

ELECTRICAL TESTING (DOMESTIC APPLIANCES)

(See also: [Electrical Equipment\(22\)](#); [Electricity\(24\)](#);
[Soldering\(79\)](#))

ELECTRICAL TESTING (DOMESTIC APPLIANCES)

INTRODUCTION

In the course of testing small domestic appliances there may be some operations carried out with live parts exposed. Equipment so tested may include television sets or other audio-visual equipment and 'white goods'.

LEGAL REQUIREMENTS

Regulation 4(3) of the Electricity at Work Regulations 1989 requires that 'work on or near to an electrical system shall be carried out in such a manner as not to give rise, so far as is reasonably practicable, to danger'. Regulation 14 places strict prohibition on working on or near live conductors unless:

- a) it is unreasonable for the equipment to be dead;
- b) it is reasonable for the work to take place on or near the live conductor;
- c) suitable precautions have been taken to prevent injury.

Regulation 3 of the Management of Health and Safety at Work Regulations 1999 requires a risk assessment to be carried out before testing begins to identify the precautions you need to take. A safe system of work should be established and recorded, along with provision of a safe working environment. Some general precautions are outlined below but reference must be made to the detailed advice contained in 'Safety in *electrical testing at work*' (free, HSE, INDG354, 04/04) and relevant HSE engineering information sheets when conducting your risk assessment.

All personnel must be competent. Specialist advice may be needed to ensure that testing procedures and the set up is safe. All personnel involved in testing must be given specific safety training relevant to the work they are doing. Even skilled workers can make accidental contact with dangerous electrical conductors if they have not been properly protected. Appropriate training or instruction must also be given to anyone who may attempt to enter test areas and approach test benches.

TESTING ENVIRONMENT

There should be adequate clear working space and the testing environment should be as earth free as possible, with a minimum of exposed earthed metalwork.

Permanent test areas should be set apart by barriers to prevent entry, with suitable warning signs and green or red lights to indicate whether it is safe to enter the area and should be provided with an emergency stop button to cut power supplies in the event of an emergency. The poster 'Electric Shock: First Aid

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Procedures' should be displayed at a prominent location, giving emergency contact numbers. Temporary test areas should be set up in the same way where reasonably practicable.

The floors and walls should be insulated; the floor with rubber matting (complying with relevant British Standard). The electrical supply should be via one or more isolating transformers. Pipework, conduit, radiators, structural steel work, socket outlets should be removed or shrouded with insulating material. Benches and other 'furniture' should be made of non-conducting material and legs and framework shrouded with insulating material to prevent contact. Where it is necessary to have a mains socket outlet connected directly to the supply, a Residual Current Device (Earth trip) should be installed.

Soldering irons and task lighting should be extra low voltage and supplied from an isolating transformer.

Each item under test should have it's own test supply.

Individuals carrying out testing should be kept far enough apart so that they cannot touch each other, otherwise two undetected faults on each piece of equipment under test could cause current to flow through both persons. Electrostatic discharge wrist straps can be used (with at least 1 Megohm resistance).

TESTING OF AUDIO-VISUAL EQUIPMENT

This equipment can be of Class I or Class II design, or might not be classified as such but housed in an insulating enclosure. A lot of mains-powered equipment only uses mains power to supply what is known as a power supply unit. This is a sub-assembly within the equipment and from this unit onwards to the working parts the voltages are in the category of extra low voltage so that the danger of electric shock is removed.

On some equipment the internal metal parts are connected to one pole of the main supply - older designs of TV sets are typical of this type. If the equipment is connected such that the live conductor is connected to the chassis, when a test engineer is working with covers removed and is in an environment where earth leakage paths exist, electric shock risk is high.

Consequently an adequately rated **isolating transformer** should be used, and where there are a number of adjacent working positions **individual isolating transformers** should be used for each piece of equipment. Aerial sockets should be of isolated construction complying with BS 415.

Further precautions should include a **non-conducting work environment** (including bench, socket outlets and other service equipment). The use of a 30mS Residual Current Device (RCD) for supplementary protection is also advised, particularly where isolated supplies are not provided to each piece of equipment.

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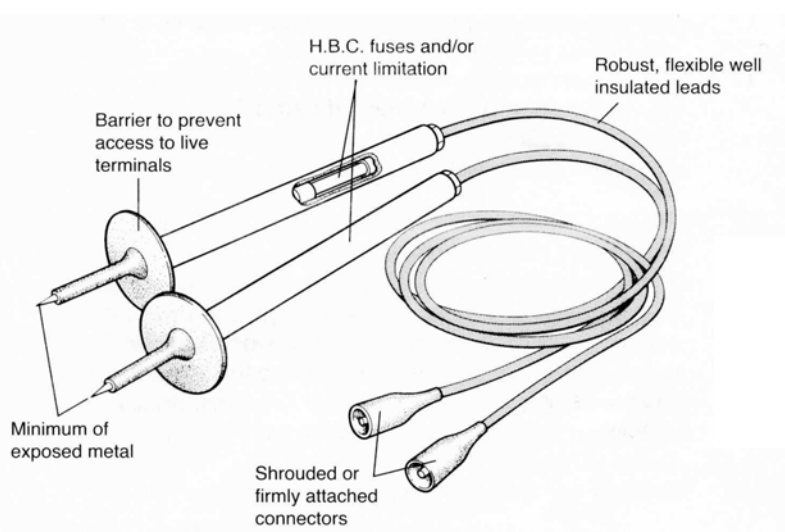
WHITE GOODS TESTING

There are likely to be many dangerously live conductors exposed if the machines are worked on with the covers removed. The main precaution that should be adopted is to provide insulation or barriers to prevent accidental contact. These protective devices could be of a temporary nature and be fitted before testing commences.

ELECTRICAL TEST EQUIPMENT

Guidance Note GS 38 'Electrical test equipment for use by electricians' provides guidance for electrically competent people involved in electrical testing, diagnosis and repair. The advice includes reference to the following:

Design safety - summarised in this diagram:-



System of work - before testing begins it is essential to establish that the test device, including all leads, probes and connectors, is suitably rated for the voltages and currents, which may be present. The equipment that is to be worked on must be safe for the intended test and the working environment must not present additional dangers. Appropriate precautions should be taken whilst testing is carried out, as outlined previously. Test devices/equipment should be regularly inspected and, where necessary, tested by a competent person with reference to the contents of the guidance note.

SOLDERING

Soldering using rosin-based fluxes presents a potential hazard of sensitisation and occupational asthma. Exposure to fumes from such soldering should be minimised by appropriate ventilation (See Soldering element in this manual).

CHECKLIST - ELECTRICAL TESTING (DOMESTIC APPLIANCES)

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| 1. | Do you conduct testing of domestic electrical appliances as part of your business? | YES | NO |
| 2. | Do you provide an earth free environment where testing takes place? | YES | NO |
| 3. | Do you use isolating transformers for each test area? | YES | NO |
| 4. | Do you use Residual Current Devices (RCDs) as a supplementary precaution? | YES | NO |
| 5. | Do you minimise the need to expose live conductors and/or use temporary screening? | YES | NO |
| 6. | Do test engineers possess the appropriate knowledge, training, experience and skills to achieve safety from electrical danger? | YES | NO |
| 7. | Do you have a maintenance system (to include written records) for test equipment? | YES | NO |
| 8. | Do you have safe systems of work specified for electrical testing, identified within a suitable and sufficient risk assessment? | YES | NO |
| 9. | Do you control any risk arising from the use of resin-based fluxes used in soldering? | YES | NO |

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REFERENCES / FURTHER DETAILS

- * 1. Safety in Electrical testing at Work- general guidance. (HSE) (single copies free) INDG 354. (04/02). (ISBN: 0 7176 2296 7)
- * 2. CD-ROM. Your guide to the essentials of electrical safety.(HSE). ISBN 0 7176 1714 9.
- * 3. GS38: Electrical test equipment for use by electricians. (HSE) (ISBN 0 7176 0845 X)
- **4. EIS 36- Safety in Electrical Testing. Servicing, testing and repair of audio, TV and computer equipment. (HSE) www.hse.gov.uk/pubns/eis36.pdf
- **5. EIS 35- Safety in Electrical Testing. Servicing and repair of domestic equipment. (HSE) www.hse.gov.uk/pubns/eis35.pdf

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- * Available to view by prior arrangement at Nuneaton and Bedworth Borough Council, Environmental Health Services, Council House, Coton Road, Nuneaton. CV11 5AA
 - ** Free copy available from Nuneaton and Bedworth Borough Council at the above address.