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## Overview

This standard identifies the competences you need to carry out visual inspections, calibration and setting activities on instruments used to check electrical and electronic equipment/circuits, in accordance with approved procedures. You will be required to prepare the instruments, ensuring that they are safe and free from hazards, to obtain all relevant and current documentation, and to obtain the necessary tools and equipment required. You will be required to select the appropriate calibration equipment, based on the type of equipment to be calibrated and the accuracy of the measurements that will be taken. In carrying out the calibration activities, you will be expected to set up, calibrate and check the equipment across its full operating range (where this is appropriate). Equipment to be calibrated could include instruments such as those used to measure current, voltage, resistance, polarity, insulation values, signal waveforms.

Your responsibilities will require you to comply with organisational policy and procedures for the calibration activities undertaken, and to report any problems with these activities 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 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 calibration techniques and procedures to electrical and electronic test instrumentation including, where appropriate, British, European and International standards. You will understand how to use the tools and equipment to calibrate the equipment, in adequate depth to provide a sound basis for carrying out the activities and identifying where instruments do not meet the required calibration specification.

You will understand the safety precautions required when carrying out the calibration 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:*

1. work safely at all times, complying with health and safety legislation and other relevant regulations, directives and guidelines
2. obtain and use the correct equipment to carry out the calibration activities
3. identify and confirm the calibration checks to be made and acceptance criteria to be used
4. correctly set up, check and calibrate the equipment, using approved techniques and procedures
5. record the results, and complete calibration documentation in the appropriate format
6. where appropriate, apply suitable identification to the equipment, stating current date(s) of calibration
7. deal promptly and effectively with problems within your control and report those that cannot be solved

## Knowledge and understanding

### *You need to know and understand:*

1. the specific safety precautions to be taken when checking and calibrating electrical and electronic test instrumentation (such as specific legislation or regulations governing the activities or work area, safe working practices and procedures to be adopted, general workshop safety practice)
2. the health and safety requirements of the work area in which you are carrying out the calibration activities, and the responsibility these requirements place on you
3. Regulations with regard to the substances used in the calibration process
4. the hazards associated with calibrating electrical and electronic test instrumentation, and how they can be minimised
5. the appropriate personal protective equipment and clothing (PPE) to be worn during the calibration activities
6. what constitutes a hazardous voltage and how to recognise victims of electric shock
7. how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)
8. how and where to obtain the required calibration specifications, and how to check that they are current and complete
9. the general principles of quality assurance systems and procedures
10. the basic operating principles of the test instruments that are being calibrated
11. preparations to be undertaken before the equipment is checked and calibrated (such as cleaned and free from contaminants, visually inspected for damage or missing parts)
12. the procedures and precautions to be adopted to eliminate/protect against electrostatic discharge (ESD)
13. the need to take note of any special operating conditions
14. the effects that the environment may have on the calibration activities (such as where precision measurements are concerned)
15. the use of temperature-controlled standards rooms for calibration activities
16. the application and uses of the tools and equipment to calibrate electrical and electronic test instruments (such as stabilised power supplies, reference signal generators, measuring bridges and reference potentiometers)
17. the typical defects and variations that can be found on the instruments, and

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how to identify them

18. the need to carry out the calibration checks, and to record the results using the appropriate documentation

19. the procedure to be followed when instruments do not meet calibration requirements

20.

the importance of completing calibration documentation, what needs to be recorded and where records are kept

21.

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

## Scope/range

1.

Prepare for the calibration activities by carrying out all of the following:

- 1.1 ensure that the work area is in a safe and tidy condition
- 1.2 ensure that environmental conditions are suitable for the calibration checks being made (such as temperature, cleanliness, humidity)
- 1.3 obtain and use the correct quality control documentation (such as calibration records, equipment specifications)
- 1.4 obtain and check the general condition of the instrumentation to be calibrated
- 1.5 obtain appropriate calibration/reference equipment for the job in hand
- 1.6 leave the work area in a safe and tidy condition on completion of the activities

2.

Carry out the calibration of electrical/electronic test instruments in both of the following types of measurement:

- 2.1 analogue
- 2.2 digital

3.

Carry out the calibration of electrical/electronic test equipment, to include eight of the following types of instruments:

- 3.1 multimeters
- 3.2 flash testers
- 3.3 ammeter
- 3.4 resistance boxes
- 3.5 voltmeter
- 3.6 residual current device (RCD) tester
- 3.7 watt meters
- 3.8 signal generators
- 3.9 ohmmeters
- 3.10 portable appliance (PAT) testers
- 3.11 oscilloscope
- 3.12 logic probes
- 3.13 insulation tester
- 3.14 current injection devices
- 3.15 loop impedance tester
- 3.16 phase testers
- 3.17 earth bond testers
- 3.18 amplifiers
- 3.19 current probes
- 3.20 spectrum analysers
- 3.21 chart recorders

- 3.22 network analysers
- 3.23 frequency meters and counters
- 3.24 logic analysers
- 3.25 other specific test equipment

4.

Use three of the following types of equipment during the calibration activities:

- 4.1 reference/workshop potentiometers
- 4.2 spectrum analysers
- 4.3 measuring bridges
- 4.4 network analysers
- 4.5 master/reference stabilised power supplies
- 4.6 logic analysers
- 4.7 master/reference meters
- 4.8 master/reference signal generators
- 4.9 master/reference oscilloscopes
- 4.10 AEI and ACI equipment
- 4.11 other specific calibration equipment

5.

Test and calibrate electrical/electronic test instrumentation, to include carrying out all of the following:

- 5.1 obtaining calibration parameters from data records
- 5.2 connecting up power supplies, test and calibration equipment
- 5.3 following specified or appropriate calibration procedures
- 5.4 ensure that any special operating conditions are taken into account
- 5.5 calibrating to manufacturer's procedures and specifications
- 5.6 applying appropriate coding to calibrated equipment
- 5.7 recording calibration results accurately and legibly, in the appropriate format
- 5.8 identifying and recording out-of-specification instruments
- 5.9 taking appropriate action in respect of instruments that fail to meet calibration specifications
- 5.10 diagnosing faults during the calibration process (where appropriate)

6.

Complete the calibration documentation, to include one from the following, and pass to the appropriate people:

- 6.1 calibration report
- 6.2 'equipment withdrawal from service' report
- 6.3 job card
- 6.4 customer specific documentation
- 6.5 electronic reports

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Checking and calibrating electrical and electronic test equipment



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