



**SP ENERGY
NETWORKS**

**Guidance on
Avoiding Danger from
Underground Electricity Cables
based on HSE Document HS(G)47**

This information is provided as guidance only to be used in conjunction with Safe Digging Practices in the vicinity of underground electricity cables. This is by no mean conclusive.

Carriageway work

**DIAGRAMMATIC
CROSS SECTION
OF TYPICAL
ROAD**

WEARING COURSE

BASE COURSE

ROAD BASE

SUB- BASE

BACK-FILL

**FINE BACK
FILL OVER
APPARATUS**

Introduction

Many accidents occur when underground services are damaged during excavation and other work involving ground penetration. Not all accidents occur immediately: some happen years after work has been carried out, perhaps when a pipeline is damaged and it corrodes over a long period of time. In addition to the risk of personal injury, damage can be very costly and can have knock-on effects. Consider, for example the effect of a hospital or a home kidney-dialysis patient if services are lost.

This guidance outlines the dangers which can arise from work near underground services and gives advice on how to reduce the risk. It deals only with risks to health and safety and is not concerned with damage which has no attendant risk. However, the precautions needed to reduce the risk of accidents will generally reduce the risk of damage.

Application

This guidance applies to all situations where underground services may be found and where work is undertaken which involves penetrating the ground at or below surface level. There is however one exception: work in a carriageway where the ground penetration is contained within the wearing and base courses (see Figure 1) where it is unlikely that services are present. An example of this would be of the road resurfacing. Even with shallow work of this type care will need to be taken not to damage surface boxes for valves, pressure points, siphons etc.

All other work in roads will be covered by this guidance. All work in areas other than built-up roads, including work in footways and kerbing, is included regardless of depth, as underground services may be found very near the surface. Other matters relating to work near underground services, such as the need to support excavations and the dangers of contaminated ground, are not covered

Who should use the guidance

This guidance should be used by all those who have responsibilities under relevant legislation, including employers, employees, owners of underground services and those concerned with planning, organising and supervising work near such services. This includes work by or for the utilities and also roadworks, construction and demolition work. The guidance is aimed primarily at central and site management including travelling supervisors.

Demolition Sites

Special problems can arise in the case of service terminations in derelict property or on demolition sites. Anyone concerned with demolition work has a duty to give adequate notice to the relevant gas, electricity and water authorities of intention to demolish any premises. Work should not start until either those authorities have confirmed in writing that the supply has been disconnected, or other appropriate safeguarding action has been taken. For further advice read HSE Guidance Note GS29 Parts 1 to 4(12) and BS 6187(11).

Buried services on industrial or commercial sites may be owned by the site occupier.

A contractor who is to demolish buildings or plant on such a site should contact the service owner, whether this is the site owner, to ensure that all relevant services are isolated before work starts.

Safe systems of work for trenchless methods

Trenchless methods are increasingly being used for laying and renovating buried pipes and cables, particularly where there is a need to avoid surface disruption.

The most widely used techniques are impact moling, pipe bursting and auger boring. Care should be taken when using trenchless methods to avoid colliding with, and thereby damaging, other services. With moling and pipe bursting it is also important not to come too close to adjacent services, as displaced soil may damage or enter nearby pipes or ducts.

Plans, locators and trial excavations should be used to locate existing services in the same way as for traditional excavation methods. The path of the device being used should then be planned accordingly. As a general guide, the minimum clearance between adjacent services should be either one and a half times the diameter of the pipe being laid or 150mm, whichever is the greater. However, these clearances may need to be varied taking into account such factors as the construction of adjacent plant, ground conditions, bore diameter, the accuracy and reliability of the technique/equipment being used, and whether the other plant is parallel or crossing the proposed line. Moles are prone to deflection from their original course and if there are existing services in the vicinity a mole tracking device should be used.

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Depth guide down the side of the excavation - the 0.5m safety margin may be reduced:

- (a) where congestion of buried cables renders it impracticable; or
- (b) where surface constructions limit the space available;

but only if the line of the cable has been positively identified by plans and confirmed by a locator. Because of the difficulty in confirming depth, hand-held power tools should never be used over the cable unless either:

- (a) the cable has already been exposed by digging under the surface to be broken out and it is at a safe depth, (at least 300mm) below the bottom of the hard surface material; or
- (b) physical precautions have been taken to prevent the tool striking the cable.

Where mechanical excavators are used in the possible vicinity of underground cables, the work should be arranged so that damage to cables is avoided as far as is reasonable practicable, and so that everyone is kept well clear of the excavator bucket while it is digging.

Safe systems of work

If a cable is struck, the driver should stay in the cab. If the driver has to leave the cab he should jump clear and not climb down, otherwise he may be electrocuted. A watch should be kept on the machine and no-one should go down into the excavation or touch the mechanical excavator or the cable until the cable owner has made the damaged cable safe.

During digging work a careful watch should be kept for evidence of cables, and repeat checks made with a locator to determine more precisely the position of any cable as signals become clear. Remember that a cable is positively located only when it has been safely exposed, and even then, digging should still proceed with care: there may be other cables, particularly HV cables, adjacent or lower down.

Where it is necessary to break away or disturb concrete in which a cable is embedded, either the local distribution electricity company should be asked to make the cable dead, or an alternative safe method of excavation agreed with the distribution electricity company or other owner of the cable before work starts.

When excavation can proceed safely only after a buried cable has been made dead, and where permits to work or other safety documents are used, liaison should be maintained between the parties involved to ensure that work covered by the permit is completed, and workmen are clear, before the circuit is re-energised.

Accidents sometimes occur after underground cables have been exposed. Cables should not be used as hand or foot holds by anyone climbing in or out of the trench. Where a cable exposed for more than 1m crosses a trench, the owner should be asked to provide support. Any cables lying in the bottom of an excavation should be protected by nail-free wooden planks, troughing or other suitable means, but care should be taken not to use materials or equipment which could damage or penetrate the outer sheath of cables. Cables should not be moved aside unless the operation is supervised by the cable owners. Precautions should be taken to prevent access to exposed cables by children or other unauthorised people.

Hard or sharp materials such as pieces of rock, large stones, hard-core or surplus concrete, should not be tipped into open cable trenches. Advice on backfilling cable trenches can be obtained from electricity companies.

Safe systems of work

Flashes can lead to severe burns or even death. Gas leaks can cause fire or explosion. Damage can result from excavation or penetration of the ground e.g. by a road pin.

Underground services may be found in roads, footpaths and on sites. Always assume that they are present. Treat any services found anywhere as LIVE.

Accidents have happened because people have mistaken one service for another, e.g. black plastic covered electricity cables look like black plastic water pipes and cast iron gas and water mains look alike. **Check before you act.**

Before starting work

Make sure you have plans of the underground services in the area. This may not always be possible for unforeseen emergency works. **Remember that service connection cables and pipes from the mains to a building or street light may not be shown**

- Use a cable and pipe locator to trace electricity cables and metal pipes. You should have been trained how to do this. If in doubt, or if you have any difficulty, ask your supervisor for advice.
- Mark the positions of the cables and pipes using paint or other waterproof marking on the ground.
- Look for signs of service connection cables or pipes, e.g. a gas meter or service connection entry into a house or a street light.
- Hand dig trial holes (as many as necessary) to confirm the position of services in the area of your work. This is particularly important if there are plastic pipes, which cannot be found using a locator.

Safe systems of work

When you start work

- Wherever possible, hand dig near buried services. Spades and shovels are safer than picks, pins or forks.
- Check that any cable which is embedded in concrete and has to be broken out has been made dead before work starts, or that another safe way of working has been agreed with the electricity board.
- Watch out for signs of services as work continues.
- Backfill around services with a fine material. DO NOT use flints, bricks, mass concrete or similar material.
- Report any damage to a cable, pipe or pipe coating. Even if there is not immediate danger, damage could lead to danger at a later date:
- Do not use hand-held power tools within 0.5m of the marked position of an electricity cable (unless the number of services present makes it impossible or surface obstructions reduce the space available):
- Do not use hand-held power tools directly over the marked line of a cable unless:
(a) you have already found the cable at that position by careful hand digging beneath the surface and it is at a safe depth (at least 300mm) below the bottom of the surface to be broken: or
(b) physical means have been used to prevent the tool striking it;
- do not use a mechanical excavator within 0.5m of a gas pipe. If an excavator is used near an electricity cable keep everyone clear of the bucket while it is digging:
- do not use exposed services as a convenient step or hand-hold:
- do not handle or attempt to alter the position of an exposed service:
- do not install plant close to an existing service. Ask your supervisor to tell you what the separation should be:
- do not build existing services into a manhole or other structure or encase them in concrete.