SEMEM365

Servicing anaesthetic and ventilation equipment

Overview

This standard identifies the competences you need to carry out servicing activities on anaesthetic and ventilation equipment, in accordance with approved procedures. You will be required to service a range of anaesthetic and ventilation equipment, such as anaesthetic machines, anaesthetic vaporisers, breathing circuits, ventilation units, anaesthetic gas scavenging system (AGSS) and medical gas cylinders. This will involve dismantling, removing and replacing faulty items on a variety of different types of anaesthetic and ventilation equipment. You will be expected to apply a range of dismantling and reassembly methods and techniques, which are appropriate to the equipment being serviced and the type of components being removed/replaced, and which will include electrical, electronic and mechanical units and components.

Your responsibilities will require you to comply with organisational policy and procedures for the servicing activities undertaken, and to report any problems with the activities that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You must ensure that all tools, equipment and materials used in the servicing 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 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 the correct servicing procedures. You will understand the dismantling and reassembly methods and procedures used, and their application. You will know about the anaesthetic and ventilation equipment being worked on, and component properties, functions and associated defects, in adequate depth to provide a sound basis for carrying out the servicing activities, correcting faults and ensuring that the serviced equipment functions to the required specification and remains compliant with all standards and regulations.

You will understand the safety precautions required when carrying out the servicing 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.

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 the relevant servicing schedules to carry out the required work
3. carry out the servicing activities within the limits of your personal authority
4. carry out the servicing activities in the specified sequence and in an agreed timescale
5. remove and replace/refit a range of components
6. report any instances where the servicing activities cannot be fully met or where there are identified defects outside the planned schedule
7. complete and store all relevant servicing documentation in accordance with organisational requirements
8. dispose of waste materials in accordance with safe working practices and approved procedures and leave the work area in a safe condition

Knowledge and understanding

You need to know and understand:

1. the health and safety, infection control and de-contamination requirements of the work area and equipment being serviced, and the responsibility these requirements place on you
2. the statutory and advisory documentation relating to medical devices (such as warnings and guidance from the regulatory authority, relevant standards)
3. the importance of reporting any equipment adverse incidents to the regulatory authority
4. the isolation procedure that applies to the servicing activities (such as electrical isolation, removal of fuses, placing of maintenance warning notices)
5. 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, methods of first aid resuscitation)
6. how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)
7. the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the servicing activities
8. how to obtain and interpret documents needed in the servicing activities (such as drawings, circuit and physical layouts, charts, specifications, manufacturers' manuals, history/maintenance reports, graphical electronic/electrical symbols, wiring regulations)
9. the working practices of, and the need to respect, the hospital ward and/or patient environment
10. hazards associated with carrying out servicing activities on anaesthetic and ventilation equipment (such as exposure to live conductors, gases and anaesthetic agents) and how to minimise them and reduce any risk
11. the basic principle of operation of the anaesthetic and ventilation equipment being serviced, and the function of individual components
12. the human physiology directly associated with the anaesthetic and ventilation equipment being serviced
13. the risks to the human body from external energy sources associated with anaesthetic and ventilation equipment
14. the application and functions of a range of components used in the equipment

(such as switches, sensors, overload protection devices, transformers, thermistors, rectifiers, printed circuit boards, valves, pumps)
15. the care, handling and application of ohmmeters, multimeters and other electrical measuring instruments (such as dedicated test equipment)
16. organisational policy on the repair/replacement of components, and the procedure for obtaining replacement parts, materials and other consumables necessary for the servicing activities
17. how to check that the replacement components meet the required specification/operating conditions (such as values, tolerance, current carrying capacity, voltage rating, power rating, working temperature range)
18. the techniques used to dismantle/reassemble anaesthetic and ventilation equipment (such as unplugging, de-soldering, removal of screwed, clamped and crimped connections, removal of pipes, hoses and mechanical components)
19. methods of removing and replacing components without causing damage to the equipment or other components
20. the procedures and precautions to be adopted to eliminate/protect against electrostatic discharge (ESD) when working on sensitive equipment or devices
21. the different types of cabling (such as multicore cables, single core cables, steel wire armoured (SWA), mineral insulated (MI), screened cables, data cables) and their application
22. the use of current wiring and other regulations when replacing wires and cables
23. methods of attaching identification markers/labels to removed components or cables to assist with re-assembly
24. the tools and equipment used in the servicing activities (including the use of cable stripping tools, crimping tools, soldering irons)
25. methods of checking that components are fit for purpose, and the need to replace `lifed' items
26. how to make adjustments to components/assemblies to ensure that they function correctly
27. 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
28. the importance of carrying out electrical safety tests on anaesthetic and ventilation equipment, and the implications if this is not carried out
29. the importance of making visual checks before proving the equipment with the electrical supply on
30. the generation of documentation and/or reports following the servicing activity
31. the equipment operating and control procedures to be applied during the

servicing activity

32. the problems that can occur during the servicing activity, and how they can be overcome

33. the organisational procedure(s) to be adopted for the safe disposal of waste of all types of materials

34. the extent of your own authority and to whom you should report if you have a problem that you cannot resolve

Scope/range

1.

Carry out all of the following during the servicing activities:

1.1 plan and communicate the servicing activities so as to minimise disruption to normal working
1.2 obtain and use the correct issue of organisational and/or manufacturers' drawings and servicing documentation
1.3 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
1.4 ensure that the correct equipment decontamination procedure has been adhered to before and after the servicing activities
1.5 ensure the safe isolation of equipment (such as electricity, mechanical, gas, air or fluids)
1.6 provide and maintain safe access and working arrangements for the servicing area
1.7 carry out the servicing activities, using appropriate techniques and procedures
1.8 return the equipment to service on completion of the activities
1.9 dispose of waste materials in accordance with safe working practices and approved procedures and leave the work area in a safe condition

2.

Carry out servicing on five of the following types of anaesthetic and ventilation equipment:

2.1 anaesthetic machines
2.2 breathing circuits
2.3 anaesthetic gas scavenging system (AGSS)
2.4 anaesthetic vaporisers
2.5 ventilation units
2.6 medical gas cylinders and associated equipment

3.

Carry out all of the following activities, as applicable to the equipment being serviced:

3.1 isolating the equipment
3.2 applying electrostatic discharge (ESD) precautions
3.3 dismantling equipment to the appropriate level
3.4 disconnecting and reconnecting wires and cables
3.5 soldering and de-soldering (as applicable)
3.6 attaching suitable cable identification markers
3.7 removing and replacing electrical units/components
3.8 removing and replacing mechanical units/components
3.9 checking components for serviceability

3.10 replacing damaged/defective components
3.11 replacing all `lifed' items
3.12 setting and adjusting replaced components
3.13 tightening fastenings to the required torque
3.14 re-calibrating and/or adjusting equipment
3.15 making visual checks before powering up
3.16 checking equipment operating parameters
3.17 carrying out electrical safety tests
3.18 functionally testing the serviced equipment

4.

Remove and replace/refit a range of components, to include fifteen of the following:

4.1 cables and connectors
4.2 filters
4.3 potentiometers
4.4 printed circuit boards
4.5 sensors
4.6 gauges
4.7 overload protection devices
4.8 thermistors
4.9 display units
4.10 switches
4.11 transformers
4.12 indicators (lamps, LEDs)
4.13 locking and retaining devices
4.14 transducers
4.15 valves
4.16 power supplies
4.17 regulators
4.18 pumps
4.19 analogue or digital integrated circuits
4.20 canisters
4.21 motors
4.22 potentiometers
4.23 timers
4.24 hoses/pipework
4.25 flow meters
4.26 seals
4.27 bellows
4.28 diaphragms
4.29 batteries
4.30 structural components
4.31 rectifiers
4.32 other specific components

5.

Service anaesthetic and ventilation equipment, in compliance with all of the following:

5.1 organisational guidelines and codes of practice
5.2 equipment manufacturer's operation range
5.3 relevant and current documentation such as those provided by MHRA or the regulatory authority
5.4 equipment and associated BSEN standards, CE marking and, where appropriate wiring regulations
5.5 the equipment functions to specification
5.6 the equipment remains compliant with all standards and regulations
5.7 all potential defects are identified and reported for future action

6.

Complete and store all relevant repair documentation in accordance with organisational requirements, using one of the following:

6.1 job cards
6.2 servicing logs or reports
6.3 organisational-specific documentation
6.4 electronic reports

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