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# Test Instruments

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Standards & Requirements

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# Instrument Standard

- BSEN61010 is the basic safety standard for all electrical test instruments.
  - The basic instrument standard is BSEN61557 (Elec safety in low volt distribution systems).
  - HSE guidance notes GS38 recommends certain requirements for all instruments, leads, probes and accessories.
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# Instrument Accuracy

- **Basic accuracy of 5% is usually adequate. In the case of analogue instruments 2% of fsd.**
  - Basic accuracy is an 'ideal' and accuracy in the field can differ due to:-
  - **Instrument errors:-** operator ability; battery condition; ambient temp; instrument orientation.
  - **Loss of calibration:-** need for regular calibration using standards traceable to national standards. Checks after mishandling.
  - **Field errors:-** contact resistance, lead resistance etc.
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# Low Resistance Ohm Meters

- This can take the form of a specialised low-ohm meter or the continuity range of an IR/continuity tester.
  - Test current may be a.c or d.c.
  - The test current must be derived from a source with a no-load voltage of between 4v & 24v and capable of delivering a short circuit current not less than 200mA (0.2A).
  - Measuring range must cover a span of at least 0.2 $\Omega$  to 2 $\Omega$ .
  - Digital resolution must be 0.01 $\Omega$ .
  - Instruments to BSEN61557-4 will satisfy the above.
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# IR Ohm-meter

- Must be capable of developing the test voltage across the load:-
    - 250v SELV-PELV
    - 500v Circuits rated up to 500v excluding ELV
    - 1000v Circuits rated between 500v & 1000v
  - Instruments to BSEN61557-2 will satisfy the above.
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# Earth Fault loop Impedance Testers

- These circulate current from the phase conductor into the protective earth. This will therefore raise the potential of the protective earth system.
  - Test duration should be within safe limits.
  - Instrument should cut off the test after typically 40mS.
  - Transient variations of mains voltage can introduce field errors during tests therefore the test should be repeated at least once.
  - For circuits rated up to 50A a resolution of  $0.01\Omega$  is acceptable.
  - Can also provide function for measuring  $I_{pSCC}$ .
  - Instruments to BSEN61557-3 will satisfy the above.
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# RCD Testers

- Should be capable of supplying full range of test current.
  - Test current should be applied for no longer than 2 seconds.
  - Instruments to BSEN61557-6 will satisfy the above.
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# Earth Electrode Resistance Testers

- Can be a 4 terminal or 3 terminal device (where a combined lead to the earth electrode would not have a significant resistance compared to the earth electrode resistance).
  - Field errors can be introduced due to the effects of temporary spike resistance or layout of test electrodes.
  - Temporary spikes should be positioned within reasonable accuracy.
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# Phase Rotation Instruments

- Indication can be by mechanical, visual or audible means.
  - The indication must be unambiguous.
  - Instrument should be suitable for continuous operation.
  - Current to earth through meter should not exceed 3.5mA.
  - Should be provided with permanently connected leads or a plug device where live parts are not accessible in any situation.
  - Devices to BSEN61557-7 satisfy the above
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