out the location of components/modules
2.2 positioning and securing equipment and components
2.3 securing by using mechanical fixings
2.4 drilling and hole preparation
2.5 levelling and/or alignment
2.6 securing by using masonry fixings
2.7 making installation connections (such as mechanical, electrical, fluid power, utilities)

3.

Carry out four of the following cable termination activities:

3.1 stripping cable insulation/protection
3.2 attaching suitable cable identification
3.3 routeing and securing wires and cables
3.4 heat shrinking (devices and boots)
3.5 terminating cables and wires
3.6 crimping (such as tags and pins)
3.7 making mechanical/screwed/clamped connections
3.8 sealing and protecting cable connections
3.9 soldering and de-soldering
3.10 adding cable end fittings

4.

Assist in the connection of equipment to two of the following types of electrical supply:

4.1 single phase
4.2 three phase
4.3 direct current
4.4 low voltage (up to 115V)

5.

Use two of the following instruments during the installation activities:

5.1 multimeter
5.2 earth-loop impedance tester
5.3 insulation resistance tester
5.4 other specific test equipment

6.

Carrying out three the following checks on the installed equipment:

6.1 making visual checks for completeness and freedom from damage
6.2 polarity
6.3 insulation resistance values
6.4 earth-loop impedance
6.5 continuity

7.

Assist in dealing with two of the following conditions during the installation process:

7.1 installations with no faults
7.2 partial equipment malfunction

7.3 complete malfunction of equipment

8.

Assist in using fault location methods and techniques on the installed equipment, to include one of the following:

8.1 diagnostic aids (such as organisational records/history, manufacturers' manuals, fault analysis charts, troubleshooting guides)
8.2 fault finding techniques (such as six-point, half-split, unit substitution)
8.3 functional testing the installation/running equipment self-diagnostics

9.

Produce installations which comply with one of the following:

9.1 equipment manufacturer's operation range
9.2 current wiring regulations
9.3 BS, ISO and/or BSEN standards
9.4 customer (contractual) standards and requirements
9.5 organisational standards and procedures

10.

Complete and store all relevant installation documentation in accordance with organisational requirements, to include one of the following:

10.1 installation records
10.2 organisational-specific documentation
10.3 job card
10.4 electronic reports

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