

Carrying out fault diagnosis on lift installations

Overview

This standard identifies the competences you need to carry out fault diagnosis on lift installations, in accordance with approved procedures. You will be required to diagnose faults on a lift involving two of the following interactive technologies: mechanical, electrical, fluid power or electronics, both at assembly and sub-assembly/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 evidence gained, you will be expected to identify the fault and its probable cause, and to suggest suitable 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 are outside your permitted authority, to the relevant people. 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 fault diagnosis procedures on lift equipment. You will understand the various fault diagnosis methods and techniques used, and their application. You will 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, identifying faults or conditions that are outside the acceptable specification. You will know about the interaction of the other associated integrated technologies, and will have adequate knowledge to carry out effective fault diagnosis of the lift installation. You will understand the safety precautions required when carrying out the fault diagnosis 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.

Carrying out fault diagnosis on lift installations

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

Carrying out fault diagnosis on lift installations

Knowledge and understanding

You need to know and understand:

1. the health and safety requirements of the area in which you are carrying out the fault diagnosis activities
2. the safe working practises for lifts (as described in BS7255)
3. the specific safety precautions to be taken when carrying out the fault diagnosis of lift equipment
4. the isolation and lock-off procedures or permit-to-work procedure that applies
5. the importance of wearing protective clothing (PPE) and other appropriate safety equipment during the fault diagnosis process; the type of equipment to be used, and where to obtain it
6. hazards associated with carrying out fault diagnosis on lifts (such as handling oils/greases, stored pressure/force, electrical contact, process controller interface, using faulty or damaged tools and equipment, using practices/procedures that do not follow laid-down procedures), and how they can be minimised
7. what constitutes a hazardous voltage/current and how to recognise victims of electric shock
8. how to reduce the risks of an electric shock (such as insulated tools, rubber matting, isolating transformers)
9. where to obtain, and how to interpret, drawings, circuit diagrams, specifications, manufacturers' manuals and other documents needed in the fault diagnosis activities
10. 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, function testing, unit substitution, injection and sampling techniques, equipment self-diagnostics)
11. how to evaluate the various types of information available for fault diagnosis (such as reports, monitoring equipment, sensory inputs, installation records, operation of the lift)
12. how to evaluate sensory information from sight, sound, smell, touch
13. the procedures to be followed for investigating faults, and how to deal with intermittent conditions
14. how to use the various aids and reports available for fault diagnosis
15. the type of equipment that can be used to aid fault diagnosis (such as mechanical measuring instruments, electrical measuring instruments, test rigs, pressure and flow devices), how to check it is calibrated or configured correctly for the intended use and that it is free from damage and defects
16. how to analyse and evaluate possible characteristics and causes of specific faults/problems

Carrying out fault diagnosis on lift installations

17. how to relate previous reports/records of similar fault conditions
18. how to evaluate the likely risk of running the equipment with the displayed fault, and the effects the fault could have on the overall operation
19. how to prepare a report which complies with the company policy on fault diagnosis
20. the extent of your own responsibility, and whom you should report to if you have problems that you cannot resolve

Carrying out fault diagnosis on lift installations

Scope/range related to performance criteria

1. Carry out **all** of the following during the fault diagnostic activities:
 1. plan the fault diagnosis to cause minimum disruption to normal working
 2. use the correct issue of company and/or manufacturers' drawings and installation documentation
 3. adhere to risk assessment, COSHH and other relevant safety standards
 4. ensure the safe isolation of the equipment (such as mechanical, electricity, or fluids)
 5. ensure safe access and working arrangements for the installation area
 6. carry out the fault diagnostic activities using approved techniques and procedures
 7. identify the fault and determine appropriate corrective action
 8. dispose of waste items in safe and environmentally acceptable manner, and leave the work area in a safe condition
2. Carry out fault diagnosis on **three** of the following aspects of the lift system:
 1. mechanical
 2. fluid power
 3. electrical
 4. electronic
3. Collect evidence regarding the fault from **two** of the following sources:
 1. monitoring equipment
 2. recording devices
 3. sensory input (such as sight, sound, smell, touch)
 4. operation of the equipment
4. Use a range of fault diagnostic techniques, to include:
 1. half-split technique

Plus **two** more from the following:

 2. emergent problem sequence
 3. function testing
 4. six point technique
 5. injection and sampling
 6. unit substitution

Carrying out fault diagnosis on lift installations

7. input/output technique
 8. equipment self-diagnostics
-
5. Use a variety of diagnostic aids and equipment, to include **two** of the following:
 1. manufacturer's manual
 2. logic 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. circuit diagrams/specifications
-
6. Use **two** of the following types of test equipment to help in the fault diagnosis:
 1. mechanical measuring equipment (such as measuring instruments, dial test indicators, torque instruments)
 2. electrical/electronic measuring instruments (such as multimeters, logic probes, special test instruments)
 3. fluid power test equipment (such as test rigs, flow meters, pressure gauges)
-
7. Deal with **two** of the following conditions during the installation process:
 1. intermittent problem
 2. partial failure/out-of-specification operation
 3. complete malfunction
-
8. Provide a record of the outcome of the fault diagnosis, using **one** of the following:
 1. step-by-step analytical report
 2. corrective action report
 3. company-specific reporting procedure

Carrying out fault diagnosis on lift installations

Developed by	Semta
Version Number	2
Date Approved	February 2016
Indicative Review Date	March 2019
Validity	Current
Status	Original
Originating Organisation	Semta
Original URN	SEMIC35
Relevant Occupations	Engineering; Engineering and manufacturing technologies; Functional Managers; Managers and Senior Officials
Suite	Installation and Commissioning Suite 3
Keywords	Engineering; manufacturing; installation; lifts; fault diagnosis; mechanical; electrical; electronic; fluid power