

Overview

This standard identifies the competences you need to carry out maintenance activities on medical gas pipeline systems and equipment, in accordance with approved procedures. You will be required to maintain a range of piped medical gas systems and equipment, such as medical/surgical compressed air systems, cylinder manifold systems, terminal supply units, medical vacuum systems, and anaesthetic gas scavenging systems, dental compressed air and vacuum systems, primary, secondary and tertiary supply systems. This will involve dismantling, removing and replacing faulty items, at component or unit level, on a variety of different types of medical gas pipeline systems and equipment and, where appropriate, this will involve depressurising the system and removing, replacing and repairing system components, as applicable.

Your responsibilities will require you to comply with organisational policy and procedures for the maintenance 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 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 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 maintenance procedures. You will understand the dismantling and reassembly methods and procedures used, and their application. You will know about the medical gas pipeline system and equipment being worked on, its component properties, functions and associated defects, in adequate depth to provide a sound basis for carrying out the maintenance activities, correcting faults and ensuring that the maintained 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 maintenance 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 maintenance schedules to carry out the required work
3. carry out the maintenance activities within the limits of your personal authority
4. carry out the maintenance activities in the specified sequence and in an agreed timescale
5. report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule
6. complete and store all relevant maintenance documentation in accordance with organisational requirements
7. 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 maintained, and the responsibility these requirements place on you
2. the statutory and advisory documentation relating to medical gas pipeline systems and equipment (such as warnings and guidance from the regulatory authority, relevant standards, Health Technical Memorandum (HTM) documentation)
3. the importance of reporting any equipment adverse incidents to the regulatory authority
4. the permit-to-work procedure that applies to the gas pipeline system being maintained
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, isolating transformers)
7. the importance of wearing protective clothing and other appropriate safety equipment (PPE)
8. hazards associated with carrying out maintenance activities on medical gas pipeline systems and equipment, and how to minimise them and reduce any risks
9. how to obtain and interpret documents needed in the maintenance activities (such as drawings, circuit and physical layouts, charts, specifications, manufacturers' manuals, history/maintenance reports, graphical electronic/electrical symbols and current wiring regulations)
10. the working practices of, and the need to respect, the hospital ward and/or patient environment
11. the basic principles of operation of the medical gas pipeline system and equipment being maintained, and the function of individual components
12. the identification and application of different types of valve (such as poppet, spool, piston, disc, ball)
13. the identification and application of different types of sensors (such as optical, reed, micro)

14. the identification and application of different types of actuators (such as rotary, linear, single acting, double acting)
15. the identification and application of different types of compressor (such as single acting, double acting)
16. the identification and application of different types of pump (such as positive and dynamic, reciprocating, screw and claw)
17. the sequence to be adopted for the dismantling/reassembly of various types of medical gas pipeline system
18. the care, calibration, handling and application of appropriate measuring instruments and test equipment
19. the organisational policy on the repair/replacement of components, and the procedure for obtaining replacement parts, materials and other consumables necessary for the maintenance activities
20. how to check that replacement components meet the required specification/operating conditions
21. the techniques used to dismantle/reassemble medical gas pipeline systems and equipment
22. methods of removing and replacing components without causing damage to the equipment or other components
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 maintenance activities
25. methods of checking that components are fit for purpose, and the need to replace 'lived' items
26. how to make adjustments to components/assemblies to ensure that they function correctly
27. the methods used to label and identify different pipework systems (including colour coding/warning signs)
28. 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
29. the importance of ensuring that sampling and testing of medical gases is carried out on completion of the maintenance activities, and the implications if this is not carried out
30. the importance of making visual checks before proving the equipment
31. the generation of documentation and/or reports following the maintenance activity
32. the equipment operating and control procedures to be applied during the

maintenance activity

33. the problems that can occur during the maintenance activity, and how they can be overcome

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

35. 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 maintenance activities:

- 1.1 plan and communicate the maintenance activities so as to minimise disruption to normal working
- 1.2 obtain and use the correct issue of organisational and/or manufacturers' drawings and maintenance documentation
- 1.3 adhere to procedures or systems in place for risk assessment, COSHH, relevant health technical memorandums (HTM) personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
- 1.4 comply with permit-to-work procedures at all times
- 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 maintenance area
- 1.7 carry out the maintenance activities, using appropriate techniques and procedures
- 1.8 return the system/equipment to service on completion of the maintenance activities
- 1.9 hand over the maintained system/equipment to the appropriate person to authorise that the system can be returned to service
- 1.10 record the results of the maintenance activity and report any defects found
- 1.11 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 maintenance on six of the following medical gas pipeline systems and equipment:

- 2.1 medical vacuum system
- 2.2 cylinder manifold system
- 2.3 medical/surgical compressed air system
- 2.4 terminal supply units
- 2.5 dental compressed air and vacuum system
- 2.6 monitoring and alarm systems
- 2.7 anaesthetic gas scavenging system
- 2.8 primary, secondary and tertiary supply systems

3.

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

- 3.1 using appropriate techniques to release stored pressure safely
- 3.2 supporting equipment components
- 3.3 disconnecting/removing hoses and pipes

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- 3.4 removing and replacing units/components (such as pumps, cylinders, valves, actuators)
- 3.5 proofmarking/labelling of removed components
- 3.6 visually checking components for serviceability
- 3.7 replacing all 'lived' items (such as seals, filters, gaskets)
- 3.8 disconnecting and re-connecting cables and wires
- 3.9 removing and replacing electrical/electronic units/components (such as switches, circuit boards)
- 3.10 setting, aligning and adjusting replaced components
- 3.11 tightening fastenings to the required torque
- 3.12 making 'off-load' checks before re-pressurising the system
- 3.13 carrying out emergency repairs
- 3.14 testing the system for leaks
- 3.15 functional testing of the maintained system

4.

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

- 4.1 protection devices
- 4.2 power supplies
- 4.3 manifolds
- 4.4 switches
- 4.5 batteries
- 4.6 pipework
- 4.7 electrical connectors
- 4.8 heater elements
- 4.9 gauges
- 4.10 locking and retaining devices
- 4.11 drain flasks
- 4.12 filters and filtration components
- 4.13 seals and gaskets
- 4.14 display meter units
- 4.15 inspection ports
- 4.16 sensors
- 4.17 printed circuit boards
- 4.18 drains
- 4.19 pumps
- 4.20 reservoirs
- 4.21 medical gas cylinders
- 4.22 valves
- 4.23 receivers
- 4.24 separators
- 4.25 motors
- 4.26 compressors
- 4.27 indicator lamps/LEDs
- 4.28 pistons
- 4.29 cylinders
- 4.30 identification markers

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4.31 regulators

4.32 actuators

5.

Maintain medical gas pipeline systems, 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 HTM documentation

5.4 equipment and associated BSEN standards, CE marking and current wiring regulations (where appropriate)

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 maintenance documentation in accordance with organisational requirements, using one of the following:

6.1 job cards

6.2 servicing logs or reports

6.3 permit to work

6.4 organisational-specific documentation

6.5 electronic reports

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