



Safety Bulletin 112

Electrical safety at work

Electricity kills and injures people. Around 1000 electrical accidents at work are reported to HSE each year and about 25 people die of their injuries.

Many deaths and injuries arise from:

- ✚ use of poorly maintained electrical equipment;
- ✚ work near overhead power lines;
- ✚ contact with underground power cables during excavation work;
- ✚ mains electricity supplies (230 volt);
- ✚ use of unsuitable electrical equipment in explosive areas such as car paint spraying booths;

Fires started by poor electrical installations and faulty electrical appliances cause many additional deaths and injuries.

Electrical injuries

Electrical injuries can be caused by a wide range of voltages but the risk of injury is generally greater with higher voltages and is dependent upon individual circumstances.

Alternating current (AC) and Direct Current (DC) electrical supplies can cause a range of injuries including:

- ✚ Electric shock
- ✚ Electrical burns
- ✚ Loss of muscle control
- ✚ Thermal burns

Electric shock

A voltage as low as 50 volts applied between two parts of the human body causes a current to flow that can block the electrical signals between the brain and the muscles. This may have a number of effects including:

- ✚ Stopping the heart beating properly
- ✚ Preventing the person from breathing
- ✚ Causing muscle spasms

The exact effect is dependent upon a large number of things including the size of the voltage, which parts of the body are involved, how damp the person is, and the length of time the current flows.

Electric shocks from static electricity such as those experienced when getting out of a car or walking across a man-made carpet can be at more than 10,000 volts, but the current flows for such a short time



that there is no dangerous effect on a person. However, static electricity can cause a fire or explosion where there is an explosive atmosphere (such as in a paint spray booth).

Electrical burns

When an electrical current passes through the human body it heats the tissue along the length of the current flow. This can result in deep burns that often require major surgery and are permanently disabling. Burns are more common with higher voltages but may occur from domestic electricity supplies if the current flows for more than a few fractions of a second.

Loss of muscle control

People who receive an electric shock often get painful muscle spasms that can be strong enough to break bones or dislocate joints. This loss of muscle control often means the person cannot 'let go' or escape the electric shock. The person may fall if they are working at height or be thrown into nearby machinery and structures.

Thermal burns

Overloaded, faulty, incorrectly maintained, or shorted electrical equipment can get very hot, and some electrical equipment gets hot in normal operation. Even low voltage batteries (such as those in motor vehicles) can get hot and may explode if they are shorted out.

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.

A single low voltage torch battery can generate a spark powerful enough to cause a fire or explosion in an explosive atmosphere such as in a paint spray booth, near fuel tanks, in sumps, or many places where aerosols, vapours, mists, gases, or dusts exist.

How do I know if my electrical equipment is safe?

You can find out if your electrical equipment is safe by carrying out suitable checks, such as inspection and/or testing. The level of inspection and/or testing should depend upon the risks. A simple visual inspection is likely to be sufficient for equipment used in a clean dry environment. In addition, equipment that is more likely to become damaged or is operated in a harsh environment is likely to require more demanding electrical tests.

Checks should be carried out often enough that there is little chance the equipment will become unsafe before the next check. It is good practice to make a decision on how often each piece of equipment should be checked, write down the decision, make sure the check is carried out, and write down the results. You should change how often you carry out checks according to the number and severity of faults found.

The best way to find out if specialised equipment is safe, is to have it inspected and tested by a person with specific competence on the type of equipment. This may be the original manufacturer or his authorised service and repair agent. A reputable servicing company that deals with the type of equipment should also be competent to check its safety.



How often should I get my electrical installation tested?

Electrical installations should be tested often enough that there is little chance of deterioration leading to danger. Any part of an installation that has become obviously defective between tests should be de-energised until the fault can be fixed.

You should have your electrical installation inspected and tested by a person who has the competence to do so, such as an Electrical Contractors Association (ECA), National Inspection Council for Electrical Installation Contracting (NICEIC), or The Electrical Contractors' Association of Scotland (SELECT) approved electrical contractor. These can be found in the Yellow Pages.

It is possible to do simple checks on your installation using an electrical socket tester. This is a device that can be plugged into a socket outlet, and can identify if there is a wiring fault. However, be aware that many types of socket tester cannot detect certain types of fault, and could indicate the socket is safe when it is not.

How do I make my electrical equipment safe to work on?

You can be reasonably sure that your electrical equipment is safe to work on if all sources of energy (electrical, mechanical, gas, pneumatic, hydraulic, pressure etc) have been securely isolated and any stored energy has been released from the equipment. You should always follow the procedure for doing this described in the instructions provided by the manufacturer of the equipment, and any local safety rules. If you cannot find the instructions, contact the manufacturer and get them to send you instructions before you start work.

Equipment containing dangerous chemicals or other substances may have to be decontaminated before it is safe to work on. You should ask a competent person what to do.

It is important that there is no chance that a source of energy can be deliberately or inadvertently re-connected to the equipment whilst it is being worked on. This can be achieved by applying a lock to each isolation device, and the person doing the maintenance should have all the keys to these locks in his or her possession. Warning notices should be posted at the points of isolation.

What should I do if I think I have seen an unsafe electrical installation or equipment?

If you think you have an unsafe electrical installation you should first warn everyone to stay away from it, and, if it is safe to do so, switch it off. You should then contact a competent person such as an Electrical Contractors Association (ECA), National Inspection Council for Electrical Installation Contracting (NICEIC), or The Electrical Contractors' Association of Scotland (SELECT) approved electrical contractor who will be able to advise you how to make your installation safe.

If the installation you think is unsafe is not owned by you or under your control, you should attempt to find out who does own it, and contact them. Electrical distribution poles, pylons and equipment should have a contact telephone number attached to them.

If you cannot find out who owns or controls an electrical installation you think is unsafe, you should contact your local authority or HSE.

Electrical danger signs



Signs warning of electrical danger may not always be easy to see, or may have been removed, so even if you see no signs, electrical cables may still be nearby. Stay vigilant.

When you see signs warning of electrical danger it is highly likely there is electricity present. Remember, you don't need to touch a high voltage cable to get an electric shock and even low voltage cables can be dangerous.



If you cannot work out where the electricity is, ask a competent person to do it for you.

Overhead power lines

The operating voltage of overhead power lines may be very difficult to identify. Some overhead lines look very much like 'phone lines and sometimes 'phone lines and electricity lines are on the same pole, as indicated in the pictures below.



If you are not sure, treat all overhead lines as dangerous and contact your electricity supply company for instructions on how to proceed.



Electrical wiring



You may not see electrical wires near where you plan to work but this doesn't mean there aren't any. Even if you do see wires, there may be others you cannot see. Electrical wiring may sometimes look like pipes, and may be a range of colours.

Before you drill or start cutting into surfaces:

- ✚ look for electrical wires and any other hazards such as asbestos. Remember to look on both sides of walls;
- ✚ ask to see plans of the electrical installation, and use these to find electrical wiring;
- ✚ If you are competent, use a suitable cable detector, or get a competent person to do it for you. Remember that some cable detectors won't find a wire carrying a small current – consult the user guide.
- ✚ look for nearby electrical equipment or installations and find where the wiring runs to these.
- ✚ use equipment that will minimise the risks during the work.
- ✚ wear suitable protective clothing.

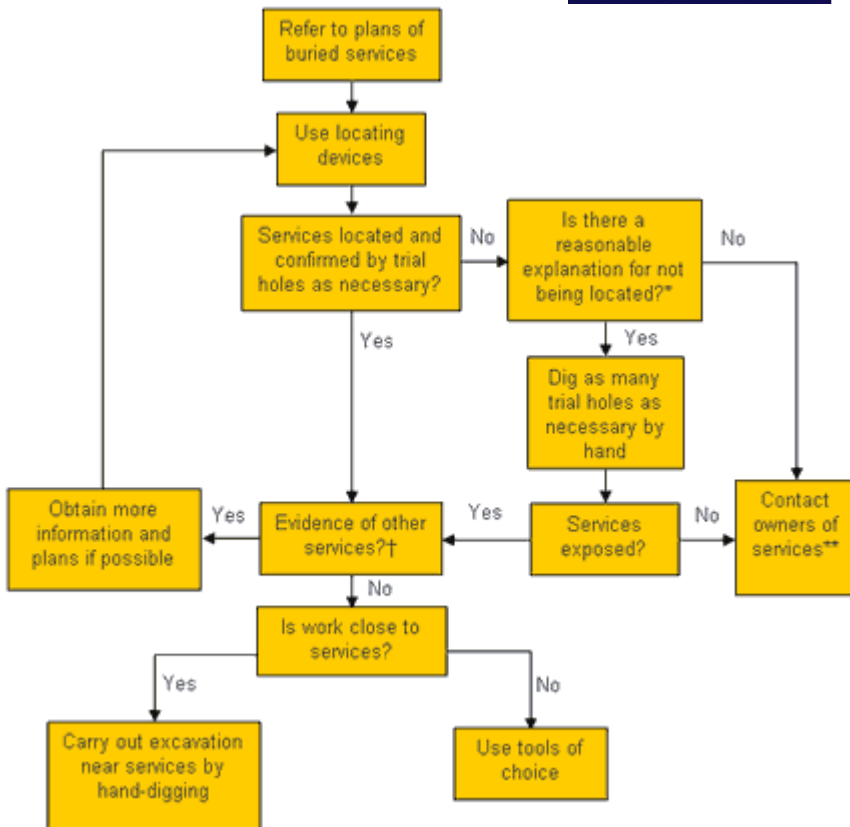
If you are in doubt **STOP WORK** and consult a competent person. Look for electrical wires and any other hazards such as asbestos.

Underground cables

If you are digging or disturbing the earth you should take care to avoid damaging underground services. Underground electricity cables can be particularly hazardous because they often look like pipes and it is impossible to tell if they are live just by looking at them.

Sometimes there are signs warning of underground services. Where you see these you should ask a competent person to find these for you and make sure you dig in a safe way

Refer to the flow chart below for guidance on how to work near underground services.



* For example, could services be non-metallic pipes? Refer to text for further information.

† In particular, visual evidence. Ensure that the presence of services, which may be unmarked on plans or for which no plans are available, has been considered, for example service connections.

** If there is visual evidence of services, but owners cannot be traced, despite all reasonable attempts to do so, any excavation could proceed but using hand-dug trial holes and proceeding with great care.

Making sure the power is off

If you are not competent to check if the power is off, ask a competent person to do it for you, and watch them doing it. If you have any doubts about the method they have used, ask someone you know is competent.

When checking that power is off the competent person should be SURE that:

1. The switch being used to turn off the power is working correctly and reliably.
2. The equipment and method being used to check for voltage works and is reliable.
3. The switch being used is the only way that the circuit can be fed with electrical power.
4. The switch being used is locked in the off position and cannot easily be turned on again.

Some electrical systems and equipment must be earthed before it is safe to work near them. Check whether this is necessary, and if it is, ensure that this is done properly.



Making sure the power stays off (Secure Isolation)



If the electrical power has been turned off to allow you to do work safely, it is essential that the power stays off until you have finished work. Make sure YOU are in control and STAY in control. A good way is to have the only key to the switch or a locked room or cabinet containing the switch. Remember, if you remove a fuse, another one could be inserted in its place, and people ignore notices. If you have any doubts that the electricity may be turned on again without you agreeing, STOP WORK.

When should I report an electrical accident to HSE?

You should report any work related accident that comes under the requirements of the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995.

In general, an electrical accident is reportable if:

- + the person dies as a result of their injuries, OR
- + the person suffers a major injury, OR
- + as a result of the injury the person is away from work for more than 3 days, or cannot undertake their full range of normal duties for more than 3 days, OR
- + a person receives an electric shock or burn where the person loses consciousness, or requires resuscitation, or admission to hospital for more than 24 hours, OR
- + plant or equipment came into contact with overhead power lines, OR
- + there is an electrical short circuit or overload that causes a fire or explosion

If you require any further information, clarification or assistance with the above, then please do not hesitate to contact us;

Telephone; 01268 649006
Freephone; 0800 046 8122
Email; info@cjtservices.co.uk

Source –Health and Safety Executive

www.hse.gov.uk