Electrical appliances guidance note

Earthed equipment

Class 1 electrical equipment is provided with one layer of insulation over the live conductors, and exposed metalwork is bonded to earth so that it cannot become live in the event of an insulation failure. The external metal casing of any item of electrical equipment must be earthed as a legal requirement. With correctly earthed supply installations and equipment, the risk of electric shock is virtually nil.

Note: Certain metal bodied kettles, manufactured to British Standard, do not require the metal body to be earthed. Such kettles should carry the British Electrotechnical Approvals Board Mark (BEAB).

In practice, the most common instances of faulty earthing are:

1. Earth connections broken accidentally or corroded through age.
2. Earth connections incorrectly made.
3. Earth connections not made at all.
4. Earth connections removed for some specific purpose and not reinstated.

The external casings or screens of all electrical equipment must be secured so that it is impossible to touch electrically live parts. If the equipment is disconnected from earth, a notice must be attached which makes this quite evident to any unsuspecting person. Only persons with appropriate knowledge and experience, i.e. competent persons, may work on unearthed equipment.

Great care must be exercised when using electrical equipment in high earth leakage areas such as cold rooms, washing up rooms, and in medical/biological laboratories where "wet" experiments are often in progress.

Residual current devices (RCD)

The application of a Residual Current Device (previously known as Earth Leakage Circuit Breaker) to a conventionally earthed system should be considered where it is vital to provide an additional back-up protection against failure of the primary earthing system.

As a general rule, an RCD will prevent a person from being subjected to a lethal shock from a fault current to earth by limiting the magnitude of the shock to 30 mA and the duration of the shock to 30 ms. An RCD will give no protection from a live to neutral contact.

RCD units are packaged either as fixed installations fitted to the incoming supply or are available in the form of a power breaker 13 Amp fused plug or adaptor. Every RCD unit is fitted with a test button which should be operated regularly to prove breaker operation.

Double insulated equipment

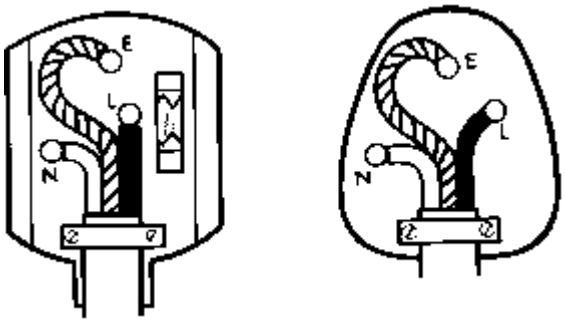
Class 2 electrical equipment has all exposed metalwork separated from the conductors by two layers of insulation, so that the metalwork cannot become live. There is no earth connection and the operator's safety depends upon the integrity of the two layers of insulation.

British double insulated equipment is marked with the symbol:

Plugs

Plugs which are incorrectly wired, or in which the connections have been broken, can cause serious accidents. All plugs must be wired by a competent person who should observe the following requirements:

- The earth wire, striped green and yellow, is connected to the terminal marked E; this should be the longest of the three wires so that it is the last to become detached if the cable is strained.
- The live wire (brown) is connected to the terminal marked L.
- The neutral wire (blue) is connected to the terminal marked N.
- The bared ends of the wires should be hidden under the retaining screws which should be screwed down tightly and no uninsulated wires should be visible in the plug top.
- The cable should be firmly attached in place by clamping the outer insulating cover of the cable.
- Never connect two items of electrical equipment to one plug.



Equipment which is double insulated, or has an insulated exterior, is connected by 2-core cable, without an earth lead.

Fuses

Fuses are intended to protect equipment against current overload. Other measures are necessary to protect against electric shock (see Residual Current Devices).

The fuse must be located in the live conductor and must be of the correct rating, which is usually the lowest rating that will carry the appliance current continuously. Fuses in fixed distribution boards must be replaced only by Works Division Electricians, except in the event of an emergency; if so replaced, the Works Division must be informed of the replacement immediately.

The reason for a fuse blowing, or a circuit breaker tripping, must always be investigated by a competent person and replacement fuses must always be of the correct rating.

Adaptors and extension sockets

Multipoint adaptors should not be used unless absolutely necessary, and then should only be of a type authorised by the Works Division. No more than one such adaptor may be used at any one mains outlet.

Extension sockets or plug strips should preferably be to British Standard design and should be individually fused, each should be mounted off the floor, so that it is not damaged by kicking or routine cleaning operations. Non-standard extension sockets made up by school staff must always be checked and tested by a competent person before use. Never use a lighting socket to power electrical equipment.

Cables and extension cables

Cables on old or foreign equipment which are not colour-coded in the brown, blue, yellow/green colours (EC Convention) must be replaced by a competent person before bringing the equipment into use. Cables must be chosen so that their rating is sufficient to carry the current which will flow through them in both normal and abnormal conditions.

Cables carrying power to and from equipment must be fitted with connecting plugs and sockets which do not leave bare live pins on disconnection, and insulating grommets must be used to secure cables passing through holes in metal chassis. As a further safeguard, flexible leads to portable equipment should be as short as possible; they should not cross gangways either to be walked on or run over by trolleys. Under no circumstances are flexible leads to be taken under doors. Wherever possible, trailing cables should be located within an appropriate cable duct, in order to achieve good housekeeping standards. Rubber and plastic covered cables should be kept well away from hot surfaces.

Never use a coiled extension cable without first fully unreeling the cable. The heat generated in a coiled cable carrying power can lead to the insulation melting. If there is no alternative to taking cables across a floor, then they should be protected with a suitable cable guard.

Safeguards against fire

Fires can be caused by overloaded or defective electrical circuits but, if equipment is wired properly, with the cable adequately rated and the fusing is correct, the risk is slight. However, explosions and fire can result from sparking contact in the presence of highly flammable gases and vapours, and specially designed flameproof and explosion proof electrical equipment, allied to adequate and proper ventilation, must be used in areas where these risks are

present. Always switch off equipment with the proper switch and never by pulling out the plug.

School rules for switching off unused electrical supplies, particularly in unoccupied rooms, should be formulated and observed. Where it is necessary to leave equipment operating unattended, the controlling switch must be clearly identified by using the standard University notice, available from Estates Department, clearly posted on the room door. Where possible, additional safety features should be incorporated. Information on action(s) to be taken in the event of an emergency should be included on this notice.