Overview

This standard identifies the competencies you need to investigate, locate and diagnose the cause of faults on electrical systems and equipment, in accordance with approved procedures. You will be to locate and diagnose faults in electrical rotating, wound or power control/management equipment. In addition, you will be required to select and use test instruments, review fault symptoms, interpret technical data, apply systematic fault finding procedures and record your findings.

Your responsibilities will require you to comply with organisational policy and procedures for the fault diagnostic activities undertaken and to report any problems with the 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 with a minimum of supervision taking full 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 diagnostic techniques and procedures. You will understand the diagnostic techniques and associated equipment and their application and will know about the electrical/electronic products/components, in adequate depth and breadth to provide a sound basis for carrying out the activities to the required specification.

You will understand the safety precautions required when carrying out the fault diagnostic activities. You will be required to demonstrate safe working practices throughout and will understand the responsibility you owe to yourself and others in the workplace.
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Performance criteria

You must be able to:

P1 work safely at all times, complying with health and safety, environmental and other relevant regulations, directives and guidelines
P2 review and use all relevant information on the symptoms and problems associated with the products or assets
P3 investigate and establish the most likely causes of the faults
P4 select, use and apply diagnostic techniques, tools and aids to locate faults
P5 complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved
P6 determine the implications of the fault for other work and for safety considerations
P7 use the evidence gained to draw valid conclusions about the nature and probable cause of the fault
P8 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:

K1 the specific safety precautions to be taken when carrying out fault location and diagnosis on electrical equipment and systems

K2 the personal protective equipment (PPE) to be worn whilst carrying out the fault diagnosis (such as protective clothing, eye and hearing protection, electrostatic discharge ESD)

K3 the hazards associated with the electrical components equipment and systems being investigated (such as heat, radiation, high voltages on equipment)

K4 how to recognise and deal effectively in the workplace with victims of electric shock (to include methods of safely isolating the power source and methods of first aid resuscitation)

K5 what constitutes a hazardous voltage and how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)

K6 how to obtain the necessary authority to conduct fault location and diagnosis in the relevant work areas and any specific permit-to-work procedures that are required

K7 how to obtain and use data that relates to the fault diagnostic activities

K8 how to check the calibration status of authorised test facilities and test equipment to be used

K9 the various fault diagnosis and location techniques that are used (such as six point, emergent problem, input/output, half-split techniques and algorithm charts/tables)

K10 how to set up, care for and use the range of test equipment needed for the fault location (such as logic and waveform analysis equipment, oscilloscopes, signal generators, sensing and measuring devices, current, voltage and resistance measuring instruments)

K11 how to read and interpret circuit diagrams and related symbols

K12 how to recognise, read values and, where appropriate, the polarity of electrical/electronic components

K13 the basic operating principles of the electrical components, systems and equipment being diagnosed

K14 the recognition of defects/problems (such as manufacturing stages, components to be assembled/processed)

K15 how to analyse and evaluate the results of the fault diagnosis checks carried out

K16 the faults that can occur and typical actions needed to deal with them (such as short and open circuits, problems at the hardware/software interface in equipment with embedded software)

K17 the company reporting and documentation requirements relating to fault investigation and how to use them

K18 the extent of your own responsibility and whom you should report to if
you have problems that you cannot resolve
Additional Information

Scope/range related to performance criteria

You must be able to:

1. satisfy all of the following requirements during fault location/diagnosis activities on electronic/electrical equipment:
   1.1 use the correct issue of drawings, job instructions and specifications
   1.2 follow risk assessment procedures and COSHH regulations
   1.3 use grounded wrist straps, mats and other electrostatic discharge (ESD) precautions, as appropriate
   1.4 carry out the fault location/diagnosis activities, in line with organisational procedures
   1.5 create and store records, in accordance with appropriate procedures

2. conduct fault diagnosis on one of the following categories of electrical equipment:
   2.1 rotating equipment (such as single/three-phase motors, alternators)
   2.2 wound equipment (such as large transformers/inductors)
   2.3 control equipment (such as switchgear, distribution, power management)

3. collect fault diagnosis evidence from two of the following sources:
   3.1 test instrument measurements
   3.2 recording devices (such as shock, vibration, humidity, temperature)
   3.3 circuit meters
   3.4 sensory input (such as sight, sound, smell, touch)
   3.5 circuit self-diagnosis

4. use two of the following sources of technical information to assist with fault finding activities:
   4.1 technical manual/specification
   4.2 wiring/circuit diagrams
   4.3 engineering drawings
   4.4 logic diagrams
   4.5 flow charts/fault algorithms
   4.6 fault finding/trouble shooting guides

5. use two of the following fault diagnostic techniques:
   5.1 half-split technique
   5.2 unit substitution
   5.3 emergent sequence
   5.4 input/output technique
5.5 injection and sampling
5.6 function testing
5.7 six point technique

6. use all the following fault diagnosis procedures:
   6.1 inspection (such as breakages, signs of overheating, missing parts, loose fitting, dry joints)
   6.2 operation (such as manual switching off and on, automatic switching/timing/sequencing, outputs)
   6.3 measurement (such as voltage, current, continuity, logic states, noise, frequency, signal shape and level)

7. identify and locate two of the following categories of fault:
   7.1 intermittent component/circuit failure
   7.2 complete component/circuit failure
   7.3 partial failure/reduced performance

8. complete the relevant paperwork, to include one of the following and pass it to the appropriate person:
   8.1 customer report
   8.2 company report
   8.3 job/order card
   8.4 other appropriate media
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<tr>
<td>Date approved</td>
<td>February 2013</td>
</tr>
<tr>
<td>Indicative review date</td>
<td>February 2018</td>
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