

Electrical safety and you

INTRODUCTION

Electricity can kill. Each year about 1000 accidents at work involving electric shock or burns are reported to the Health and Safety Executive (HSE). Around 30 of these are fatal. Most of these fatalities arise from contact with overhead or underground power cables.

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.

This leaflet outlines basic measures to help you control the risks from your use of electricity at work. More detailed guidance for particular industries or subjects is listed on pages 6 - 8. If in doubt about safety matters or your legal responsibilities, contact your local inspector of health and safety. The telephone number of your local HSE office will be in the phone book under Health and Safety Executive. For premises inspected by local authorities the contact point is likely to be the environmental health department at your local council.

WHAT ARE THE HAZARDS?

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.

ASSESSING THE RISK

Hazard means anything which can cause harm.

Risk is the chance, great or small, that someone will actually be harmed by the hazard.

The first stage in controlling risk is to carry out a risk assessment in order to identify what needs to be done. (This is a legal requirement for all risks at work.)

When carrying out a risk assessment:

- identify the hazards;
- decide who might be harmed, and how;
- evaluate the risks arising from the hazards and decide whether existing precautions are adequate or more should be taken;
- if you have five or more employees, record any significant findings;
- review your assessment from time to time and revise it if necessary.

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.

More information on carrying out risk assessments is available in other HSE publications listed on page 6 of this leaflet.


REDUCING THE RISK

Once you have completed the risk assessment, you can use your findings to reduce unacceptable risks from the electrical equipment in your place of work. There are many things you can do to achieve this; here are some.

Ensure that the electrical installation is safe

- install new electrical systems to a suitable standard, eg BS 7671 *Requirements for electrical installations*, and then maintain them in a safe condition;
- existing installations should also be properly maintained;
- 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 lightbulbs 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. You may need specialist advice.

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, such as:

- temporary lighting can be run at lower voltages, eg 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. The best place for an RCD is built into the main switchboard or the socket-outlet, as this means that the supply cables are permanently protected. If this is not possible a plug incorporating an RCD, or a plug-in RCD adaptor, can also provide additional safety.

RCDs for protecting people have a rated tripping current (sensitivity) of not more than 30 milliamps (mA). Remember:

- an RCD is a valuable safety device, never bypass it;
- if the RCD trips, it is a sign there is a fault. Check the system before using it again;
- if the RCD trips frequently and no fault can be found in the system, consult the manufacturer of the RCD;
- the RCD has a test button to check that its mechanism is free and functioning. Use this regularly.

Carry out preventative maintenance

All electrical equipment and installations should be maintained to prevent danger. It is strongly recommended that this includes an appropriate system of visual inspection and, where necessary, testing. By concentrating on a simple, inexpensive system of looking for visible signs of damage or faults, most of the electrical risks can be controlled. This will need to be backed up by testing as necessary.

It is recommended that fixed installations are inspected and tested periodically by a competent person.

The frequency of inspections and any necessary testing will depend on the type of equipment, how often it is used, and the environment in which it is used. Records

of the results of inspection and testing can be useful in assessing the effectiveness of the system. More detailed guidance is available in the booklets listed on pages 6 - 8.

Equipment users can help by reporting any damage or defects they find.

Work safely

Make sure that people who are working with electricity are competent to do the job. Even simple tasks such as wiring a plug can lead to danger - ensure that people know what they are doing before they start.

Check that:

- suspect or faulty equipment is taken out of use, labelled 'DO NOT 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.

More complicated tasks, such as equipment repairs or alterations to an electrical installation, should only be tackled by people with a knowledge of the risks and the precautions needed.

You must not allow work on or near exposed live parts of equipment unless it is absolutely unavoidable and suitable precautions have been taken to prevent injury, both to the workers and to anyone else who may be in the area.

Underground power cables

Always assume cables will be present when digging in the street, pavement or near buildings. Use up-to-date service plans, cable avoidance tools and safe digging practice to avoid danger. Service plans should be available from regional electricity companies, local authorities, highways authorities, etc.

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.

Electrified railways and tramways

If working near electrified railways or tramways, consult the line or track operating company. Remember that some railways and tramways use electrified rails rather than overhead cables.

HSE GUIDANCE ON ELECTRICAL SAFETY

The following publications contain advice on the safe use of electricity for particular industries or in high risk circumstances.

Risk assessment and general health and safety

5 steps to risk assessment INDG163(rev1) HSE Books 1998 (single copies free or priced packs of 10 ISBN 0 7176 1565 0)

Essentials of health and safety at work HSE Books 1994 ISBN 0 7176 0716 X

Maintenance of portable electrical equipment

Maintaining portable and transportable electrical equipment HSG107
HSE Books 1994 ISBN 0 7176 0715 1

Maintaining portable electrical equipment in offices and other low-risk environments
INDG236 HSE Books 1996 (single copies free or priced packs of 10
ISBN 0 7176 1272 4)

Maintaining portable electrical equipment in hotels and tourist accommodation
INDG237 HSE Books 1996 (single copies free or priced packs of 10
ISBN 0 7176 1273 2)

General electrical guidance

Live rails kill - advice for people who need to work near live conductor rails
INDG150 HSE Books 1994 free leaflet

Avoiding danger from underground services HSG47 (Second edition)
HSE Books 2000 ISBN 0 7176 1774 0

Avoidance of danger from overhead electrical lines GS6(rev) HSE Books 1997
ISBN 0 7176 1348 8

Electrical safety on construction sites HSG141 HSE Books 1995
ISBN 0 7176 1000 4

Electricity at work - safe working practices HSG85 HSE Books 1993
ISBN 0 7176 0442 X

Electrical test equipment for use by electricians GS38(rev) HSE Books 1995
ISBN 0 7176 0845 X

Electrical safety at places of entertainment GS50 HSE Books 1997
ISBN 0 7176 1387 9

Electrical hazards from steam/water pressure cleaners etc PM29(rev)
HSE Books 1995 ISBN 0 7176 0813 1

Selection and use of electric handlamps PM38 HSE Books 1992
ISBN 0 11 886360 6

Memorandum of guidance on the Electricity at Work Regulations 1989 HSR25
HSE Books 1989 ISBN 0 7176 1602 9

GUIDANCE ON ELECTRICAL SAFETY FROM OTHER ORGANISATIONS

Note: The inspection and testing intervals for electrical equipment given in these publications are recommendations and are not legal requirements.

BS 7671: 1992 *Requirements for electrical installations*. IEE Wiring Regulations 16th edition. The IEE Wiring Regulations have the status of a British Standard. They are supported by a separate series of Guidance Notes enlarging on particular requirements of parts of the Regulations.

Code of practice for in-service inspection and testing of electrical equipment

Both titles are available from:
Institution of Electrical Engineers
PO Box 96
Stevenage, Herts SG1 2SD

FEI Recommendations for periodic safety checks for business equipment

Available from:
Publicity Department, Ref SR
FEI
Russell Square House
10-12 Russell Square
London WC1B 5EE

FURTHER INFORMATION

This leaflet is available in priced packs of 15 from HSE Books,
ISBN 0 7176 1207 4. Single free copies are also available from HSE Books.

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also available from bookshops.)

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Fax: 02920 859260 e-mail: hseinformationservices@natbrit.com or write to
HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG.
You can also visit HSE's website: www.hse.gov.uk

This leaflet contains notes on good practice which are not compulsory but which
you may find helpful in considering what you need to do.

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