

# ELECTRICAL SAFETY



Health and Safety Guidance Note



**NFU Mutual**  
RISK MANAGEMENT SERVICES

## INTRODUCTION

Electricity can kill. Every year people are killed or seriously injured at work due to electric shock or associated burns. Even non-fatal shocks can cause severe and permanent injury.

Electricity is supplied in two forms, referred to as 'alternating' and 'direct' current. This guidance note concentrates on the most hazardous form of supply normally encountered in the workplace, namely 'alternating' current or 'mains' electricity. Alternating current is usually supplied at a voltage of either 240 volts (single phase supply) or 415 volts (three phase supply) both of which have the potential to be fatal.

Faulty electrical systems are responsible for a large number of workplace accidents and fires each year. The safe management of electrical systems can be relatively straightforward as long as suitable control systems are in place and safety procedures followed.

Please note that specific guidance on working with overhead power lines and underground services is provided in separate guidance notes.

## WHAT ARE THE HAZARDS ASSOCIATED WITH ELECTRICITY?

The hazards associated with the use of electricity include:

- Contact with live parts resulting in:
  - Electric shock that could result in muscular spasms and cramps, respiratory failure, irregular beating of the heart (fibrillation), which can lead to cardiac arrest;
  - Electric burns - due to the conductive nature of the human body, particularly beneath the skin. Burns that may appear superficial on the skin surface may often be deep-seated and extensive.
  - Thermal burns - people can receive thermal burns if they get too near hot surfaces or if they are near an electrical explosion. Other injuries may result if the person pulls quickly away from hot surfaces whilst working at height or if they then accidentally touch nearby machinery.
- Electric arcing - arcing is the process that occurs when electrical energy 'jumps' between conductors due to faults such as inadequate earthing or insulation;
- Fires and explosions as a result of:
  - Overloading electrical circuits causing overheating;
  - Leakage of current due to poor insulation;
  - Placing flammable materials too close to electrical equipment;
  - Faulty or poorly maintained protective devices;
  - Sparks being emitted from electrical equipment;
  - Ignition of flammable substances in the working atmosphere;
  - Overloading of the installation or connected equipment.
- Associated injuries - e.g. fall from a height if receiving an electric shock whilst working on a ladder etc.

## WHO IS AT RISK?

As you may predict, electricians are most at risk from electricity-related accidents. But it's not only electricians who might be affected by an electrical accident – it can be users of equipment too.

- Have you ever found a plug with water in it after cleaning?
- Noticed the insulation of a lead is worn exposing live cables within?
- Found a broken socket case?
- Had a shock from equipment such as scales or conveying? Did you register it as an electric shock, or did you just brush it off as a 'bit of static'?

Electrical fires and explosions can increase the number of people that are at risk.

## WHAT ARE MY LEGAL RESPONSIBILITIES?

The Electricity at Work Regulations 1989 [Electricity at Work Regulations (Northern Ireland) 1991] apply to electrical installations at virtually all premises. They require precautions to be taken against the risk of death or personal injury from electricity in work activities.

As an employer you have to:

- Assess the risks from electricity;
- Ensure electrical installations are safe and provided with protective devices;
- Provide safe and suitable equipment;
- Carry out preventive maintenance and inspection;
- Act to address the risks from electricity;
- Ensure people working on or with your electrical equipment or systems are 'competent' for the task.

## HOW DO I ASSESS THE RISKS FROM ELECTRICITY?

The first stage in ensuring protection from electricity is to identify the risks it creates by carrying out a risk assessment. The risk assessment process identifies risks and establishes sensible and proportionate measures to control the risks in your workplace. You are probably already taking steps to protect your employees, but your risk assessment will document what you are doing and will help you decide whether you should be doing more. Specific guidance on how to carry out a risk assessment is also provided in the Risk Assessment Guidance Note.

Further, by documenting your risk assessment and the completion of any further actions you will be able to demonstrate the steps you have taken to manage your electrical risks if you are ever asked to do so e.g. after an accident.

Many different factors affect the actual risk posed by electrical installations and equipment:

- The age and suitability of the electrical installation and whether any additions to the system have been undertaken;
- The operating voltage;
- Whether the system and equipment are subject to a planned programme of inspection and testing;
- Whether any work is undertaken on live systems;
- The likely exposure to wear and tear that the equipment will suffer, e.g. extension leads are particularly liable to damage – to their plugs and sockets, to their electrical connections and to the cable itself;
- The environment that the installation and equipment will be used in. If the environment is wet or in a potentially flammable or explosive atmosphere, the risks will be increased;

- Whether the equipment is suitable for the job being undertaken;
- The type of equipment that is being used;
- Who will be using the equipment and how competent they are;
- How often the equipment is used.

## HOW DO I REDUCE THE RISK FROM ELECTRICAL DANGER?

Once the risks have been identified and assessed you need to take action to remove them, or where this is not possible, reduce them to an acceptable level. There are many things you can do to achieve this, including:

### **Ensure all work on electrical installations and electrical equipment is undertaken by a competent electrician or electrical contractor**

– Any person engaged in a work activity where technical knowledge or experience is necessary to prevent danger must be competent, or under close supervision. The level of supervision must be relative to the risks.

Anyone employed to undertake electrical work should be accredited by a UKAS approved inspection body such as NIC-EIC, ECA, NAPIT or SELECT.

A competent person should at least have adequate:

- Knowledge of electricity;
- Experience of the type of work;
- Understanding of the system to be worked on;
- Understanding of the hazards;
- Ability to recognise danger.

Depending on the extent of work on electrical systems being carried out, ensure suitable and sufficient first aid provision.

### **Ensure that the electrical installation and equipment is suitable and safe.**

Make sure that you install any new electrical systems in accordance with an appropriate standard such as, e.g. 'BS 7671 Requirements for Electrical installations, IEE wiring Regulations 18th edition', and then maintain them in a safe condition.

Electrical systems should be well constructed and safe in normal use, although special attention should be paid to parts of the system that may be particularly vulnerable or where special working conditions are encountered.

Electrical systems will require a thorough examination by your competent person/ electrical contractor to ensure that the system remains safe for the environment and use, and any alterations and extensions have been carried out satisfactorily. There is no requirement to upgrade electrical systems to present IEE standards unless the construction or condition of that system is likely to increase the risk of injury.

It is important that consideration is given to adequate protection measures and devices, such as:

- Earthing and bonding;
- Insulation and enclosure;
- Current limitation, e.g. RCDs;
- Ingress protection from dusts, gases and liquids;
- Switching and isolation.

Electrical systems should be designed and chosen to carry out their functions safely. Careful consideration should be paid to ensuring that the right equipment is selected for the right job with an assessment of the anticipated risks and equipment requirements being carried out as part of the design process.

**Carry out preventative maintenance and inspection** – The maintenance of electrical systems needs to be carried out periodically in a systematic fashion and based on an appreciation of the risks posed by each electrical system.

The periods between inspections should be based on a risk assessment completed by a competent person or a competent electrical contractor e.g. every 3-5 years.

Make sure you keep a written record of tests on fixed electrical systems together with the date of when any defects were rectified, as it will provide you with evidence that you are pro-actively managing your risks from electricity.

**Ensure that your portable electrical equipment is safe** – Portable electrical appliances are responsible for many serious accidents each year and their use in the workplace must be strictly managed.

Portable electrical equipment can be defined as anything that is:

- Intended to be moved; or
- Likely to be moved; or
- Is connected to a fixed supply by a plug.

When purchasing new equipment, an assessment of the use to which it will be put should be made. If the equipment has to meet special requirements (IP rating) then this should be specified when ordering the equipment. If electrical equipment is to be used in potentially flammable atmospheres, the equipment must be safe for use in those conditions -electrical risks can sometimes be eliminated by using air, hydraulic or hand-powered tools instead. Equipment should also meet the standards laid down by the British Electrotechnical Approvals Board (BEAB) or have a British Standard Kite-mark.

The following points should be considered when using portable electrical appliances in the workplace:

- The lowest voltage equipment for the job should be used where reasonably practicable;
- Wet or damp working environments should be avoided where possible;
- User checks should be undertaken prior to using the equipment;
- A system for reporting faults should be developed;
- RCD protection should be considered;
- Excessive trailing leads should be avoided – provide enough socket outlets to prevent overloading;
- Personal protective equipment may be required.

Effective maintenance of portable electrical equipment can help to prevent electrical accidents. Maintenance of portable electric equipment can be achieved by a combination of:

- before use checks by the user – a basic checklist is provided at the end of this guidance note;
- formal visual inspections by a competent person; and
- where necessary a combined inspection and test, also known as a portable appliance test (PAT), by an electrically competent person.

Maintenance will need to be carried out more frequently where the risk is high, where the equipment is more likely to be subject to physical and/or environmental damage e.g. on farms, construction sites and less frequently where the risk is lower, e.g. in offices.

Contrary to popular belief, there are no statutory requirements for portable electrical appliances to be inspected and tested on a fixed annual or six-monthly basis.

However, you are required to ensure any equipment present in the workplace is safe and portable appliance testing is one way you can demonstrate you are doing this.

There is no legal requirement to label equipment that has been inspected or tested, nor is there a requirement to keep records of these activities. However, a record and/or labelling can be a useful management tool for monitoring and reviewing the effectiveness of the maintenance scheme – and to demonstrate that a scheme exists.

The following table sets out the suggested initial frequency for the various types of checks on portable electrical equipment. These are a guide for anticipated average use conditions. More demanding conditions of use will require more frequent formal visual inspections, and/or combined inspections and tests. Alternatively you may wish to seek advice from a competent person who has the knowledge and experience to make the necessary judgement.

Type of equipment	Users checks	Formal visual inspection	Combined inspection and test
Equipment hire	N/a	Before issue/after return	Before issue
Battery operated equipment (less than 40V)	No	No	No
Extra low voltage (less than 50V ac), telephone equipment, low-voltage desk lights	No	No	No
Construction - 110V equipment	Yes, weekly	Yes, monthly	Yes, before first use on site, then 3-monthly
Construction - 230V equipment	Yes, daily/every shift	Yes, weekly	Yes, before first use on site then monthly
Construction - Fixed RCDs	Yes, daily/every shift	Yes, weekly	Yes, before first use on site, then 3-monthly (portable RCDs monthly)
Construction - Equipment site offices	Yes, monthly	Yes, 6-monthly	Yes, before first use on site, then yearly
Heavy industrial/high risk of equipment damage (not construction)	Yes, daily	Yes, weekly	Yes, 6-12 months
Light industrial	Yes	Yes, before initial use, then 6-monthly	Yes, 6-12 months
Office information technology rarely moved, e.g. desktop computers, photocopiers, fax machines	No	Yes, 2-4 years	No, if double insulated, otherwise up to 5 years
Double insulated (class II) equipment moved occasionally (not hand-held), e.g. fans, table lamps	No	Yes, 2-4 years	No
Hand-held double insulated (class II) equipment, e.g. some floor cleaners, some kitchen equipment	Yes	Yes, 6 months – 1 year	No
Earthed (class I) equipment, e.g. electric kettles, some floor cleaners	Yes	Yes, 6 months – 1 year	Yes, 1-2 years
Cables, leads and plugs connected to class I equipment, extension leads and battery charging equipment	Yes	Yes, 6 months – 4 years, depending on type of equipment it is connected to	Yes, 1-5 years depending on the equipment it is connected to

Source HSE

Over time, and with practical maintenance experience, it may be possible to extend maintenance intervals if results of checks, inspections or tests show that few faults are found.

However, if faults are common it may be necessary to reduce intervals or take other action to improve maintenance and reduce risk.

Testing of portable electrical appliances is carried out with the aid of testing equipment such as a voltmeter or a portable appliance tester (PAT). The person doing testing work needs to be competent to do it. In many low-risk environments, a sensible (competent) member of staff can undertake visual inspections if they have enough knowledge and training. However, when undertaking combined inspection and testing, a greater level of knowledge and experience is needed, and the person will need:

- The right equipment to do the tests;
- The ability to use this test equipment properly;
- The ability to properly understand the test results.

Once any defects have been discovered, it is essential that the equipment is isolated immediately and then either discarded or effectively repaired.

Care should be taken to ensure that all equipment is logged for maintenance and all new appliances entered into the maintenance programme. If many appliances are involved, it would be worthwhile ensuring that each appliance has a unique reference code to avoid any possible confusion.

**Ensure work is done 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.

When determining safe working procedures for working on or near electrical systems and/or equipment, consider the following:

- Precautions for working on dead electrical systems: If there is a need to work on electrical equipment, then wherever possible, that work should be carried out when the equipment is dead. In some situations, certain precautions will also need to be taken to ensure that the equipment does not become live while it is being worked on.

- Working space, access and lighting: Adequate working space, lighting and access should be provided at all electrical equipment on which or near which work is being done so that persons can work safely.
- Provision, use and maintenance of protective equipment: There will be instances where certain protective equipment will be required when working with electrical systems. These may range from insulated tools, personal protective equipment to rubber mats etc.

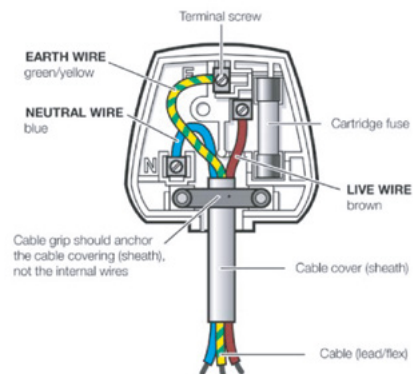
## FURTHER GUIDANCE

- HSE Website “Electrical Safety at Work”  
[www.hse.gov.uk/electricity/](http://www.hse.gov.uk/electricity/)
- HSG107 HSE Maintaining portable electrical equipment  
[www.hse.gov.uk/pubns/priced/hsg107.pdf](http://www.hse.gov.uk/pubns/priced/hsg107.pdf)
- HSR25 Memorandum of guidance on the Electricity at Work Regulations 1989  
[www.hse.gov.uk/pubns/priced/hsr25.pdf](http://www.hse.gov.uk/pubns/priced/hsr25.pdf)
- INDG231 Electrical Safety and You  
[www.hse.gov.uk/pubns/indg231.pdf](http://www.hse.gov.uk/pubns/indg231.pdf)
- INDG236 Maintaining portable electric equipment in low-risk environments  
[www.hse.gov.uk/pubns/indg236.pdf](http://www.hse.gov.uk/pubns/indg236.pdf)
- HSG85 Electricity at work: Safe working practices  
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# BASIC PORTABLE APPLIANCE ELECTRICAL SAFETY CHECKS

When using electrical equipment it is important that you examine all portable electrical apparatus before use. Electrical faults (e.g. damaged leads, broken casing, loose plugs, etc.) must be reported for rectification by a competent person. Wherever possible, use low voltage equipment.



These checks should be carried out before use, with the equipment disconnected.

Employees should look for:

- Is there damage (apart from light scuffing) to the cable sheath?
- Is there damage to the lead including fraying?
- Is the plug damaged (e.g. the casing cracked or pins bent)?
- Are there inadequate joints, including taped joints, in the cable?
- Are coloured wires visible where the lead joins the plug (the cable is not being gripped where it enters the plug)?
- Does the appliance appear to have been subjected to conditions for which it is not suitable (e.g. is it wet or excessively contaminated with dust/dirt)?
- Is there damage to the external casing of the equipment or are there loose screws or parts etc.?
- Is there evidence of overheating (e.g. burn marks, staining or discolouration)?
- Is the main on/off switch damaged, does it operate incorrectly?
- Have cables been trapped under furniture or in floor boxes?

**If you answer “YES” to any of the above, it indicates that the appliance is potentially dangerous and must be taken out of use.**

## **ELECTRICAL REPAIRS ARE AN ELECTRICIAN'S JOB**

Do not touch or tamper with equipment unless you have been specifically trained and authorised.

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