

## Checking and testing electronic products

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### Overview

This standard identifies the competences you need to carry out visual checks and specific tests on electronic products, in accordance with approved procedures. You will be required to carry out checks and tests on electronic products, such as electronic assemblies, printed circuit board assemblies, power supplies, motor control equipment, signal processing equipment, alarm and protection equipment, motor vehicle, aeronautical and marine/yacht and boat equipment to establish that it is safe and functioning to specification. You will be required to use a range of electronic test instruments to measure and check that the equipment is to specification.

Your responsibilities will require you to comply with organisational policy and procedures for the checking and testing activities undertaken, and to report any problems with the electronic product you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You will be expected to ensure that all tools and equipment used to check and test the product are returned to the correct location on completion of the activities. You will be expected to work to instructions, either 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 appropriate checking and test procedures to electronic products. You will understand the electronic product being checked, the test equipment being used, and the various test procedures, in adequate depth 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 checking and testing activities, especially those for isolating the equipment and for taking the necessary safeguards to protect yourself and others against direct and indirect electric shock. 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:

1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. follow the appropriate procedures for use of tools and equipment to carry out the required checks/tests
3. set up and carry out the checks/tests using the correct procedures and within agreed timescales
4. record the results of the tests in the appropriate format
5. review the results and carry out further tests if necessary

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## Knowledge and understanding

## You need to know and understand:

1. the specific safety precautions to be taken when checking and testing electronic products (such as specific legislation or regulations governing the activities or work area, safe working practices and procedures to be adopted, general workshop safety practice, displaying of warning notices)
2. the health and safety requirements of the work area where you are carrying out the testing activities, and the responsibility these requirements place on you
3. the hazards associated with the electronic tests being conducted (such as static electricity, high voltage points on equipment exposed to contact during tests), and how they can be minimised
4. the personal protective equipment (PPE) - such as protective clothing, eye and hearing protection, antistatic devices) to be worn both for personal protection and protection of the components or circuits whilst carrying out the testing activities
5. what constitutes a hazardous voltage and how to recognise victims of electric shock
6. how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)
7. the clean work area protocols that should be used, in appropriate cases
8. how to obtain the necessary job instructions and other documents needed in the checking and testing activities
9. the preparations to be undertaken before the product is tested (such as visual examination for defects)
10. the type of test equipment to be used, and how it is to be connected to the product under test
11. how to check that the test equipment is within current calibration dates, and is in a safe and usable condition
12. the importance of ensuring that test equipment is used only for its intended purpose, and within its specified range and limits
13. the importance of using the appropriate test points in the circuit, and how these are identified
14. the types of test used to verify the correct functioning of the electronic equipment
15. how to interpret the value and significance of the test readings
16. problems or errors that could occur and which may affect the test results, and how they can be avoided
17. recording the test results, and the documentation to be used
18. the typical defects and variations that can be found on the electronic products, and how to identify them
19. the procedure to be followed when the products are out of

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specification

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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 testing of the electronic products:
  1. obtain all the necessary information to carry out the checking and testing activities (such as job instructions and testing documentation)
  2. follow clean work area protocols, where appropriate
  3. obtain the appropriate test equipment, and check that it is within current calibration dates, and is in a safe and usable condition
  4. carry out the checking and testing activities, using the specified techniques and procedures
  5. use grounded wrist straps and other electrostatic (ESD) precautions, as appropriate
  6. identify and record the test results in the appropriate format
  7. place products (in and out of specification) in the correct location on completion of the checking and testing activities
  8. leave the work area in a safe and tidy condition on completion of the activities
2. Test **one** of the following manufactured electronic products:
  1. printed circuit board assemblies
  2. motor vehicle/leisure vehicle equipment
  3. visual displays/screens
  4. marine/yacht and boat equipment
  5. microwave components
  6. alarms and protection devices
  7. electronic assemblies
  8. ADC and DAC hybrid circuits/equipment
  9. electronic modules/sub-assemblies
  10. aeronautical electronic equipment
  11. power supplies (such as switched mode, series regulation, parallel regulation)
  12. motor control systems (such as closed loop servo and proportional control, solid state inverter control)
  13. sensor/actuator equipment (such as linear, temperature, photo-optic, flow, rotational, level, pressure, mass/weight)
  14. digital devices (such as process control, microprocessor-based, logic devices, display devices)
  15. signal processing equipment (such as frequency modulating/demodulating, oscillators, amplifiers, filters)
  16. other specific electronic product

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3. Carry out **one** of the following checks:
  1. in-process/sample
  2. final check
4. Carry out visual check of electronic products, to include checking **all** of the following:
  1. all manufacturing/assembly procedures are complete
  2. joints are free from excess solder and flux residue
  3. all components are correctly assembled and orientated
  4. products are free from damage or obvious defects
  5. all connections are mechanically secure
5. Carry out the tests using **one** of the following types of test equipment:
  1. continuity tester
  2. signal generator
  3. ammeter
  4. multimeter
  5. signal tracer
  6. Q meter
  7. oscilloscope
  8. logic probe/analyser
  9. pulse sequencing analyser
  10. computer-aided diagnostic equipment
  11. automatic test equipment
  12. recording devices (such as shock, vibration, humidity, temperature)
  13. specific product testing equipment
  14. computer-aided diagnostic equipment
  15. other specific test equipment
6. Carry out **two** of the following tests:
  1. function test
  2. insulation resistance
  3. soak test
  4. clock/timer switching
  5. continuity, open and short circuit tests
  6. shock and vibration withstand tests
  7. DC voltage/current levels
  8. heat dissipation
  9. AC voltage/current levels
  10. pulse train sequencing and pulse width/rise time
  11. logic states

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12. waveform shape, frequency and amplitude checks
  13. frequency modulation/demodulation
  14. signal noise/interference levels
  15. environmental tests (such as humidity, temperature)
  16. component value tests (such as resistance, capacitance, inductance)
  17. other product-specific tests
7. Carry out tests in compliance with **one** of the following standards:
1. BS or ISO standards and procedures
  2. customer standards and requirements
  3. company standards and procedures
  4. statutory regulations
8. Complete the relevant paperwork, using **one** of the following:
1. inspection report
  2. customer specific documentation
  3. job card

## Checking and testing electronic products

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