G18 APPENDIX 1 - ELECTRICAL SAFETY – GUIDANCE FOR CARRYING OUT RISK ASSESSMENTS

INTRODUCTION

Each year approx. 1000 accidents at work involving electric shock or burns are reported to the Health and Safety Executive (HSE). Even non-fatal shocks can cause severe and permanent injury. Shocks from faulty equipment may lead to falls from ladders, scaffolds or other work platforms. Those using electricity may not be the only ones at risk: poor electrical installations and faulty electrical appliances can lead to fires which may also cause death or injury to others. Most of these accidents can be avoided by careful planning and straightforward precautions.

The main hazards are:

- Contact with live parts causing shock and burns (normal mains voltage, 230 volts AC, can kill).
- Faults which could cause fires.
- Fire or explosion where electricity could be the source of ignition in a potentially flammable or explosive atmosphere, eg in a spray paint booth.

The risk of injury from electricity is strongly linked to where and how it is used. The risks are greatest in harsh conditions, for example:

- in wet surroundings - unsuitable equipment can easily become live and can make its surroundings live
- out of doors - equipment may not only become wet but may be at greater risk of damage
- in cramped spaces with a lot of earthed metalwork, such as inside a tank or bin - if an electrical fault developed it could be very difficult to avoid a shock

Some items of equipment can also involve greater risk than others. Extension leads are particularly liable to damage - to their plugs and sockets, to their electrical connections, and to the cable itself. Other flexible leads, particularly those connected to equipment, which is moved a great deal, can suffer from similar problems.

Reducing the Risks

Ensure that the electrical installation is safe:

- new electrical systems or modification to be carried out by a competent person and to a suitable standard, e.g., BS 7671 Requirements for electrical installations, and then maintain them in a safe condition
- existing installations should also be properly maintained (5 yearly inspections and test by competent electrical contractor)
- provide enough socket-outlets: - overloading socket-outlets by using adaptors can cause fires

Provide safe and suitable equipment:

- choose equipment that is suitable for its working environment
- Electrical risks can sometimes be eliminated by using air, hydraulic or hand powered tools. These are especially useful in harsh conditions
- ensure that equipment is safe when supplied and then maintain it in a safe condition
- provide an accessible and clearly identified switch near each fixed machine to cut off power in an emergency
- for portable equipment, use socket-outlets which are close by, so that equipment can be easily disconnected in an emergency
- the ends of flexible cables should always have the outer sheath of the cable firmly clamped to stop the wires (particularly the earth) pulling out of the terminals
- replace damaged sections of cable completely
- Use proper connectors or cable couplers to join lengths of cable. Do not use strip connector blocks covered in insulating tape
- Some types of equipment are double insulated. These are often marked with a 'double-square' symbol. The supply leads have only two wires – live (brown) and neutral (blue). Make sure they are properly connected if the plug is not a moulded-on type
- Protect light bulbs and other equipment which could easily be damaged in use. There is a risk of electric shock if they are broken
- electrical equipment used in flammable/explosive atmospheres should be designed to stop it from causing ignition during use

Reduce the voltage

One of the best ways of reducing the risk of injury when using electrical equipment is to limit the supply voltage to the lowest needed to get the job done (Approx 50 volts and below is generally not capable of causing a fatal shock), such as:

- temporary lighting can be run at lower voltages, e.g., 12, 25, 50 or 110 volts
- where electrically powered tools are used, battery operated are safest
- portable tools are readily available which are designed to be run from a 110 volts Centre-tapped-to-earth supply

Provide a safety device

If equipment operating at 230 volts or higher is used, an RCD (residual current device) can provide additional safety. An RCD is a device which detects some, but not all, faults in the electrical system and rapidly switches off the supply. An RCD will reduce the risk a serious electric shock but should only be used as a backup; they are not a substitute for suitable equipment or proper maintenance.

RCD's must be used to reduce the risk of shocks when using electrical equipment out of doors and in low resistance areas such as workshops, laboratories, and kitchens.

The best place for an RCD is built into the main switchboard, as this means that the electrical supply is permanently protected. If this is not possible, an electrical outlet incorporating an RCD, or a plug in RCD adaptor, can also provide additional safety. Any equipment that causes an RCD to trip should be withdrawn from use and checked by a competent person.

All RCD's have test buttons to check that their mechanism is free and functioning correctly. These should be operated before use on RCD adaptors, plugs and sockets and quarterly on RCD's built into the main switchboard. (See G18 POEL 38a for guidance on how to test RCDs)

Employees should be informed that:

- an RCD is a valuable safety device, never bypass it
- if the RCD trips, it is a sign there is a fault. Check the equipment before using it again
- if the RCD trips frequently and no fault can be found in the system, report it
- the RCD test buttons should be operated before use on adaptors, plugs and sockets and at least quarterly on RCDs in the main switchboard to check that the mechanisms are free and functioning

Carry out preventative maintenance

All electrical equipment and installations should be maintained to prevent danger. To identify where any maintenance is necessary a system of visual inspection and, where necessary, testing must be implemented.

Fixed electrical installations must be inspected and tested at least every 5 years by a competent electrical contractor.

LCC owned and provided portable appliances / equipment such as kettles, desk fans, vacuum cleaners, floor buffers, electric tools, etc. should be tested regularly (Portable Appliance Testing) by a competent person. The frequency of testing may depend on the level of risk associated with the individual piece of equipment and/or the frequency of use this equipment receives and where experience shows maintenance is required more often to prevent danger. See guidance table, G18 Electricity at Work, here.

Permanently sited low risk office equipment, such as computers, printers, photocopiers, fax machines, fridges etc. which are rarely moved will require less maintenance to prevent danger if the mains cables are organized to prevent damage. Inspection and test frequencies of between 2 and 4 years are generally acceptable with this equipment.

Records of these inspections and tests should be kept and it is good practice to label items to show inspections and tests have been carried out. A checklist and record sheet can be found in G18, Appendix 2

Work safely

Make sure that staff who are working with electricity/using electrical equipment are competent to do the job.
Employees should be encouraged to carry out pre-use checks on portable electrical equipment and basic training on electrical safety and carrying out these checks should be provided.

The basics of these are covered in Employee Leaflet POEL 38 Electrical Safety.

Check that:

- suspect or faulty equipment is taken out of use and kept secure until examined by a competent person.
- where possible, tools and power socket-outlets are switched off before plugging in or unplugging.
- equipment is switched off and/or unplugged before cleaning or making adjustments
- Work on, or near, exposed live parts of equipment must be avoided unless it is necessary and suitable precautions have been taken to prevent injury, both to the workers and to anyone else who may be in the area.
- Contractors and employees carrying out formal visual inspections/tests and plug fitting must be competent and managers must satisfy themselves this is the case before authorising employees to do this work. Authorization should be in writing and records of training should be kept.
- Anyone carrying out equipment repairs or alterations to electrical installations must be competent, and this work shall only be carried out by persons with sufficient technical knowledge and experience.

Underground power cables

Always assume cables will be present when digging/excavating. Use up-to-date service plans, cable avoidance tools and safe digging practice to avoid danger. More detailed guidance on avoidance of danger from underground cables is available from the HSE.

Overhead power lines

When working near overhead lines, it may be possible to have them switched off if the owners are given enough notice. If this cannot be done, consult the owners about the safe working distance from the cables. Remember that electricity can flash over from overhead lines even though plant and equipment do not touch them. Over half of the fatal electrical accidents each year are caused by contact with overhead lines. More detailed guidance on avoidance of danger from overhead electric lines is available from HSE.