AVOIDANCE OF DANGER FROM OVERHEAD POWER LINES PE323

1. PURPOSE

This document provides guidance and sets out the arrangements that shall be followed when work near overhead power lines is to be undertaken and where there is a risk of contact with the wires. This document describes the steps that should be taken to prevent contact with them.

If contact is made with, or if people or equipment come too close to a live overhead electricity supply power line, there is a risk of serious injury, including fatality, severe shock and/or burns to a person as well as potential damage to infrastructure and plant.

2. SCOPE

These arrangements apply to all circumstances when work is to be carried out near to any overhead electricity supply power lines.

Note: This does not include 25kV AC Overhead Line Equipment (OLE) which are covered by the following documents:

- RSSB GE/RT8000 Hand Book 16 AC Electrified Lines
- NR/SP/ELP/29987 Working on or about 25kV AC Electrified Lines

3. REFERENCES (INPUTS) / RELATED DOCUMENTS

Legislation

- The Health and Safety at Work Act 1974
- Construction (Design and Management) Regulations 2015
- The Management of Health and Safety at Work Regulations 1999
- The Electricity at Work Regulations 1989
- HSE Guidance Note GS6 (Fourth edition) Avoiding danger from overhead power lines
- The Provision and Use of Work Equipment Regulations 1998
- The Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and guidance L22

Client / Industry Standards

- RSSB GE/RT8000 Rule Book
- RIS-1700-PLT Safe Use of Plant for Infrastructure Work
- NR/SP/ELP/29987 Working on or about 25kV AC Electrified Lines
- NR NR/L2/OHS/133 - Code of Practice for Planning and Delivering Safe Work
- NR NR/L2/OHS/019 - Safety of People at Work on or Near the Line

VolkerRail

- IMS - VolkerRail Integrated Management System
- SAF19 - Planning & Delivering Safe Work
- SAF30 - Risk Assessments
- PE326 - Vehicular Plant and Crane Operations

Other Reference Material

- ENA Technical Specification 43–8 Overhead Line Clearances
- Look Out Look Up! A Guide to the Safe Use of Mechanical Plant in the Vicinity of Electricity Overhead Lines Energy Networks Association (ENA)

4. DEFINITIONS

None

5. PROCESS

5.1 BACKGROUND

Every year people at work are killed or seriously injured when they come into contact with live overhead electricity power lines. These incidents often involve:

- machinery, e.g. cranes, lorry-loader cranes, combine harvesters, MEWP's, tipping trailers etc.;
- equipment, e.g. scaffold tubes and ladders;
- work activities, e.g. loading, unloading, lifting, spraying, and stacking.

If a machine, scaffold tube, ladder, or even a jet of water touches or gets too close to an overhead wire, then electricity will be conducted to earth. This can cause a fire or explosion and electric shock and burn injuries to anyone touching the machine or equipment. An overhead wire does not need to be touched to cause serious injury or death as electricity can jump, or arc, across small gaps.

Overhead electricity supply power lines and cables must be considered to be 'live' at all times unless notified otherwise in writing (usually by the relevant permit to work).

5.2 TYPES OF OVERHEAD POWER LINES AND THEIR HEIGHTS

Figure 1 275 kV Transmission Line

Figure 2 11 kV distribution line

Figure 3 400 V Distribution Line

5.2.1 Minimum heights above ground level for overhead power lines

There is a legal minimum height for overhead lines which varies according to the voltage carried. Generally, the higher the voltage, the higher the wires will need to be above ground. Equipment such as transformers and fuses attached to wooden poles and other types of supports will often be below these heights.

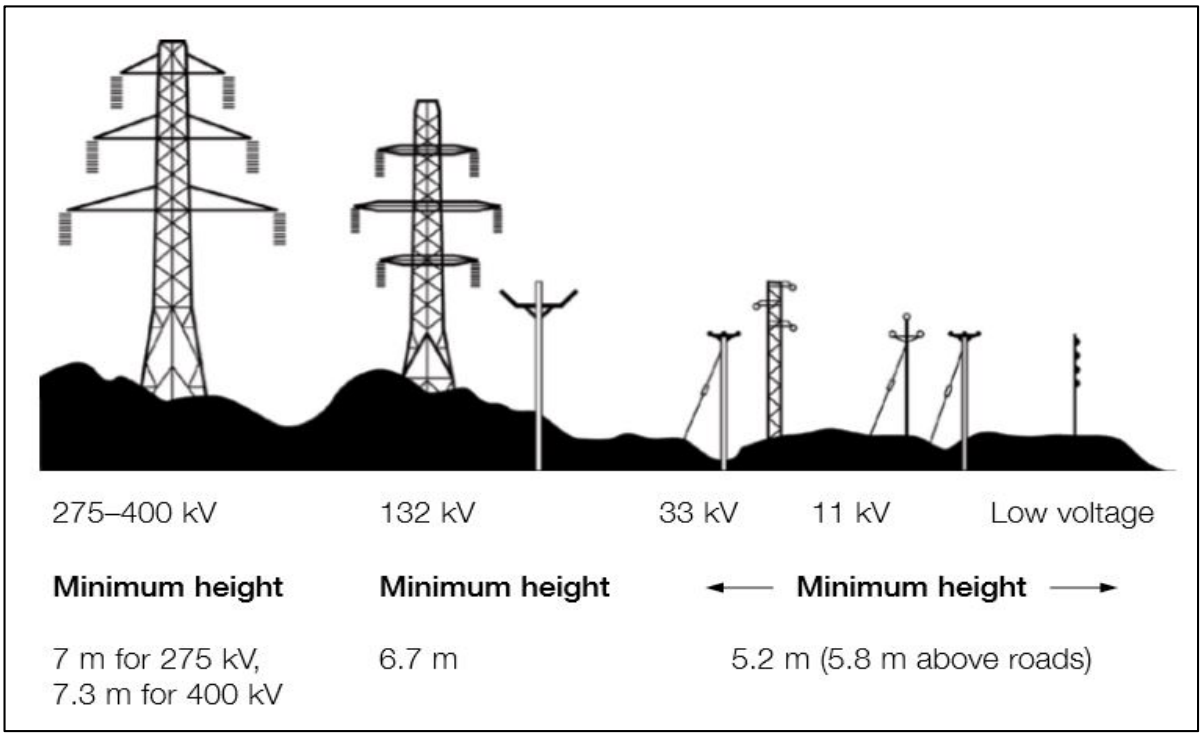


Figure 4 Minimum Wire Heights

5.2.2 The Law

The law requires that work may be carried out in close proximity to live overhead lines only when there is no alternative and only when the risks are acceptable and can be properly controlled. A suitable and sufficient risk assessment must be carried out that is specific to the site. The risk assessment should be undertaken in accordance with VolkerRail standard SAF 30. Businesses and employees who work near to an overhead line must manage the risks.

5.2.3 Preventing overhead line contact accidents

Good management, planning and consultation with interested parties before and during any work close to overhead lines will reduce the risk of accidents. This applies whatever type of work is being planned or undertaken, even if the work is temporary or of short duration. You should manage the risks if you intend to work within a distance of 10 m, measured at ground level horizontally from below the nearest wire.

5.2.4 General Principles of Prevention

The General Principles of Prevention shall be followed before undertaking any work near to overhead power lines.

5.2.4.1 Remove the risk

The most effective way to prevent contact with overhead lines is by not carrying out work where there is a risk of contact with, or close approach to, the wires.

If working near an overhead line cannot be avoided and there is a risk of contact or close approach to the wires, the power line owner should be contacted to find out if the line can be permanently diverted away from the work area or replaced with underground cables. This will often be inappropriate for infrequent, short-duration or transitory work.

If this cannot be done and there remains a risk of contact or close approach to the wires, enquire whether the overhead line can be temporarily switched off while the work is being done.

5.2.4.2 Risk Control

If the overhead line cannot be diverted or switched off, and there is no alternative to carrying out the work near it, an assessment will be needed to determine how the work can be done safely. If it cannot be done safely, it should not be done at all. The site-specific risk assessment will inform the decision. Things to consider as part of your risk assessment include:

- the voltage and height above ground of the wires. Their height should be measured by a suitably trained person using non-contact measuring devices;
- the nature of the work and whether it will be carried out close to or underneath the overhead line, including whether access is needed underneath the wires;
- the size and reach of any machinery or equipment to be used near the overhead line;
- the safe clearance distance needed between the wires and the machinery or equipment and any structures being erected. If in any doubt, the overhead line's owner will be able to advise you on safe clearance distances;
- the site conditions, e.g. undulating terrain may affect stability of plant etc.;
- the competence, supervision and training of people working at the site.

If the line can only be switched off for short periods, schedule the passage of tall plant and, as far as is possible, other work around the line for those times.

5.3 MANAGEMENT ARRANGEMENTS

5.3.1 Planning of the Work

Before work commences, the site shall be inspected to ascertain whether there are any overhead power lines, either directly over or adjacent to the site (including the route from the access point to the site of work). Such an inspection must be conducted in daylight. This can usually be undertaken as an element of site walkouts.

For sites with overhead wires on which cranes or excavators are to work, the Machine and Lifting Operations Planner/s concerned shall also visit the site during daylight.

Prior to the commencement of any site work the local Electricity Company owning the power cables shall be consulted to determine and clarify permissible clearances. If these are insufficient, it may be possible to divert or isolate lines and bond metallic structures to allow work to be undertaken. If the overhead lines cannot be diverted or isolated, precautions, determined by the nature of the work at the site, must be taken.

5.3.2 Working Close to Overhead Power Lines

In normal circumstances, the position of overhead power lines allows the safe passage of persons and normal vehicles etc., however, work operations involving the use of portable access equipment or plant with extending equipment may require restrictions, these are set out below.

Restrictions may be necessary whenever plant or equipment is within the following limits (all distances measured horizontally):

- 15 metres for overhead power lines suspended from steel towers.
- 9 metres for overhead power lines suspended from timber poles.
- In the case of “fixed” ‘Jibbed’ equipment that can only raise and lower, maximum Jib length plus 6 metres from any overhead power line.

These values are for guidance – in all cases the supply owner must agree the values.

It may be necessary to limit plant and equipment with extending jibs or baskets with mechanical or electrical slew/height restrictors, where this is a consideration VolkerRail Plant division shall be consulted.

Where work will be carried out within these distances the restrictions set out in Clauses 7.3 and 7.4 (below) will apply.

5.3.3 Where No Work is Planned Under or Plant Passing-Under Overhead Power Lines

Barriers shall be erected parallel to the overhead line, not less than 6 metres distance from it (See Appendix A). The possibility of cranes etc. encroaching on the minimum distance must be taken into account, and where necessary the 6 meter distance increased in accordance with 6.2 above.

The barriers shall be surmounted by coloured bunting which forms an additional warning. If access is only possible from one side then a barrier on that side will be sufficient.

Note: The owner of the power line(s) may advise a minimum distance greater than 6 metres, depending on the voltage of the overhead power line. In certain cases, particularly where high voltage lines with long spans are involved, allowance should be made for lateral swing of the conductors, to maintain the safe distance from barriers to the overhead line at all times.

Additional guidance on using specific plant and the method of taking measurements, selection and suitability of barriers and bunting is available in HSE Guidance Note GS6.

5.3.4 Where Plant May Pass Under Overhead Power Lines

If it is necessary for plant working on a site to travel back and forth under overhead power lines, the area where they must pass through should be as small as possible and not more than 10 metres wide. A passageway shall be clearly defined by the use of fencing or barriers, and goal posts should be erected a distance below the lowest conductor in its lowest state across the width of the passageway as specified by the supply owner. This distance must be measured / calculated by appropriate survey techniques. Passageway

entrance goal posts should be of rigid construction and of non-conducting material, distinctly marked in order that they may be clearly identified.

Warning notices shall be provided on each side of the passageway advising people of the hazard and giving the cross bar clearance in order that drivers realise that they must lower their Jibs etc. and have sufficient time to do this. To give crane drivers sufficient time to lower the Jib before reaching the goal posts, it is advisable to position advance warning notices as far from the goal posts as required by the length of the Jib on the machine.

(Examples of use of rigid barriers and goal posts is shown in Appendix B)
Where it is not possible to limit the passage of plant to a specific location, goal posts may consist of tensioned steel plastic covered rope and should be erected on both sides of the line at a distance of not less than 12 metres from the conductor. The increased distance allows the possibility of ropes being stretched by cranes. Where steel ropes are used they must be effectively earthed. All systems should be fitted with coloured bunting. Signing of approaches shall be carefully considered dependent on the planned movements that will occur.

5.3.5 Where Work Is To Be Carried Out Beneath Overhead Power Lines
If it is essential for work to be carried out beneath the overhead lines and they cannot be isolated or diverted, it will be necessary to take the following precautions in addition to those noted above.

In the case of Electricity supply lines the Electricity Company should be consulted for guidance as to what additional precautions may be required. Guidance may also be obtained from HSE Guidance Note GS6. Access for plant and material and the working of plant should be under the direct control of a responsible person appointed to ensure that safety precautions are observed. This person with agents if necessary should be stationed in a suitable position to police the goal post etc. Plant and equipment or tools that could reach beyond the safe clearance limit should never be taken under the lines. Plant such as cranes and excavators should be modified by the addition of suitable physical restraints so that they cannot reach beyond the safe clearance limit.

5.3.6 Unexpected Contact with the Live Wires
If someone or something comes into contact with an overhead line, it is important that everyone involved knows what action to take to reduce the risk of anyone sustaining an electric shock or burn injuries. Key points are:

- never touch the overhead line's wires;
- assume that the wires are live, even if they are not arcing or sparking, or if they otherwise appear to be dead;
- remember that, even if lines are dead, they may be switched back on either automatically after a few seconds or remotely after a few minutes or even hours if the line's owner is not aware that their line has been damaged:
- if you can, call the emergency services. Give them your location, tell them what has happened and that electricity wires are involved, and ask them to contact the line's owner:
- if you are in contact with, or close to, a damaged wire, move away as quickly as possible and stay away until the line's owner advises that the situation has been made safe:
- if you are in a vehicle that has touched a wire, either stay in the vehicle or, if you need to get out, jump out of it as far as you can. Do not touch the vehicle while standing on the ground. Do not return to the vehicle until it has been confirmed that it is safe to do so;
- be aware that if a live wire is touching the ground the area around it may be live. Keep a safe distance away from the wire or anything else it may be touching and keep others away.

- The incident must be reported to VolkerRail Control Centre (VRCC) as a "Dangerous Occurrence" and must be reported to the Network Rail Electrical Control Operator, (ECO).

The mechanical appliance shall be left for a reasonable period, at the site or as near as possible to the site, to enable the Inspecting Officer to inspect it and the site of the occurrence.

The mechanical appliance must be thoroughly examined by a competent person from the Plant Supplier before being brought back into use.

5.3.7 Specific Safety Requirements
The method of work must be fully documented with control measures and briefed to all site staff that are affected. The clearances must have been agreed with the supplier. There must be robust arrangements to brief internal and Sub Contract Plant Operators etc.

5.4 AUDIT REQUIREMENTS
The audit requirements associated with this standard are included within the Category 3 audit programme.

6. ASSOCIATED GUIDANCE & INFORMATION

Appendix A – NO passage under power lines

Appendix B – Passage of plant under power lines

7. DOCUMENTATION (OUTPUTS)

None

8. ISSUE RECORD

Issue	Date	Comments
1	Oct 2007	First Issue. This document was previously issued in Engineering & Safety Manual as 'ESI 303' (this should be removed and destroyed).
2	Apr 2008	Periodic review and minor modifications to Appendix A to show diagrams on a larger scale.
3	14/09/2012	Reviewed in line with current organisation and job titles, minor amendments throughout
4	09/11/2017	Amended diagrams included at Appendices A & B

9. WHAT HAS CHANGED IN THIS LATEST ISSUE AND WHY

Document has been amended following re-issue of Health and Safety Guidance Note GS6, including appendices A & B.

10. BRIEFING REQUIREMENTS

All new employees will receive an introduction to the Integrated Management System (IMS) at induction, according to the nature of the role.

All employees with an email address receive the 'Record of Revisions' each month, which details changes to the IMS. All Line Managers retain the responsibility to ensure their staff are briefed on changes as appropriate.

The following table defines how revised issues of this document are briefed to existing employees according to related specific responsibilities.

This is determined using the 'RACI' principle. Those roles identified as 'Responsible' and 'Accountable' should receive a formal awareness briefing facilitated by the Document Owner.

Discipline	Role	RACI	Type of briefing
Engineering	Engineering Director	Accountable	Detailed
Planning & Programming	Programme Managers	Informed	Awareness
Project Management	Senior/Project Managers	Informed	Awareness
Engineering	Senior/Project Engineers	Informed	Awareness
Engineering	Engineering Managers	Informed	Awareness
Engineering	Construction/Delivery Managers	Informed	Awareness
HSQE	Safety Managers	Informed	Awareness
HSQE	Safety Advisors	Informed	Awareness
Labour	Machine/Crane Controllers	Informed	Awareness
Labour	Machine Operators	Informed	Awareness
Labour	POS Representatives	Informed	Awareness

11. IMS AUTHORISATION

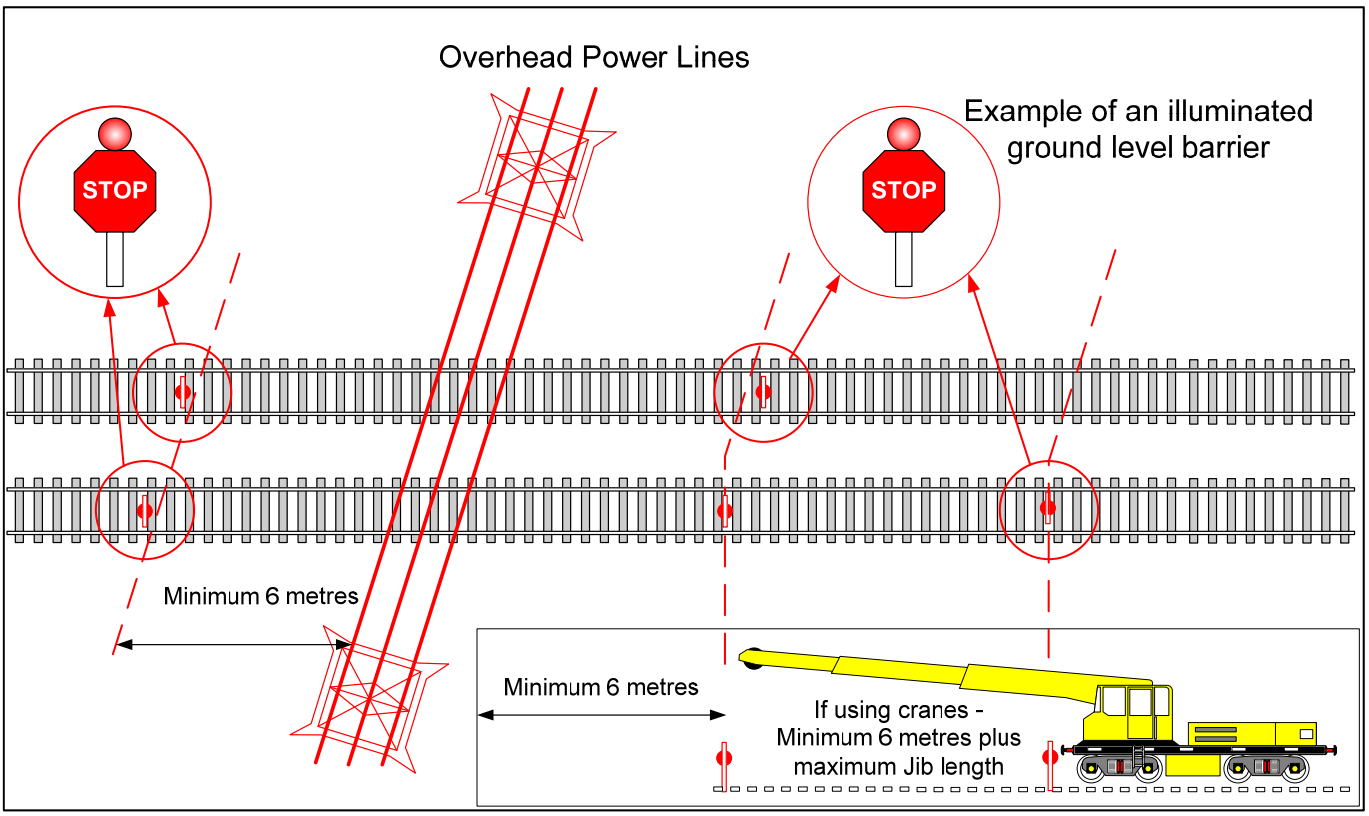
Document owner approval:

Jack Pendle, Engineering Manager, 01/11/2017

Approval for IMS:

Paula Roberts, IMS Coordinator, 01/11/2017

Where there will be NO passage of plant under the power lines.



Where there WILL be passage of plant under the power lines.