



# WORKING UNDER OVERHEAD POWER LINES

## BACKGROUND

Think Brick Australia (TBA) represents the clay brick and paver manufacturers of Australia. Safety is a major issue and concern for our members.

This document stipulates the regulations and guidelines safeguarding the health and safety of all personnel against the risks of working near overhead power lines or associated machinery and equipment. It includes legislative obligations imposed by the *Electricity (General) Regulations 2012* and *Safe Works Australia* concerning the proximity, or “unsafe distance” while working close to power lines and operating associated machinery.<sup>[1]</sup>

## POWERLINE RISKS

The risk arises when a cable is struck by a machine or tool, which can cause fumes, hazardous fires and explosions to occur, resulting in serious injury, permanent disability or even death. Contact with live overhead power lines can lead to death and serious injuries.

Due to fatal hazards associated with power lines, it is crucial to communicate and follow all safety guidelines and regulations in the workplace to prevent such accidents from occurring.

## SAFETY GUIDE

The information in this guide applies to the operation of plant, machinery and other equipment near overhead power lines, not limited to any type or class. Broadly speaking, the following are the guidelines for working under power lines:<sup>[9]</sup>

- First make sure to follow the ABC rule when working near power lines:
  - A**ssess safe distances;
  - B**e Cautious and seek assistance from an “Observer” or a “Spotter”; and
  - C**ontact electricity supplier to seek advice.
- Beware of ‘inattention blindness’ which develops when you are so focused on your work task, leading to temporary ‘blindness’ to what’s happening around you.
- Know the exact height of your equipment — more specifically, the exact height when it is fully raised or extended.
- The separation distances for operating plant, machinery or equipment, plant, machinery or equipment near overhead power lines must not be less than those shown in Table 1.



## PRELIMINARY PROCEDURES (PRE-JOB RISK ASSESSMENT)

The following considerations must be made prior to working under power lines to avoid severe penalties:

- The location of the adjacent structure, its dimensional constraints and its functional utility (i.e. the purpose it serves, commercial, residential, industrial etc.).
- The voltage capacity of the power line must be determined since it mandates the required safety clearance.

Any specifications of the power lines (including voltage capacity) can be obtained from the electricity regulators of the region. A list of these regulators are provided by Safe Work Australia – Electricity Regulators <sup>[4]</sup>.

It is important to be aware of the voltages when working under power lines, especially between buildings as voltages may vary (see Figure 2). Safety precautions vary under different voltage levels (see Table 1).

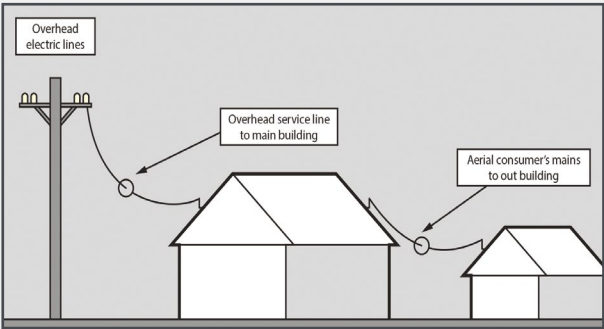


Figure 1: Low voltage overhead service lines <sup>[2]</sup>

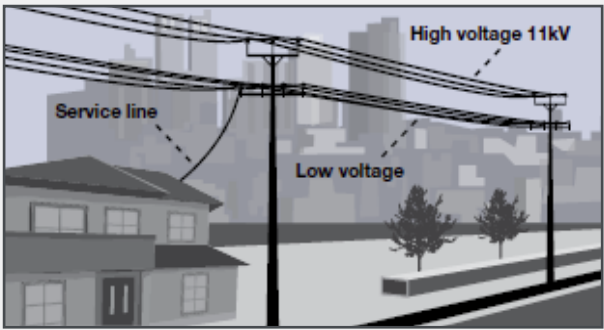


Figure 2 : Common Power lines with difference in voltages <sup>[7]</sup>

## HOW TO SAFELY DETERMINE THE VOLTAGE OF POWER LINES?

A high voltage detector is used by a qualified professional to determine the AC voltage within cables, cords, switches, circuit boards or similar equipment. A typical handheld probe can detect voltage between 30 to 122,000 volts, without contacting the conductor. High voltage probes typically have an audible indicator which beeps at higher frequencies and begins flashing bright warning lights when in range of higher voltages, to alert the holder. <sup>[10]</sup>



Figure 3 : Non-Contact High Voltage Tester <sup>[10]</sup>



Figure 4 : Non-Contact High Voltage Tester attached to Hot Stick Extension <sup>[12]</sup>

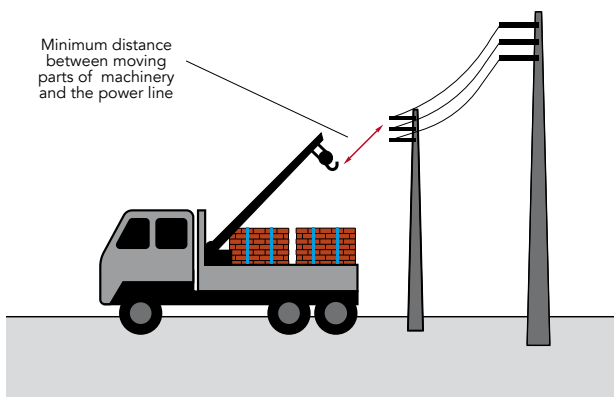


Figure 5: Possible movement of power lines and machinery <sup>[6]</sup>

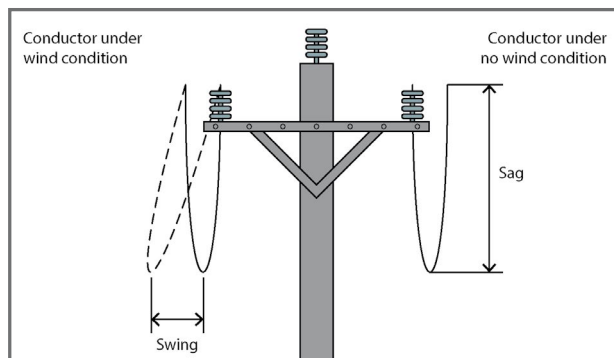


Figure 6: Conductor 'sag or swing' <sup>[3]</sup>

## CRANES AND ELEVATING MACHINERY

To operate machinery to the prescribed distances of the Regulations, you also have to factor in the following:

- Power lines' movement due to wind effects.
- Mechanical movement of machinery arm.
- Swinging of loads from momentum and wind effects.

Any breach of the prescribed clearances can lead to <sup>[3]</sup>:

- Risk of electric shocks for you and any other persons in the vicinity.
- Release of toxic fumes.
- Hazardous fires and explosions.

These risks can result in serious injury, permanent disability or death, hence preventative measures must be carefully followed.

To estimate the height or voltage of the overhead electric lines, ask your Electricity Supply Authority for advice, or check Safe Work Australia - Electrical Safety Code of Practice for further information <sup>[2]</sup>.

To operate machinery with an elevating component such as cranes, elevating work platforms and earthmoving equipment such as excavators the following safety requirements must be fulfilled:

- The voltage of the power line must be identified;
- A spotter (competent person who is suitably qualified by experience, training, or both with the sole duty of observing and warning against the unsafe approach of the crane, its lifting attachments or its load to power lines) carries out spotting duties always;
- A documented risk assessment is carried out before any work commences, in consultation with all relevant parties involved in the work;
- The electricity network operator is notified before commencing work; and
- Any conditions specified by the electricity network operator or Technical Regulator are complied with.

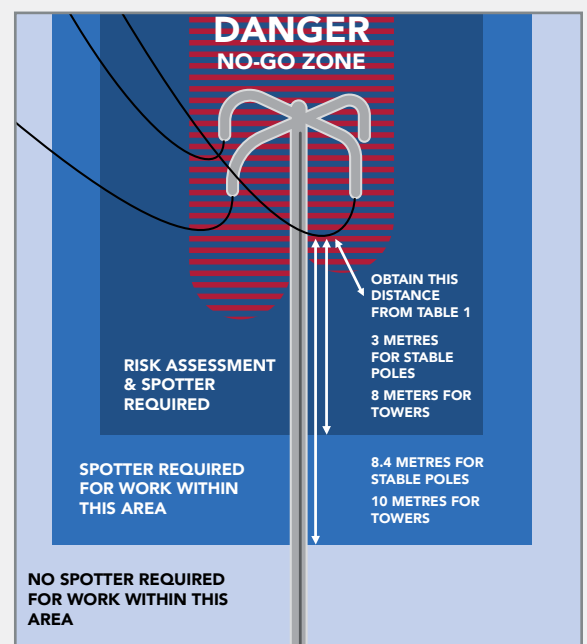


Figure 7: Clearance zones for operating machinery in proximity to power lines <sup>[6]</sup>



## SAFE APPROACH LIMITS FOR PEOPLE

The minimum safe approach limit is measured from the closest conductor on the power line to the closest part of the person or an object held by the person. Subject to a documented risk assessment considering the movement of tools, materials and structures, it is possible to use reduced approach limits as indicated in Table 1 below.

	Cranes AS 2550.1 Crane Code. (Approved Code of Practice) Earthmoving machinery and Elevating Work Platforms		Machinery Electricity (General) Regulations 2012 Schedule 5, Table 1 – Distance to operation of machinery, vehicle or vessel with elevating component or shear legs	Safe Approach Limits Electricity (General) Regulations 2012 64(3) Safe Approach Limits		Buildings and Structures, including Scaffolds Electricity (General) Regulations 2012 Schedule 1, Table 1	
Voltage (in volts)	No Spotter	Spotter required	Risk assessment and spotter required	Approach limit – normal persons	Approach limit – with risk assessment	Horizontal direction	Vertical direction
240	6.4m	3.0m	1.0m	3.0m	1.0m	1.5m	3.7m
415	6.4m	3.0m	1.0m	3.0m	1.0m	1.5m	3.7m
7,600	6.4m	3.0m	1.5m	3.0m	2.0m	3.1m	5.5m
11,000	6.4m	3.0m	1.5m	3.0m	2.0m	3.1m	5.5m
19,000	6.4m	3.0m	1.5m	3.0m	3.0m	3.1m	5.5m
33,000	6.4m	3.0m	1.5m	3.0m	3.0m	3.1m	5.5m
66,000	6.4m	3.0m	3.0m	4.0m	4.0m	5.5m	6.7m
132,000 pole	6.4m	3.0m	3.0m	5.0m	5.0m	15m	NA
132,000 tower	10.0m	8.0m	3.0m	5.0m	5.0m	20m	NA
275,000	10.0m	8.0m	4.0m	6.0m	6.0m	25m	NA

Table 1: Safety Requirements for power lines<sup>[6]</sup>



## WHAT TO DO IF YOU GET SHOCKED ON SITE?

Emergency rescue procedures must be developed, tested and practiced for each workplace or site. These emergency plans need to ensure:

1. **Look first, don't touch** – the person may still be in contact with the electricity.
2. **Seek immediate medical attention**, regardless of how minor the shock may be, call 000.
3. **Immediately report all electric shocks** to the Health, Safety and Environmental (HSE) manager/site supervisor, irrespective of seriousness.
4. To avoid further incidents, **keep others a minimum of 5 m from the area electric shock**. Take particular care if the victim is in contact with water or metal, which carries electricity.
5. In cases with high voltage energised electric lines, it is important to contact providers to **cut off the electricity** for the safety of all individuals on site.
6. **Review and revise the on-site HSE policy** where appropriate to avoid future incidents.

Even if you can't see a physical injury, a mild electric shock might cause internal damage and medical attention is still required to assess whether the heart has been affected. All workers on site must be familiar with emergency procedures.<sup>[11]</sup>

### PRELIMINARY PROCEDURES

Have you contacted the electricity operator?

Did the operator approve the work being carried out?

Did the operator specify any operating conditions?

Have you checked the power line's voltage and function (e.g. residential) and taken appropriate precautions

### SITE INSPECTION

Has a risk assessment been carried out?

Has it been documented and shared with all parties?

Are cranes or elevating machinery needed on site?

Have you noted the height of the machinery (fully extended)?

Is there enough distance away from power lines?  
(Refer to Table 1 in Power line Factsheet)

Is a spotter needed for the job?

Have you assigned a spotter for the site?  
([Refer to Safe Work Australia General Guide For Cranes](#))

**ABC GUIDE:**  
**ASSESS SAFE DISTANCES**  
**BE CAUTIOUS AND HAVE A SPOTTER**  
**CONTACT ELECTRICITY SUPPLIER TO SEEK ADVICE**





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## REFERENCES

- [1] Government of South Australia (2017), Electricity (General) Regulations 2012, Adelaide, Legislation Revision and Publication Act 2002
- [2] Safe Works Australia (2014), Guide for working near low voltage overhead electric lines near structures
- [3] Safe Works Australia (2014), General guide for working in the vicinity of overhead and underground electric lines
- [4] Safe Works Australia (2014), Electricity Regulators
- [5] Safe Works Australia (2014), Electricity supply authorities
- [6] Be Energy Safe (2015), Working safely near overhead power lines, Government of South Australia
- [7] Be Energy Safe (2017), Building safely near power lines, Government of South Australia
- [8] Work Cover (2006), Code of Practice 2006: Work Near Overhead Power Lines, Gosford, Government of New South Wales.
- [9] Work Cover Tasmania (2009), A Guide to working safely near Overhead Power Lines, Tasmania, Government of Tasmania
- [10] Amprobe, 2019. Amprobe TIC 300 PRO High Voltage Detector for Safety
- [11] Health Direct Australia, 2019, Electric shocks and burns
- [12] Klein Tools, 2019. High Voltage Non-Contact Testers