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## Overview

This standard identifies the competences you need to carry out overhauling activities on pneumatic, vacuum or compressed air equipment and components, in accordance with approved procedures. The equipment to be overhauled will have been removed from its operating environment, and the overhauling activities will take place in a maintenance environment or equipment manufacturer's workshop.

It covers a range of pneumatic, vacuum and compressed air equipment such as air and vacuum pumps, pressure and flow control valves, cylinders and actuators, compressors, intensifiers, accumulators, regulators and other specific equipment. The overhauling activities will include carrying out all necessary safety activities, dismantling the equipment to component level, inspecting and checking all components for damage and wear, replacing all 'lived' items and worn/faulty components or units, reassembling the equipment and carrying out all necessary tests/checks.

Your responsibilities will require you to comply with organisational policy and procedures for the overhauling activities undertaken, and to report any problems with these activities, or with the tools and equipment used 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 overhauling activities are removed from the work area, 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 appropriate overhauling procedures to pneumatic, vacuum or compressed air equipment. You will understand the dismantling and reassembly methods and procedures used, and their application. You will know how the equipment functions, the common faults encountered, the purpose of the individual components and associated defects, in adequate depth to provide a sound basis for carrying out the overhauling activities, correcting faults and ensuring that the overhauled equipment meets the required specification.

You will understand the safety precautions required when carrying out the overhauling

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activities. 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:*

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1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. follow the relevant overhauling schedules to carry out the required work
3. establish the components to be removed and, where appropriate, mark components to aid re-assembly
4. ensure that any stored energy or substances are released safely and correctly
5. carry out the overhaul to the agreed level, using the correct tools and techniques
6. ensure that all removed components are correctly identified and stored in the correct location
7. report any instances where the overhauling activities cannot be fully met, or where there are identified defects outside the planned overhauling schedule
8. complete the relevant documentation, in accordance with organisational requirements
9. dispose of unwanted components, waste materials and substances, in accordance with safe working practices and approved procedures
10. 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:*

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1. how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. hazards associated with carrying out overhauling activities on pneumatic, vacuum and compressed air equipment and how to minimise them and reduce any risks
3. the importance of wearing protective clothing (PPE) and other appropriate safety equipment during the overhaul
4. how to use and extract information from equipment manuals, history/maintenance reports, charts, circuit and physical layouts, specifications, symbols used in pneumatic, vacuum and compressed air systems, and other documents needed in the overhauling process
5. how to carry out currency/issue checks on the specifications you are working with
6. the procedure for obtaining replacement parts, materials and other consumables necessary for the overhaul
7. terminology used in pneumatic, vacuum and compressed air systems, and the use of fluid power diagrams and associated symbols
8. the various types of component that make up the pneumatic, vacuum or compressed air equipment (such as pipes, flexible hoses, valves used for pressure, flow and directional control, double and single action cylinders/actuators, pumps, pressure intensifiers, mechanical and electrical control devices)
9. the basic principles of operation of the pneumatic, vacuum or compressed air equipment being worked on, and the performance characteristics and function of the valves, cylinders/actuators within the circuit
10. the sequence to be adopted for the dismantling/reassembling of various types of pneumatic, vacuum or compressed air assemblies
11. the techniques used to dismantle the equipment to unit or component level without damage to the components
12. the identification and application of different types of valves, sensors and

actuators pumps static and dynamic seals

13. the various mechanical fasteners that will need to be removed and replaced, and their method of removal and replacement

14. recognition of contaminants, and the problems they can create; the effects and likely symptoms of contamination in the pneumatic, vacuum or compressed air equipment

15. how to identify defects and wear characteristics, and the need to replace 'lived' and consumable items

16. how to check that replacement components have the correct part/identification markings

17. how to reassemble the components

18. why securing devices need to be tightened to the correct torque, locked and labelled, and the different methods that are used for this

19. the tools and equipment used in the overhauling activities, and their calibration/care and control procedures

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

21. the need to complete the overhaul documentation and/or reports following the overhauling activity

22. the procedure for the safe disposal of waste materials and scrap components

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

## Scope/range related to performance criteria

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1. Carry out all of the following during the overhaul of the pneumatic, vacuum or compressed air equipment:
  - 1.1 obtain and use the appropriate documentation for the overhauling activities
  - 1.2 adhere to procedures or systems in place for risk assessment, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
  - 1.3 provide and maintain safe access and working arrangements for the work area
  - 1.4 ensure the safe depressurisation of the pneumatic, vacuum or compressed air equipment (where appropriate)
  - 1.5 carry out the overhauling activities, following good practice/approved procedures
  - 1.6 ensure that components and surrounding structures are maintained free from damage and foreign objects
  - 1.7 return all tools and equipment to the correct location on completion of the activities
  - 1.8 leave the work area in a clean and safe condition on completion of the activities
2. Carry out the overhauling activities, to component level, on three of the following types of pneumatic, vacuum or compressed air equipment:
  - 2.1 air pumps
  - 2.2 pressure intensifiers
  - 2.3 pressure controllers
  - 2.4 vacuum pumps
  - 2.5 accumulators
  - 2.6 air reservoirs/tanks
  - 2.7 air coolers
  - 2.8 compressors
  - 2.9 linear actuating mechanisms
  - 2.10 water extractors
  - 2.11 pressure control valves
  - 2.12 rotary cylinders/motors
  - 2.13 heat exchangers
  - 2.14 flow/directional control valves
  - 2.15 safety devices
  - 2.16 humidifier

- 2.17 pressure regulators
- 2.18 other specific components
- 3. Carry out all of the following activities, as applicable to the equipment being overhauled:
  - 3.1 cleaning parts prior to dismantling
  - 3.2 pre-disassembly checks and tests
  - 3.3 releasing stored energy (where applicable)
  - 3.4 proof-marking/labelling of components
  - 3.5 dismantling equipment to unit/sub-assembly level
  - 3.6 dismantling units to component level
  - 3.7 checking components for serviceability (such as visual, measurement, NDT, use of probes/scopes)
  - 3.8 replacing all damaged or defective components
  - 3.9 replacing all 'lived' and consumable items (such as piston seals, dust caps, filters, gaskets)
  - 3.10 reassembling equipment
  - 3.11 making mechanical connections
  - 3.12 setting and adjusting replaced components
  - 3.13 securing components using mechanical fasteners and threaded devices
  - 3.14 tightening fastenings to the required torque
  - 3.15 applying locking and retaining devices (such as circlips, pins, wire locking, lock nuts, stiff nuts, swage nuts)
  - 3.16 fitting blanks to openings to prevent entry of contaminating debris
- 4. Replace/refit a range of pneumatic, vacuum or compressed air equipment components, to include eight of the
  - 4.1 pipes and hoses
  - 4.2 housings
  - 4.3 spring mechanisms
  - 4.4 unions and couplings
  - 4.5 plungers
  - 4.6 gauges
  - 4.7 pistons
  - 4.8 bearings
  - 4.9 gaskets
  - 4.10 strainers (including water separator)
  - 4.11 rollers
  - 4.12 sealing devices
  - 4.13 non-return valves
  - 4.14 regulators
  - 4.15 electrical controls (solenoids, motors, switches)
  - 4.16 actuating mechanisms
  - 4.17 filters
  - 4.18 pressure reducing valves
  - 4.19 sensors
  - 4.20 diaphragms
  - 4.21 other specific components

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5. Carry out checks and tests on the overhauled equipment, to include three of the following:
    - 5.1 visual inspection for completeness of all operations
    - 5.2 visual inspection for freedom from damage or foreign objects
    - 5.3 check that there is appropriate protection to openings to prevent entry of contaminating debris
    - 5.4 carrying out any 'special-to-type' test rig checks (such as leak, pressure, range of movement, timings/sequencing)
  6. Overhaul pneumatic, vacuum or compressed air equipment, in compliance with one of the following:
    - 6.1 BS, ISO or BSEN standards and procedures
    - 6.2 customer standards and requirements
    - 6.3 company standards and procedures
    - 6.4 equipment manufacturer's requirements

SEMMME3117

Overhauling components of pneumatic, vacuum or compressed air equipment



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