SEMEMI2-22 - SQA Unit Code H2B1 04
Carrying out maintenance on emergency power generation equipment

Overview

This unit identifies the competences you need to carry out corrective maintenance activities on emergency power generation equipment, in accordance with approved procedures. This will involve dismantling, removing and replacing faulty or damaged components, in line with company procedures, on a variety of emergency power generation equipment, including engine/primary power source, the generator, the electrical load connection, and the appropriate control equipment.

You will be expected to cover a range of maintenance activities, such as marking/labelling of components to aid the reassembly, aligning/adjusting of components, and dismantling components by mechanically dismantling, unplugging, de-soldering, and removal of screwed, clamped and crimped connections, using appropriate techniques and procedures.

Your responsibilities will require you to comply with organisational policy and procedures for the maintenance activities undertaken, and to report any problems with these activities, or with the tools and equipment used, 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 maintenance 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 enable you to adopt an informed approach to applying maintenance procedures to emergency power generation systems and equipment. You will have an understanding of dismantling and reassembly methods and procedures, and their application. You will know how the emergency power generation system and equipment functions and the purpose of individual components, in adequate depth to provide a sound basis for carrying out any repair or adjustment. In addition, you will have sufficient knowledge of these components to ensure that they are fit for purpose and meet the specifications, thus providing a sound basis for carrying out reassembly.

You will understand the safety precautions required when carrying out the maintenance activities, especially those for isolating the equipment. 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.

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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 follow the relevant maintenance schedules to carry out the required work

P3 carry out the maintenance activities within the limits of your personal authority

P4 carry out the maintenance activities in the specified sequence and in an agreed time scale

P5 report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule

P6 complete relevant maintenance records accurately and pass them on to the appropriate person

P7 dispose of waste materials in accordance with safe working practices and approved procedures

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Knowledge and understanding

You need to know and understand:

K1 the health and safety requirements of the area in which the maintenance activity is to take place

K2 the isolation and lock-off procedure or permit-to-work procedure that applies to the equipment being maintained

K3 the specific health and safety precautions to be applied during the maintenance procedure, and their effects on others

K4 the hazards associated with carrying out maintenance activities on emergency power generation equipment/systems (such as moving machinery, hot components, stored pressure/force, live electrical connections, handling oils and coolants, using damaged or badly maintained tools and equipment, not following laid-down maintenance procedures), and how they can be minimised

K5 the importance of wearing the correct personal and environmental protection equipment, and other appropriate safety equipment, during the maintenance process

K6 how to obtain and interpret information from job instructions and other documents needed for the maintenance activities (such as drawings, circuit and physical layouts, charts, specifications, manufacturers' manuals, history/maintenance reports, graphical electrical symbols, BS7671/IEE wiring regulations)

K7 the basic principles of how the equipment functions, its operating sequence, the working purpose of individual units/components and how they interact

K8 why electrical earthing and bonding is critical, and why it must be both mechanically and electrically secure

K9 the sequence to be adopted for the dismantling/reassembly of various types of assemblies

K10 the methods and techniques used to dismantle/assemble emergency power generation equipment (such as removing bolted components and assemblies, removing components requiring pressure, unplugging, de-soldering, removal of screwed, clamped and crimped connections)

K11 methods of checking that components are fit for purpose, how to identify defects and wear characteristics, and the need to replace `lifed' items (such as batteries, lamps, seals and gaskets)

K12 how to make adjustments to components/assemblies to ensure that they function correctly

K13 methods of removing and replacing components and units, without damaging the system and infrastructure

K14 the use of electrical measuring equipment (such as multimeters and resistance testers)

K15 methods of testing the equipment and systems for leaks, and the tools

and equipment that can be used

K16 types of coolants and antifreeze agents; quantities used; and methods of flushing and filling the system

K17 how to check that tools and equipment are free from damage or defects, and are in a safe and usable condition

K18 the importance of maintenance documentation and/or reports following the maintenance activity, and how to generate them

K19 the equipment operating and control procedures to be applied during the maintenance activity

K20 how to use lifting and handling equipment correctly and safely in the maintenance activity

K21 the problems associated with the maintenance activity, and how they can be overcome

K22 the organisational procedure to be adopted for the safe disposal of waste of all types of materials

K23 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 maintenance activity:
   - 1.1. undertake the maintenance 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 mechanical, electricity, gas, air or fluids)
   - 1.5. ensure that safe access and working arrangements have been provided for the maintenance area
   - 1.6. re-connect and return the equipment to service on completion of the maintenance activities
   - 1.7. dispose of waste items in a safe and environmentally acceptable manner
   - 1.8. leave the work area in a safe and tidy condition
2. carry out maintenance activities on **two** of the following types of emergency power generation equipment:
   - 2.1. turbine alternator sets
   - 2.2. piston engine alternator sets
   - 2.3. generators
   - 2.4. governors
   - 2.5. control gear
   - 2.6. voltage regulators
   - 2.7. batteries and chargers
   - 2.8. mechanical protection equipment
   - 2.9. electrical protection equipment
3. carry out **all** of the following maintenance activities:
   - 3.1. testing the system for leaks
   - 3.2. dismantling equipment to required level
   - 3.3. tightening fasteners to the required torque
   - 3.4. checking components for serviceability replacing damaged/defective components
   - 3.5. setting, aligning and adjusting replaced components
   - 3.6. checking the correct operation of all safety devices
   - 3.7. marking/labelling of components
   - 3.8. making ‘off-load’ checks before starting up
   - 3.9. replenishing oil, coolant or grease
   - 3.10. replacing all ‘lifed’ items (such as batteries, lamps)
   - 3.11. functionally testing the completed system

4. maintain and/or replace **six** of the following types of components:
   - 4.1. engine components (such as valves, shell bearings)
   - 4.2. turbine components
   - 4.3. bearings and seals
   - 4.4. clutches and brakes
   - 4.5. drive mechanisms (such as gears, chains, pulleys and belts)
   - 4.6. transmission items (such as shafts, couplings)
   - 4.7. fuel supply components (such as pumps, injectors, pipes)
   - 4.8. ignition (such as plugs, heaters, burners)
   - 4.9. cooling equipment (such as radiators, pumps, hoses)
   - 4.10. lubrication components (such as pumps, filters, pipes)
   - 4.11. exhaust systems
   - 4.12. speed governing components
   - 4.13. control panel components (such as breakers, contactors)
   - 4.14. temperature control components (such as thermostat, thermocouples, thermistors)
   - 4.15. electronic components (such as circuit boards, timers, transducers)
   - 4.16. annunciators/alarms
   - 4.17. voltage regulators
   - 4.18. relays and solenoids
   - 4.19. sensors
   - 4.20. switches and switch gear
   - 4.21. electrical cables
   - 4.22. overload protection devices
   - 4.23. safety devices
   - 4.24. pressure relief valves
   - 4.25. meters/gauges (such as temperature, pressure, speed)
   - 4.26. test systems (manual or automatic)
   - 4.27. noise reduction/attenuation
5. maintain emergency power generation equipment, in accordance with **one** of the following:
   - 5.1. organisational guidelines and codes of practice
   - 5.2. equipment manufacturer's guidelines
   - 5.3. BS7671/IEE wiring regulations
   - 5.4. BS, ISO and/or BSEN standards
6. complete **one** of the following maintenance records, and pass it to the appropriate person:
   - 6.1. job cards
   - 6.2. permit to work/formal risk assessment
   - 6.3. maintenance log and action report
   - 6.4. company specific documentation

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