AVOIDANCE OF ELECTRICAL HAZARDS WHEN WORKING NEAR OVERHEAD ELECTRIC LINES

ESB Networks

ESB Code 9803203

AVOIDANCE OF ELECTRICAL HAZARDS WHEN WORKING NEAR OVERHEAD ELECTRIC LINES

Issued by:	ESB Networks
Document Reference:	DTIS 191203-BOI
Stores Code:	9803203
Issue Date:	January 2004
Review Cycle:	3
Version:	Revision 2

Additional copies available from your local ESB Networks Area office

Contents

WORKING NEAR OVERHEAD LINES

1. Introduction

People are killed and injured each year by accidental contact with overhead electrical lines. Most of these accidents occur when cranes, excavators, tipper trucks, crane mounted lorries, mobile extendable machinery, scaffolding, ladders, farm machinery, concrete delivery trucks etc. come close to or touch live overhead lines. Such accidents are caused by failure to take all practicable precautions to prevent accidental contact with these lines. Recommended methods and procedures are set out in this booklet which, if adopted, will provide a positive approach to the elimination of these tragedies.

NOTE: GUARD AGAINST WORKING CLOSE TO LIVE OVERHEAD LINES. IF AT ALL POSSIBLE KEEP MACHINERY WELL AWAY (OUTSIDE THEIR REACH). PLAN THE WORK IN ADVANCE AND STAY SAFE.

IT IS YOUR RESPONSIBILITY TO ENSURE THAT ANY MACHINERY OR EQUIPMENT (E.G. LADDERS, CRANES, SCAFFOLDING ETC.) SET UP OUTSIDE THE 'AT RISK ZONE' (SEE SECTION 7) IS STABLE AND THAT PRECAUTIONS ARE PUT IN PLACE TO PREVENT THEM FROM FALLING INTO THE 'AT RISK ZONE'.

2. Statutory Regulations

As with all work locations, there is an obligation under the Safety Health and Welfare at Work Act 1989 to provide a safe place of work for all employees. It is the duty of the employer when employees are working near overhead lines to ensure that they are aware of the hazard. The erection of barriers, bunting and goal posts as set out in chapters 6, 7, 8 and 9 of this booklet will alert employees and the general public to the hazard and act as a warning to keep

their distance.

The General Application Regulations S.I. 44 of 1993 state in regulation 52 that overhead lines should be protected with suitable guards and barriers so as to prevent dangerous contact with a person, article, substance or any conducting material.

The nine Principles of Prevention which are also contained in the 1993 General Application Regulations S.I.44, contain requirements on the avoidance, evaluation and elimination of risk and the adaptation of the workplace to reduce the risk. This imposes duties on the contractor to protect his/her employees from the dangers associated with working near overhead lines.

Under the Construction Regulations S.I. No. 481 of 2001, the Project Supervisor (Construction Stage) must specify the control measures for dealing with the particular risks referred to in the preliminary safety and health plan, which may also include other significant risks associated with the project. Working near high voltage power lines is one of the listed hazards and must be risk assessed and the controls specified in the health and safety plan.

3. Consultation

If danger exists in the work area due to overhead electrical lines running (a) over a site, (b) near the site boundaries or (c) over access roads to the site, it is essential that the Contractor or person undertaking the work should consult with ESB Networks. This consultation should take place at the planning stage so that the proposed work can be discussed in relation to any overhead electrical line that may exist on or near the proposed site. Such an approach will provide an adequate time span where the line can be switched out and earthed, but typically for only part of the day, or otherwise, i.e. that the line can be diverted or that other precautions, as described below, can be taken.

4. Switchout of Overhead lines

If supply conditions permit the switching out of an overhead electrical line it becomes a matter of arrangement between the Contractor and the local ESB Networks Office. Ample advance warning concerning any requirement of this nature is essential to allow time for changes to be made in existing feeding methods; for informing customers whose supply or quality of supply would be affected by the switch-out, etc.

In many instances, such outages can be granted only for a short period, e.g. 2 to 3 hours, due to loss of supply to customers over the switch-out periods and, unfortunately, at times this option, is not available at all because of the necessity to maintain an un-interrupted supply to particular types of customers. In general, switching out the line is not a practical solution in situations where work in proximity to overhead lines is on-going over a period of time.

Where the switchout of an overhead line is granted, the contractor shall wait for confirmation by ESB Networks that the line is switched out and not assume that it is dead at a pre-arranged time. The contractor shall be contactable at all time during the switchout in case the ESB Networks need to switch the line back on.

5. Diversion of Overhead Lines

Where diversion of the line is a practical option, contact with ESB Networks must be made as early as possible, e.g. at the planning stage as suggested above. Time spans for the diversion of LV/l0kV/20kV lines can (be up to a few months due to wayleave serving, work load, etc., and that for higher voltages lines can be as much as one year due to planning permission submissions, wayleave serving, workload, etc. In certain circumstances it is impossible to

design a suitable line diversion due to the lack of an alternative route. In addition, if the work in proximity to a line is of a particular nature, e.g. not involving the erection of permanent structures over ground, a line diversion would not be an appropriate or justifiable means of dealing with the problem. Generally diversions of high voltage lines are not feasible.

6. Working in Proximity to Overhead lines

Where switching out the line or diverting the line, as discussed under 4. and 5. above is not practicable, the precautions required to prevent accidents involving LIVE overhead lines depend on the nature of the work. There are three broad categories of work on site.

(a) Sites where there will be no work or passage of plant under a live line. Here barriers are required to prevent close approach.

(b) Sites where plant will pass under a live line. Here, defined passageways under the line must be made.

(c) Sites where work will be done beneath a live line. Here further precautions must be taken in addition to the provision of barriers and passageways.

7. Sites where there will be no work or passage of plant under a Live Overhead Line (all work outside the 'at risk zone')

On sites where machinery or plant may accidentally come in contact with a live overhead line the Contractor should erect a barrier on the work side (limit of 'at

risk zone') at a minimum distance from the line. The barrier should run parallel to the overhead at a minimum distance of 6 metres from the nearest conductor of a low voltage, 10kV, 20kV and 38kV lines. This distance should be increased to a minimum of 10 metres for voltage of 110kV, 220kV and 400kV. The distance should be measured from the outer conductor to the barrier and not from the centre of the pole or mast. Consult ESB Networks to confirm the voltage of the line. These distances may be increased depending on the nature, frequency and duration of the work. The barrier should consist of fixed post fencing, steel drums painted red and white and filled with rubble, spaced 1.5 metres apart or other means approved by a Health and Safety Authority Inspector. The barrier should be supplemented by notice boards indicating: "DANGER LIVE OVERHEAD LINES", which should be spaced at intervals of not more then 20 metres apart along the route. Where a crane, tipper truck or other high equipment is operating in the vicinity of a live line then the barrier should be further supplemented. This can be done with a line of bunting or other approved means of highlighting the hazard at a minimum height of 3 metres immediately over the barrier, see Figure 1 and Figure 6.

Figure 1

8. Sites where plant will pass under a live Overhead Line

Where movement of plant is necessary under a live overhead line the Contractor should erect wooden or other non conducting material goal posts at the entrance to the passage on each side of the line. The goal posts should be in line with the protection barrier as detailed in 7 above, and the wooden cross-bar should be set at a height determined in consultation with ESB Networks. The passageway should be as narrow as possible and should not exceed 10 metres in width and should be fenced or have steel drums on either side. Two large warning notice boards indicating "DANGER LIVE OVERHEAD LINES" should be placed near the goal posts at each entrance to the passage. The goal posts should be marked in red and white stripes, See Figure 2.

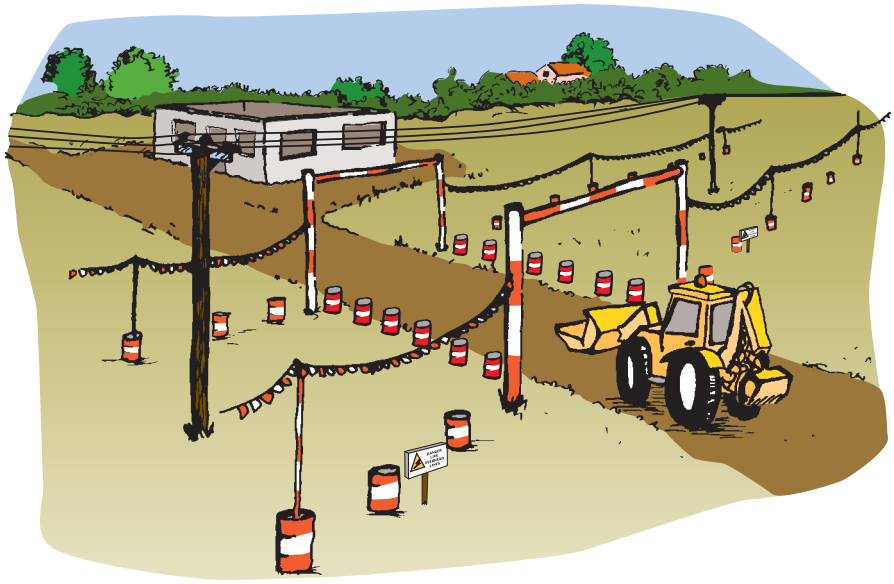


Figure 2.

9. Sites where work will be done within the 'at risk zone' of an Overhead Line

In general when work has to be carried out close to (within the 'at risk zone) of a live line, ESB Networks insists on the line being switched out for the duration of such work. In some situations, due to continuity of supply considerations, ESB Networks may be forced to permit work underneath a live line, but only after detailed consultation with them and with the understanding that strict safety precautions will be employed. In addition to the precautions outlined in 7 and 8, it will be necessary for the Contractor to erect a safety barrier underneath the line. This barrier may be made of timber or an earthed steel net and placed at a height determined by ESB Networks. It must be erected under the supervision of ESB Networks so as to avoid danger of contact with the overhead line.

Generally, mobile and fixed cranes should be located in such a position that loads cannot be slewn over live lines. If there is a need to slew over power lines, always contact ESB Networks in advance to ensure that agreed precautions are put in place before the slewing operation.

10. Maintenance of barriers and warning notices

In all cases covered under 7 and 8 and 9 above, a care and maintenance system must be introduced by the Contractor in order to ensure that barriers and warning notices remain effective for the duration of the work.

11. Special Precautions

- Always remember that, in common with electrical utilities worldwide, ESB Network's overhead electrical lines are bare conductors. In the rare

situations where one finds covered conductors this covering is largely for mechanical protection of the overhead line and is not a fully rated insulation and must be treated with the same precautions as bare conductor.

- ESB Networks must be contacted whenever it is proposed to work in the vicinity of their overhead electrical lines.

- Contact with or coming close to overhead electrical lines can be lethal whether they are carrying voltages as high as 400,000 volts or as low as 220 volts. High voltages in particular can arc across a distance in air, and this makes it hazardous to come close to high voltage lines ranging from 10kV to 400kV.

- Clearance from overhead electrical lines should not be reduced by the dumping or tipping of waste material, by landscaping operations or by the creation of storage areas under these lines.

- Pre-planning of safe working procedures is essential.

- Liaison with ESB Networks should be continued until the construction work has been completed.

- Access for plant and materials and the working of plant should be under direct supervision of a responsible person appointed by the Contractor to ensure that the safety precautions are observed.

- Self-adhesive danger stickers (obtainable free from ESB Networks) that warn machinery operators of the hazards of working in close proximity to overhead electrical lines should be placed on the cab window, doors or

dash of machines and vehicles.

- Before starting work in the vicinity of overhead electrical lines, machinery operators in particular, should be briefed by their responsible supervisors on the dangers existing and the precautions to be observed.

- In the absence of specific information provided by ESB Networks, it must be assumed at all times that an overhead electrical line is live.

- Should a vehicle accidentally come in contact with an overhead line, stay in the cab if the vehicle is not on fire. If there is a danger of fire, you should jump clear, stay clear and keep everyone else clear until ESB Networks arrive. On no account should you return to the vehicle.

- It is your responsibility to enure that any machinery or equipment (eg. ladders, cranes, scaffolding etc.) set up outside the 'at risk zone' (see section 7) is stable and that precautions are put in place to prevent them from falling into the 'at risk zone'.

12. Communicating the Safety Message

- ESB Networks advertise regularly on television and newspapers on the dangers of working near overhead lines in an effort to ensure that contractors and high machinery operators are fully aware of the hazards.

- In addition to this booklet, a safety poster giving brief details and illustrations of the precautions required when working near overhead lines is available from ESB Networks. The poster is entitled "AVOIDANCE OF ELECTRICAL HAZARDS WHEN WORKING NEAR OVERHEAD ELECTRIC LINES"

AVOIDANCE OF ELECTRICAL HAZARDS WHEN WORKING NEAR OVERHEAD LINES

At the planning stage and before starting work near an overhead line consult your local ESB office.

THERE ARE TWO GENERAL CASES

SITE WHERE THERE WILL BE NO WORK OR PASSAGE OF PLANT UNDER A LIVE OVERHEAD LINE

- A barrier should run parallel to the line. (See below for distance from line)
- This may be fixed post fencing or steel drums filled with rubble spaced 1.5 metres apart.
- If cranes are in use a line of bunting at a height of 3 metres should supplement the barriers. (See below for distance from line)
- Danger notice stating "Danger Live Overhead Line" should be spaced at intervals.

SITE WHERE PLANT WILL PASS UNDER A LIVE OVERHEAD LINE

- In addition to the above, Goal Posts should be erected as shown

Dimensions as follows:

Height of goalposts	- As advised by ESB
Width of Goalposts	- Max. 10 metres.
Height of bunting	- 3 metres
Distance between steel drums	- 1.5 metres
Distance between danger notices	- 20 metres

Horizontal distance of barrier to outside conductor on line

- 6 metres minimum for LV, 10kV, 20kV, 38kV.
- 10 metres minimum for 110kV, 220kV, 400kV.

Networks

In general if work is to be undertaken directly under the line, ESB will insist that the line is switched off for the duration of the work.

ESB may permit working under a live line only if special agreed precautions are put in place. Booklet (ESB Code 9803203) also available which gives greater detail.

Figure 3.

- Cab stickers, For Tipper Trucks, Cranes, Diggers and Tractors are also available from ESB Networks. These should be stuck on a prominent place on the vehicle and are a reminder to the Driver/Operator of the hazards associated with the machine coming in contact with overhead lines. All cab stickers contain the following safety message: “IF YOUR MACHINE CONTACTS AN ESB Networks LINE, JUMP CLEAR AND KEEP OTHERS CLEAR”

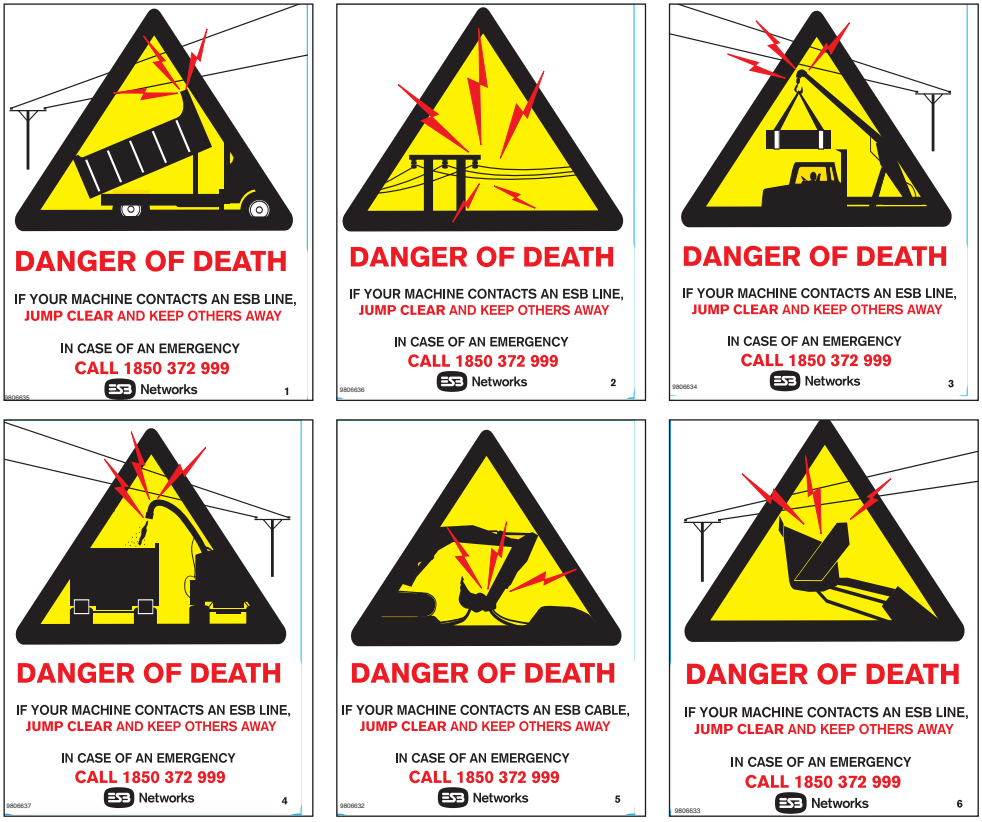


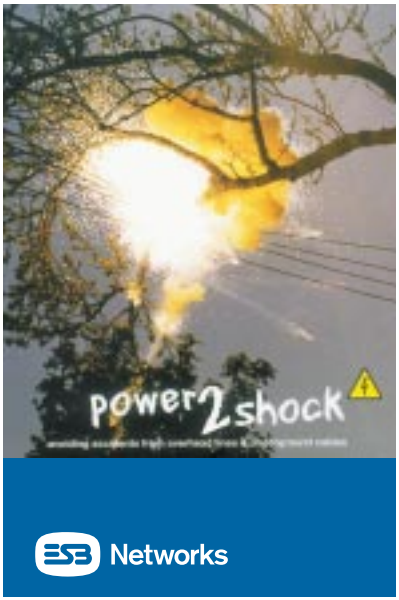
Figure 4.

- Two videos are also available which cover the hazards associated with electricity. These are entitled “Lifelines” and “Power2Shock”. The “Lifelines” video recreates 6 accidents caused by machinery coming in contact with overhead lines and underground cables. The 6 accident scenarios depicted are based on real situations where people have lost their lives in the past and involve the following: Tipper Truck, Mobile Crane, Wheeled Digger, Painters Scaffolding, Cement Truck and Tractor coming in contact with overhead lines or underground cables. The “Power2Shock“ video cover the following 4 accident scenarios: Mini Pillar Vandalism, Tree Cutting, Elevated Platform and Mini Digger

All of the above are available from ESB Networks free of charge to interested parties.

Bunting and danger signs can usually be sourced locally from danger sign manufacturers.

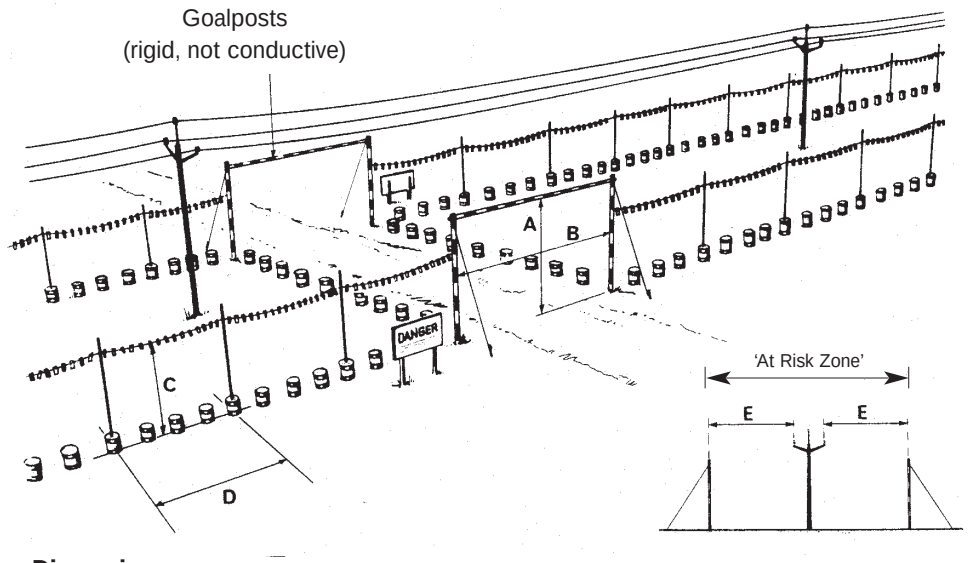
ESB Code 9803503



ESB Code 9803509

Figure 5.

Example of Rigid Goalposts and Barriers



Dimensions

A - height to be specified by electricity supplier
B - width to e determined by site conditions (max 10m)
C - height 3-6m
D - 6m (maximum)
E - 6m (minimum)

Figure 6.

ESB Networks EMERGENCY CONTACT NUMBER
1850-372 999

FOR TECHNICAL INFORMATION AND SUPPORT CONTACT ANY OF THE FOLLOWING NUMBERS IN YOUR LOCATION

Acknowledgement of Receipt of
Avoidance of Electrical Hazards
when Working Near Overhead Electric Lines

I have received on the date under my signature _____ copies of the above booklet..

Please detach this page and return to the ESB Networks member of staff who supplied the booklet(s)

Only necessary to return one signed sheet, irrespective of the number of booklets received.

You may wish to keep local records in a similar manner, for the booklets which you issue onwards to your staff or contractors

Signed: _____

Date: _____

Company Name: _____

Address: _____

_____

_____

Beware of buried cables

- Check for the presence of underground cables when planning any dig or excavation. Contact ESB Networks at 1850 372 757 for details.
- Make sure that your staff and sub-contractors are made aware of the presence of any cables and that they observe safe digging and excavating practices.
- Remember, contact or even slight damage or movement can cause a cable to explode.

Take particular care with:

✓ Excavators
✓ Mini-diggers
✓ Rock hammers
✓ Concrete saws
✓ Hand digging

Supporting Safety in the Construction Industry.

ELECTRICITY IS A GREAT FORCE OF NATURE. RESPECT ITS POWER. ESB Networks