

SEMEMI2-11 - SQA Unit Code H2AS 04

Carrying out modifications or rewiring electrical circuits



Overview

This unit identifies the competences you need to modify or rewire electrical circuits and equipment, in accordance with approved procedures. This will involve modifying or rewiring electrical circuits on equipment such as control systems, motors and starters, switchgear and distribution panels, electrical plant, wiring enclosures and luminaires, portable appliances and other specific electrical equipment.

You will be expected to carry out a range of rewiring or modification processes, such as removing and replacing cables, adding new cables, changing or adding components to panels or sub-assemblies, changing breakout points and changing the routing of cables. You will need to show ability in using various tools and equipment for cutting, stripping, crimping and soldering, bending and forming conduit, and for the installation of the various wires, cables and components that make up the electrical system and circuits.

Your responsibilities will require you to comply with organisational policy and procedures for the modification or rewiring 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 must ensure that all tools, equipment and materials used in the modification activities are removed from the work area on completion of the activities, and that all 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.

Your underpinning knowledge will be sufficient to provide a sound basis for your work, and will provide an informed approach to applying modification/rewiring procedures to electrical circuits. You will have an understanding of the function and operating conditions of the circuits being modified or rewired, in sufficient depth to determine if suitable alterations can be made, and to ensure that these are carried out in a safe and practical manner. You will also understand the organisational policy on modifying/rewiring electrical circuits, and its application.

You will understand the safety precautions required when carrying out modification activities, especially those for isolating the equipment. You will also understand your responsibilities for safety, and the importance of taking the necessary safeguards to protect yourself and others in the workplace.

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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 obtain and follow the relevant modification specifications and job instructions
- P3 confirm and agree what modifications are to be carried out to meet the specification
- P4 prepare the electrical system for the required modification
- P5 carry out the system modification using approved materials, methods and procedures
- P6 complete the modification within the agreed timescale
- P7 ensure the modified electrical system meets the specified operating conditions
- P8 produce accurate and complete records of all modification work carried out
- P9 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 specific safety precautions and procedures to be observed whilst carrying out the modifications of the electrical circuit (including any specific legislation, regulations or codes of practice relating to the activities, equipment or materials)
- K2 the health and safety requirements of the work area in which you are carrying out the modification activities, and the responsibility these requirements place on you
- K3 the hazards associated with carrying out modifications of electrical circuits, and how they can be minimised
- K4 how to recognise and deal with victims of electric shock (to include methods of safely removing the victim from the power source, isolating the power source, and methods of first aid resuscitation)
- K5 the personal protective equipment and clothing to be worn during the modification activities
- K6 how to obtain and interpret information from job instructions and other documentation used in the rewiring or modification activities (such as drawings, specifications, manufacturers' manuals, BS7671/IEE regulations, symbols and terminology)
- K7 the basic principles of how the system functions, its operating sequence, the working purpose of individual units/components, and how they interact
- K8 The different types of cabling (such as multicore cables, single core cables, steel wire armoured (SWA) cables, mineral insulated (MI) cables, screened cables), their fittings and their application
- K9 the different types of electrical components (such as plugs, switches, lighting and fittings, junction boxes, consumer units)
- K10 preparations to be undertaken on the equipment, prior to the modification
- K11 how to extract and insert new cables in wiring enclosures (such as conduit, trunking and traywork), without causing damage to other cables or components
- K12 the methods and techniques used for soldering and de-soldering, and the importance of adhering to these procedures
- K13 the methods and techniques used for crimping and heat shrinking, and the importance of adhering to these procedures
- K14 the importance of ensuring that the completed circuit is free from foreign objects, and that all terminations are electrically sound and mechanically secure
- K15 how to conduct any necessary checks to ensure that the completed modification complies with all appropriate standards
- K16 how to check that tools and equipment are free from damage or defect, are in a safe and usable condition, and are configured correctly for their

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- intended purpose
- K17 the problems that can occur with the modification operations, and how these can be overcome
- K18 the recording documentation to be completed for the activities undertaken
- K19 the extent of your own authority 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 modification or rewiring activities:
 - 1.1. undertake the modification/rewiring activities to cause minimal disruption to normal working
 - 1.2. use the correct issue of maintenance documentation (such as drawings, manuals, maintenance records)
 - 1.3. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations
 - 1.4. ensure the safe isolation of equipment (such as electricity, mechanical, gas, air or fluids)
 - 1.5. provide safe access and working arrangements for the modification area
 - 1.6. modify/rewire electrical circuits, using approved techniques and procedures
 - 1.7. apply safe working practices and procedures at all times
 - 1.8. dispose of waste items in a safe and environmentally acceptable manner
 - 1.9. leave the work area in a safe and tidy condition

2. carry out modification or rewiring activities on **one** of the following types of circuit:
 - 2.1. single phase power supplies
 - 2.2. three-phase power supplies
 - 2.3. direct current power supplies
 - 2.4. single phase lighting circuits

3. carry out modification or rewiring activities on **three** of the following types of electrical equipment:
 - 3.1. electrical plant
 - 3.2. wiring enclosures
 - 3.3. portable appliances
 - 3.4. motors and starters
 - 3.5. luminaires
 - 3.6. switchgear and distribution panels
 - 3.7. control systems and components
 - 3.8. other specific electrical equipment

4. carry out **four** of the following, using appropriate methods and procedures:
 - 4.1. replacing cables of different size or length
 - 4.2. changing or adding components to panels or sub-assemblies

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- 4.3. changing the position or angle of breakout points
 - 4.4. adding or removing components from circuits
 - 4.5. making changes to looms or mains circuits
 - 4.6. changing the route of cables
 - 4.7. changing position of electrical units
 - 4.8. removing cables
 - 4.9. adding cables to existing circuits
5. carry out **four** of the following, using appropriate methods and procedures
- 5.1. terminating mineral and armoured cables
 - 5.2. bending and forming conduit
 - 5.3. bending and forming trunking and trays
 - 5.4. sealing and protecting cable connections
 - 5.5. making mechanical/screwed/clamped connections
 - 5.6. soldering and de-soldering
 - 5.7. heat shrinking (such as devices and boots)
 - 5.8. crimping (such as tags and pins)
 - 5.9. stripping cable insulation/protection
 - 5.10. removing cable end fittings
 - 5.11. extracting/inserting components
 - 5.12. allocating identification markings
6. carry out modifications or rewiring to electrical circuits, in accordance with **one** of the following:
- 6.1. organisational guidelines and codes of practice
 - 6.2. equipment manufacturers' operation range
 - 6.3. BS7671/IEE wiring regulations
 - 6.4. BS, ISO and/or BSEN standards
7. complete **one** of the following maintenance records, and pass it to the appropriate person:
- 7.1. job cards
 - 7.2. company-specific documentation
 - 7.3. permit to work/formal risk assessment
 - 7.4. maintenance logs and action reports

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