
Overview

This standard identifies the competences you need to carry out efficient and effective fault diagnosis on fluid power equipment and circuits, on mobile or static plant, in accordance with approved procedures. You will be required to diagnose faults on a range of fluid power equipment, such as pneumatic, hydraulic and vacuum devices, both at assembly and component level. You will be expected to use a variety of fault diagnosis methods and techniques, and to utilise a number of diagnostic aids and equipment. From the information gained, you will be expected to identify the fault and its probable cause, and to suggest appropriate action to remedy the problem.

Your responsibilities will require you to comply with organisational policy and procedures for the fault diagnostic activities undertaken, and to report any problems with these activities or the tools and equipment used that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work with minimal 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 fault diagnosis procedures on fluid power equipment. You will understand the various fault diagnosis methods and techniques used, and their application. You will also know how to apply and interpret information obtained from diagnostic aids and equipment, in adequate depth to provide a sound basis for carrying out the activities and identifying faults or conditions that are outside the required specification.

You will understand the safety precautions required when carrying out the fault diagnosis activities, especially those for isolating the equipment and for taking the necessary safeguards to protect yourself and others in the workplace. You will be required to demonstrate safe working practices throughout.

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. review and use all relevant information on the symptoms and problems associated with the products or assets
3. investigate and establish the most likely causes of the faults
4. select, use and apply diagnostic techniques, tools and aids to locate faults
5. complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved
6. determine the implications of the fault for other work and for safety considerations
7. use the information gained to draw valid conclusions about the nature and probable cause of the fault
8. dispose of waste materials in accordance with safe working practices and approved procedures and leave the work area in a safe condition
9. complete and store all relevant documentation of the fault diagnosis in accordance with organisational requirements

Knowledge and understanding

You need to know and understand:

1. the health and safety requirements of the area in which the fault diagnostic activity is to take place, and the responsibility these requirements place on you
2. the isolation and lock-off procedure or permit-to-work procedure that applies
3. the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the fault diagnosis process
4. hazards associated with carrying out fault diagnosis on fluid power equipment (such as handling fluids, stored pressure/force, misuse of tools, using practices/procedures that do not follow laid-down procedures), and how to minimise these and reduce any risks
5. regulations and codes of practice relating to working with fluid power equipment
6. the importance of following the correct decontamination procedures
7. how to obtain and interpret drawings, schematic and physical diagrams, specifications, flow charts, manufacturers' manuals and other documents needed in the fault diagnostic activities
8. the various fault finding techniques that can be used, and how they are applied (such as half-split, input/output, emergent problem sequence, six point technique, functional testing, unit substitution, injection and sampling techniques, and equipment self-diagnostics)
9. the procedure to be adopted to establish the background of the fault
10. how to evaluate the various types of information available for fault diagnosis
11. how to use the various aids and reports available for fault diagnosis
12. how to evaluate sensory information from sight, sound, smell, touch
13. how to use a range of fault diagnostic equipment to investigate the problem (such as measuring devices, pressure and flow testing devices)
14. the importance of checking that test equipment is within current calibration dates, and the procedure to get the test instruments correctly calibrated
15. how to use the test equipment, and how to connect it into the circuit at the appropriate points
16. the basic principles of how the circuit/equipment functions, and the operation and applications of the individual units/components and their interrelations with other components and assemblies
17. how to analyse and evaluate possible characteristics and causes of specific faults/problems
18. how to make use of previous reports/records of similar fault conditions
19. how to evaluate the likely risk to others and yourself, and the effects

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- the fault could have on the overall process
 - 20. how to prepare and produce a risk analysis report, where appropriate
 - 21. how to prepare a report or take follow-up action which complies with the organisational policy on concluding fault diagnosis
 - 22. dispose of waste materials in accordance with safe working practices and approved procedures
 - 23. the extent of your own authority and to whom you should report if you have problems that you cannot resolve

Scope/range

1. Carry out all of the following during the fault diagnostic activity:
 1. plan the fault diagnosis activities prior to beginning the work
 2. obtain and use the correct issue of organisational and/or manufacturers' drawings and maintenance documentation
 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
 4. adhere to organisational-specific contamination and control procedures at all times
 5. ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids) and safe release of stored energy
 6. provide and maintain safe access and working arrangements for the maintenance area
 7. carry out the fault diagnostic activities using approved procedures
 8. identify the fault and determine appropriate corrective action
 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 fault diagnosis on two of the following types of equipment:
 1. pneumatic system
 2. hydraulic system
 3. vacuum system
3. Carry out fault diagnosis on all of the following system components:
 1. pumps
 2. actuators/cylinders
 3. connectors
 4. switches
 5. motors
 6. pipework
 7. hoses
 8. valves
4. Collect fault diagnosis information from four of the following sources:
 1. the person or operator who reported the fault
 2. sensory input (such as sight, sound, smell, touch)
 3. test instrument/rig measurements (such as pressure, flow,

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- sequence)
 4. plant/machinery records
 5. monitoring equipment or gauges
 6. condition of the end product
 7. recording devices
 8. electronic self-diagnostics
5. Use a range of fault diagnostic techniques, to include two of the following:
1. half-split technique
 2. input/output
 3. emergent sequence
 4. injection and sampling
 5. unit substitution
 6. six point technique
 7. functional/performance testing
 8. equipment self-diagnostics
6. Use a variety of diagnostic aids and equipment, to include two of the following:
1. manufacturer's manual
 2. physical layout diagrams
 3. algorithms
 4. flow charts
 5. probability charts/reports
 6. fault analysis charts (such as fault trees)
 7. equipment self-diagnostics
 8. troubleshooting guides
 9. sequence charts
 10. function diagrams
7. Use all of the following diagnostic procedures:
1. inspection (for leaks, loose fittings, breakages, wear/deterioration, damage to pipes/hoses, alignment)
 2. operation (such as manual operation, timing, sequencing)
 3. measurement (such as pressure, flow, timing, sequence, movement)
8. Use two of the following types of test equipment to aid fault diagnosis:
1. measuring devices/meters
 2. flow indicators
 3. pressure indicators
 4. thermal indicators
 5. test rigs

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6. self-diagnostic equipment
 7. contamination monitoring and analysing devices
9. Find faults that have resulted in two of the following breakdown categories:
1. intermittent problem
 2. partial failure or reduced performance
 3. complete breakdown
10. Complete and store all relevant documentation of the fault diagnosis in accordance with organisational requirements, using one of the following:
1. step-by-step analytical report
 2. preventative maintenance log/report
 3. corrective action report
 4. organisational-specific reporting procedure
 5. electronic reports

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Carrying out fault diagnosis on fluid power equipment and circuits



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