

Carrying out fault location on service systems and equipment

Overview

This standard identifies the competences you need to locate faults on services, and service equipment and systems, in accordance with approved procedures. You will be required to locate faults on service equipment and systems, such as fresh or foul water, environmental control, emergency power generation, heating and ventilation, gas distribution, process control, instrumentation control, and refrigeration, at sub-assembly and/or component level. You will be expected to use a variety of fault location methods and procedures, such as gathering information from the person who reported the fault, using recognised fault finding techniques and diagnostic aids, measuring, inspecting and operating the equipment.

Your responsibilities will require you to comply with organisational policy and procedures for the fault location 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 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 provide an informed approach to applying fault location procedures to service equipment and systems. You will have an understanding of the basic fault location methods and techniques used, and their application. You will also know how to interpret the information obtained from fault finding aids and equipment, in adequate depth to provide a sound basis for carrying out the activities.

You will understand the safety precautions required when carrying out the fault location 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:

1. work safely at all times, complying with health and safety 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 evidence gained to draw valid conclusions about the nature and probable cause of the fault
8. record details on the extent and location of the faults in an appropriate format

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Knowledge and understanding

You need to know and understand:

1. the health and safety requirements of the area in which the fault location 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 in the work area
3. the importance of wearing protective clothing and other appropriate safety equipment (PPE) during fault location activities
4. the hazards associated with carrying out fault location activities on services and systems (such as such as handling fluids, stored pressure/force, electrical contact, process controller interface, using faulty or damaged tools and equipment, using practices that do not follow laid-down procedures), and how they can be minimised
5. the procedure to be adopted to establish the background of the fault
6. how to use the various diagnostic aids to help identify the location of the fault
7. the various fault location techniques that can be used, and how they are applied (such as half-split, input-to- output, function testing, unit substitution, and equipment self-diagnostics)
8. how to evaluate sensory information (such as sight, sound, smell, touch)
9. how to assess evidence and evaluate the possible causes of faults/problems
10. how to use a range of fault diagnostic equipment to investigate the problem
11. the care, handling and application of measuring/test equipment (such as mechanical measuring instruments, electrical measuring instruments, test rigs and pressure and flow devices)
12. how to check that measuring/test equipment is within calibration and that it is free from damage and defects
13. how to obtain and interpret information from job instructions and other documents needed in the fault location process (such as drawings, charts, specifications, manufacturers' manuals, history/maintenance reports, graphical symbols)
14. the basic principles of how the service equipment functions, its operating sequence, the purpose of individual units/components and how they interact
15. the problems that can occur during the fault location activity, and how they can be minimised
16. how to evaluate the likely risk to yourself and others, and the effects the fault could have on the overall process or system
17. the importance of completing the correct documentation, following the maintenance activity
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the extent of your own authority and to whom you should report if you have problems that you cannot resolve

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Scope/range related to performance criteria

1. Carry out **all** of the following during the fault location activities:
 1. plan fault location methods and procedures in conjunction with others, prior to beginning the work
 2. use the correct issue of maintenance documentation (such as drawings, manuals, maintenance records)
 3. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations
 4. ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids)
 5. provide safe access and working arrangements for the maintenance area
 6. carry out the fault location activities, using approved procedures
 7. disconnect or isolate components or parts of the system, when appropriate, to confirm the diagnosis
 8. identify the fault, and consider appropriate corrective action
 9. in conjunction with others, take actions to resolve the problem
 10. dispose of waste items in a safe and environmentally acceptable manner
 11. leave the work area in a safe and tidy condition
2. Carry out fault location on **one** of the following types of services equipment, to sub-assembly or component level:
 1. fresh water
 2. foul water
 3. compressed air
 4. refrigeration
 5. environmental control
 6. emergency power generation
 7. gas distribution
 8. instrumentation and control
 9. heating and ventilation
 10. air conditioning and ventilation
 11. process control
3. Use **four** of the following diagnostic techniques, tools and aids to assist in locating the fault:
 1. information gathered from the person who reported the fault
 2. fault finding techniques (such as six point, half-split, input/output, unit substitution, emergent sequence)

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3. diagnostic aids (such as manuals, flow charts, troubleshooting guides, maintenance records)
 4. inspecting (such as checking for breakages, wear/deterioration, overheating, missing parts, loose fittings)
 5. operating (such as manually switching off and on, running equipment, condition of end product)
4. Use **two** of the following types of instruments to assist in locating faults:
1. mechanical measuring equipment (such as measuring instruments, dial test indicators, torque instruments)
 2. electrical/electronic measuring instruments (such as multimeter, logic probes, temperature meters, analysers)
 3. fluid test equipment (such as flow testing devices/meters, pressure testers, contamination testers)
5. Locate faults that have resulted in **two** of the following breakdown categories:
1. intermittent problem
 2. partial failure or reduced performance
 3. complete breakdown
6. Complete **one** of the following maintenance records, and pass it to the appropriate person:
1. scheduled maintenance report
 2. corrective action report
 3. company-specific documentation

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