

## Overview

This standard identifies the competences you need to carry out functional tests on electrical equipment, in accordance with approved procedures. You will be required to carry out pre-test inspections and tests of equipment such as electrical rotating, wound or power control/management equipment, to establish that it is functioning at optimal level and to specification. You will be required to select and use a range of electrical test instruments to ensure that the equipment is operating within the defined limits.

Your responsibilities will require you to comply with organisational policy and procedures for the testing 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 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 sound understanding of your work and will provide an informed approach to applying test procedures to electrical equipment and circuits. You will understand the equipment being worked on, the test equipment to be used and the various test procedures, in adequate depth to provide a sound basis for carrying out the activities to the required specification. In addition, you will be expected to review the outcome of the tests, to compare the results with appropriate standards, to determine the action required and to record and report the results in the appropriate format.

You will understand the safety precautions required when carrying out the inspection and testing 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 against direct and indirect electric shock.

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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 follow the appropriate procedures for use of tools and equipment to carry out the required tests
- P3 set up and carry out the tests using the correct procedures and within agreed timescales
- P4 record the results of the tests in the appropriate format
- P5 review the results and carry out further tests if necessary

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### Knowledge and understanding

*You need to know and understand:*

- K1 the health, safety and environmental requirements of the work area where you are carrying out the functional testing activities and the responsibility these requirements place on you
- K2 the equipment isolation and lock-off procedure that applies to the functional testing activities
- K3 the specific safety precautions to be taken when carrying out functional testing of electrical equipment
- K4 the hazards of carrying out functional tests on electrical equipment and how the risks can be minimised
- K5 how to recognise and deal with victims of electrical shock (to include methods of safely isolating the power source and methods of first aid resuscitation)
- K6 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)
- K7 the importance of wearing protective clothing (PPE) and other appropriate safety equipment during the electrical testing activities
- K8 the use of grounded wrist straps and other electrostatic discharge (ESD) precautions, when required
- K9 protection techniques used for electrical systems (such as to prevent burn or fire risk)
- K10 how to obtain and interpret drawings, circuit and physical layouts, charts, specifications, manufacturers' manuals, history/maintenance reports, graphical electrical symbols, wiring regulations and other documents needed for the testing activities
- K11 the principles of operation for the electrical equipment being tested
- K12 the types of test equipment to be used and their selection for particular types of tests
- K13 how to ensure that the test equipment is maintained and correctly calibrated, in accordance with the appropriate organisational procedures
- K14 how to connect the appropriate test equipment (such as for the measurement of resistance, current, voltage, power, capacitance, inductance, frequency, power factor and protective device disconnection/trip times)
- K15 the various testing methods and procedures, as recommended in approved electrical codes of practice and how to apply them to different operating conditions
- K16 displaying/recording test results and the documentation to be used
- K17 how to interpret the value and significance of the test readings
- K18 how to analyse test results, using tables in approved electrical codes of practice and how to use comparison and sequential techniques
- K19 the importance of ensuring that test equipment is used only for its

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- intended purpose and within its specified range and limits
- K20 problems or errors that could occur and which may affect the test results and how they can be avoided
- K21 the environmental control and company operating procedures relating to the testing activities
- K22 the documentation required and the procedures to be observed following the test
- K23 the extent of your own authority and whom you should report to if you have problems that you cannot resolve

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### Additional Information

#### Scope/range related to performance criteria

- You must be able to:*
1. carry out all of the following during the testing activities:
    - 1.1 use the correct issue of company and/or manufacturers' drawings and testing documentation
    - 1.2 adhere to risk assessment, COSHH and other relevant safety standards
    - 1.3 the use of grounded wrist straps and other electrostatic discharge (ESD) precautions, as appropriate
    - 1.4 check that test equipment is correctly calibrated and appropriate for the tests to be carried out
    - 1.5 provide safe access and working arrangements for the testing area
    - 1.6 carry out pre-test inspection, using appropriate techniques and procedures
    - 1.7 operate test equipment within its specification range
    - 1.8 dispose of waste items in a safe and environmentally acceptable manner
    - 1.9 leave the work area in a safe and tidy condition
  2. carry out functional tests on one of the following types 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. carry out functional tests using four of the following tools and test equipment:
    - 3.1 multimeter
    - 3.2 oscilloscope
    - 3.3 residual current device (RCD) tester
    - 3.4 ohmmeter
    - 3.5 insulation resistance tester
    - 3.6 portable appliance tester (PAT)
    - 3.7 ammeter
    - 3.8 loop impedance tester
    - 3.9 flash tester
    - 3.10 voltmeter
    - 3.11 current injection tester
    - 3.12 specialist test equipment (such as paint thickness meter, EMC)

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- meter)
4. use the relevant test equipment to measure and check five of the following:
    - 4.1 protective resistance values
    - 4.2 power rating
    - 4.3 power factor
    - 4.4 insulation resistance values
    - 4.5 resistance
    - 4.6 safety device trip speed
    - 4.7 current levels
    - 4.8 capacitance
    - 4.9 specialised tests (such as speed, sound levels, temperature, interference)
    - 4.10 voltage detection/levels
    - 4.11 inductance
    - 4.12 earth continuity
    - 4.13 frequency values
  5. check that the equipment being tested meets one of the following quality and accuracy standards:
    - 5.1 BS or ISO standards and procedures
    - 5.2 company standards and procedures
    - 5.3 customer standards and requirements
    - 5.4 specific system requirements
    - 5.5 other international standards
  6. complete the relevant documentation, to include one of the following and pass it to the appropriate people:
    - 6.1 customer report
    - 6.2 company report
    - 6.3 job/order card
    - 6.4 acceptance documentation
    - 6.5 other appropriate media

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<b>Developed by</b>	SEMTA
<b>Version number</b>	2
<b>Date approved</b>	February 2013
<b>Indicative review date</b>	February 2018
<b>Validity</b>	Current
<b>Status</b>	Original
<b>Originating organisation</b>	SEMTA
<b>Original URN</b>	SEMEEE3-34
<b>Relevant occupations</b>	Engineering technicians; Engineering and manufacturing technologies; Engineering; maintenance team technician; manufacturing technologies; production and process engineers
<b>Suite</b>	Electrical and Electronic Engineering Suite 3
<b>Key words</b>	Engineering; electrical; electronic; functional; tests; inspection; rotating; power equipment; control equipment