SEMEEE334

Carrying out functional tests on electrical equipment

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.

Performance criteria

You must be able to:

P1 work safely at all times, complying with health and safety 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 select and obtain tools, equipment and materials for the tests

P4 carry out the tests using the correct procedures and within agreed timescales

P5 record the results of the tests in the appropriate format

P6 review the results and carry out further tests if necessary

P7 deal with problems within your control and report those that cannot be solved

P8 complete and store all relevant documentation in accordance with organisational requirements

P9 leave the work area in a safe condition on completion of the activities, as per organisational requirements

Knowledge and understanding

You need to know and understand:

K1 how to work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines

K2 the importance of wearing the appropriate personal protective equipment (PPE), and of keeping the work area clean and tidy

K3 voltage ranges, what constitutes a hazardous voltage and how to reduce the risks of a phase to earth shock

K4 how to recognise and deal with victims of electrical shock

K5 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

K6 the principles of operation for the electrical equipment being tested

K7 the types of test equipment to be used and their selection for particular types of tests

K8 how to ensure that the test equipment is maintained and correctly calibrated, in accordance with the appropriate organisational procedures

K9 how to connect the appropriate test equipment

K10 the various testing methods and procedures, as recommended in approved electrical codes of practice and how to apply them to different operating conditions

K11 how to display/record test results

K12 how to interpret the value and significance of the test readings

K13 how to analyse test results, using tables in approved electrical codes of practice and how to use comparison and sequential techniques

K14 the importance of ensuring that test equipment is used only for its intended

purpose and within its specified range and limits

K15 problems or errors that could occur which may affect the test results and how they can be avoided

K16 the environmental control and company operating procedures relating to the testing activities

K17 the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

K18 how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to performance criteria

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 procedures or systems in place for risk assessment, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
   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 meter)
4. Use the 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 current industry standards, codes of practice and procedures
5.2 organisational standards and procedures
5.3 customer standards and requirements
5.4 specific system requirements
5.5 other international standards

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