

**Engineering System Integrity
Electrical Network Safety Rules**

**Engineering Specification
Electrical Distribution Unit**

Working Near or On/Within

**SP D 79049
Safe Approach Distances (SADs)**

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Document control

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1 Summary of Safe Approach Distances (SADs)

1.1 Work near or on/within

Different requirements apply to work “near” or “on/within” exposed electrical equipment, and are defined below:

Work near Work that potentially creates a situation where there is a reasonable possibility of a person, either directly or through any conducting medium, coming closer than the relevant safe approach distances specified.

NOTE: The work near distance varies with the equipment voltage and competence of the people performing the work.

For details refer to Section 4.1 Working near or on/within electrical equipment.

Work on/within Work that exists inside the SADs for an electrical asset and requires or may require contact with the normally live parts of the electrical equipment, either directly or indirectly.
For details refer to Section 4.1 Working near or on/within electrical equipment.

1.2 Work in the vicinity of

Different requirements apply to work “in the vicinity of” exposed electrical equipment, and is defined below:

Work in the vicinity of Work at a distance greater than the SAD but still close enough that the presence of the electrical hazard is to be considered in the planning of the work.

NOTE

There is no single specified outer boundary of the area that is “in the vicinity of” as the boundary varies according to each situation and the work method, materials and tools to be used.

1.3 SADs diagrams

The following diagrams are provided to assist in understanding of the distinction between “near” and “on/within” exposed electrical equipment. While the diagrams use the example of the 1500 Volt overhead wiring the same principles apply to High Voltage and Low Voltage equipment.

NOTE

All Figures shown are intended as guides only. They are not to be used as a substitute for proper job planning.

For work **Near** exposed electrical equipment refer to Section 3.1 Working on or near electrical equipment

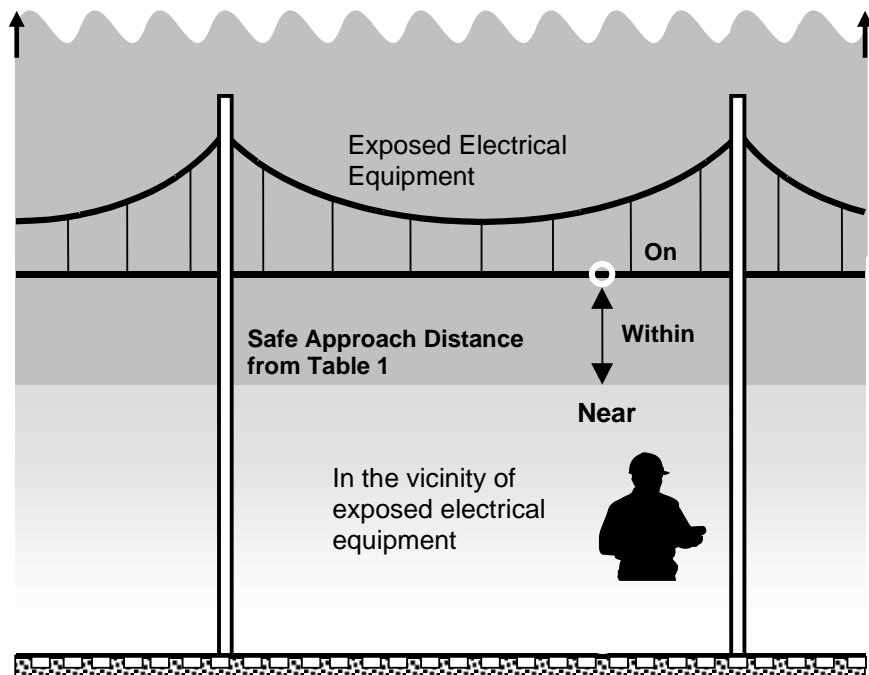


Figure 1: Working around exposed electrical equipment (looking across the tracks)

NOTE

For work above exposed electrical equipment, refer to PR D 78700 Section 10 Work above exposed electrical equipment.

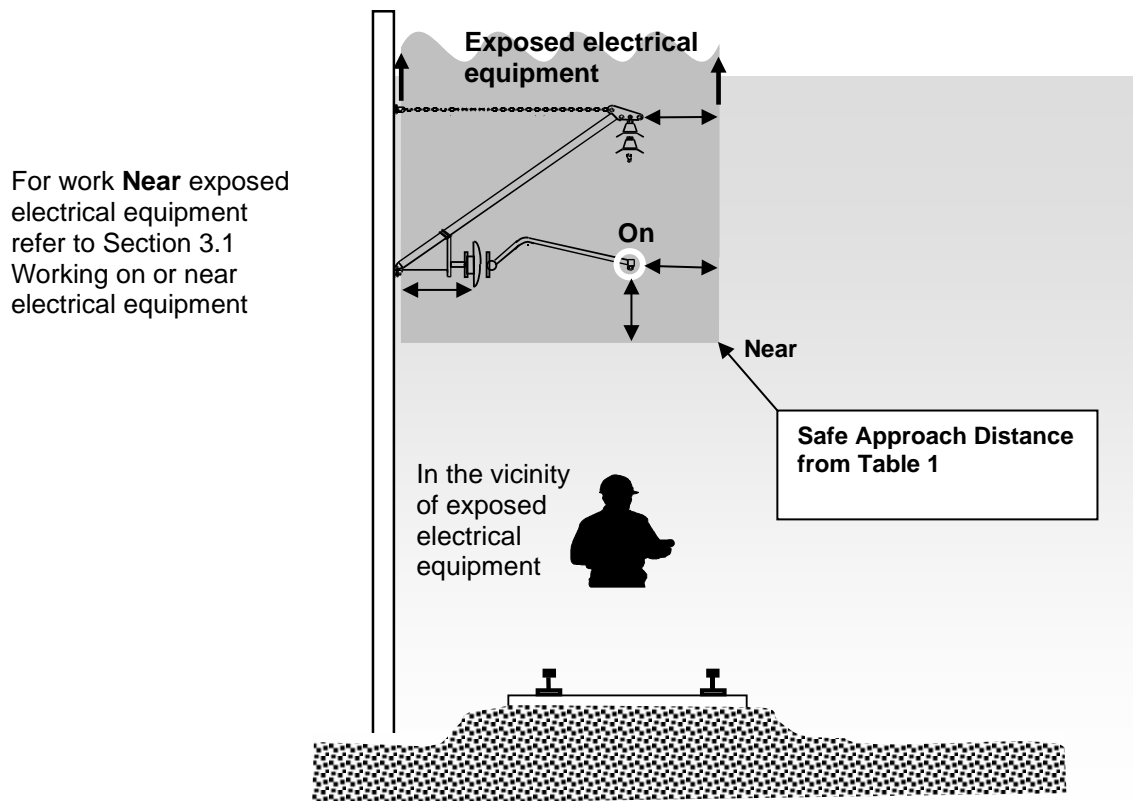


Figure 2: Working around exposed electrical equipment (looking along the tracks)

NOTE

For work above exposed electrical equipment, refer to PR D 78700 Section 10 Work above exposed electrical equipment.

For ease and quick reference, Table 1: Minimum SADs to exposed electrical equipment for persons and tools they hold and Table 2: Minimum SADs for non-electrical work around insulated Low Voltage cables up to 1000 Volt (including Low Voltage aerial bundled cables) and Low Voltage aerial lines are provided as follows as well as in Section 3 Safe Approach Distances (SADs).

2 Definitions

Refer to the **Electrical Safety Definitions** page available on the **RailSafe** site.

3 Safe Approach Distances (SADs)

3.1 Normal SADs for Persons and Tools Held by Persons

Line Managers and Employees are not to assume that it is always safe to work up to minimum SADs listed in Table 1 and Table 2. Add an additional distance to that shown in the tables if inadvertent movement or mishandling of material could infringe on the minimum SAD.

Table 1: Minimum SADs to exposed electrical equipment for persons and tools they hold

AC - Nominal Voltage	Minimum SAD		
	Ordinary Persons	Accredited Persons	Authorised Persons (See Note 1)
Insulated Low Voltage aerial lines up to 1000 Volt, including Low Voltage aerial bundled cables	Refer to Table 2		0.5m
Low Voltage - above 50 Volt AC but not exceeding 1000 Volt	3.0m	1.0m	0.5m (See also Section 3.3.1)
Above 1000 Volt up to and including 11,000 Volt	3.0m	1.2m	0.7m
Above 11,000 Volt up to and including 33,000 Volt	3.0m		1.0m
Above 33,000 Volt up to and including 66,000 Volt	3.0m	1.4m	1.5m
Above 66,000 Volt up to and including 132,000 Volt	3.0m	1.8m	
Above 132,000 Volt up to and including 220,000 Volt	6.0m	2.4m	
330,000 Volt		3.7m	(See Note 2)
500,000 Volt	8.0m	4.6m	
DC - Nominal Voltage			
Above 120 Volt but not exceeding 600 Volt	3.0m	1.0m (See also PR D 78700 Section 15 Jacking Rolling Stock)	0.5m
Above 600 Volt including 1500 Volt			0.5m (See also Section 3.3.3)

NOTE 1

Only persons holding authorisations specifically allowing work at less than that of Ordinary Persons may work to these distances.

NOTE 2

These SADs are a minimum for work around TAHE assets. When working around Other Network Operator's equipment the Sydney Trains SADs or the Other Network Operator's (whichever is larger) shall apply.

Table 2: Minimum SADs for non-electrical work around insulated Low Voltage cables up to 1000 Volt (including Low Voltage aerial bundled cables) and Low Voltage aerial lines

Work activity	Minimum SAD	
	Ordinary Persons	Accredited Persons
Mobile plant operation	Refer to <i>SP D 79050 Safe Use of Mobile Plant around Electrical Equipment</i>	
Handling non-conductive materials (timber, plywood, PVC, pipes and guttering etc.)	1.5m	0.5m
Handling metal materials (roofing, guttering, pipes etc.)	4.0m	
Driving or operating vehicle	0.6m	
Hand held tools	0.5m	
Scaffolding and temporary structures	Refer to <i>SP D 79051 Temporary Structures around Electrical Equipment</i>	

3.2 Increased SADs

3.2.1 General

Work activities that might easily bring persons or equipment closer to the electrical hazard present additional risks and require increased SADs and additional risk controls. These are set out in separate Safe Work Instructions. Line Managers planning or controlling work around electrical equipment which involves these activities are to make sure that the requirements of the SMS are followed.

3.2.2 Portable metal ladders

Metal or metal reinforced portable ladders, stepladders or step platforms are not to be used for work that is:

- near or on/within Low Voltage aerial conductors, or
- within 6 metres of 1500 Volt DC overhead conductors or equipment ,or
- within 6 metres of High Voltage (greater than 1000 Volt AC) aerial conductors or equipment

For further guidance on the use of ladders refer to *D2013/80862 Portable Ladders, Stepladders and Step Platforms*.

3.2.3 Mobile plant

Specific requirements relating to crane and plant operator competence, risk elimination/control measures and SADs apply for work using cranes and plant around electrical equipment. Refer to SP D 79050.

3.2.4 Temporary structures such as scaffolding

Specific requirements relating to certification, risk elimination and control measures and SADs apply for temporary structure work and work using temporary structures around electrical equipment. The requirements vary according to the structure's location, and whether the structure is metallic or non-conductive. Refer to SP D 79051 for further information.

3.3 Reduced SADs

3.3.1 Work on Low Voltage equipment by Authorised Persons or Qualified Electricians

Electrical discipline personnel, i.e. Authorised Persons (Low Voltage) or Qualified Electricians as set out in *PR D 78701 Personnel Certifications – Electrical*, may carry out work on Low Voltage equipment in accordance with *PR D 78402 Work on Low Voltage Distribution System* or *D2013/80873 Work on Low Voltage Installations* at a distance of less than 0.5m after the associated risks are identified and the risks of contact with live parts controlled.

NOTE

The minimum SADs for non-electrical work around insulated Low Voltage aerial lines are set out in Table 2.

3.3.2 Substation busbars (voltages not exceeding 66kV)

A person who is not appropriately authorised, e.g. an Accredited Person or an Authorised for Entry person, may approach substation busbars to a minimum distance of 1m for the purpose of passing under the busbar provided an Authorised Person (Substations) who is specifically authorised to supervise work within substations:

- provides the person on-site instruction about the dangers and precautions, and
- accompanies that person at the site, and
- provides direct/constant supervision of that person.

3.3.3 1500 Volt cables

- Unscreened 1500 Volt cable

Treat 1500 Volt unscreened insulated cable as exposed 1500 Volt equipment.

Authorised Persons may approach an unscreened insulated 1500 Volt cable to a distance of not less than 50mm, on condition that:

- the reduced SAD is applied to the normally insulated cable only, and not applied to exposed conductor or conductive components connected to the conductor, and
- extra care is taken when working at the reduced SAD.

- **Screened 1500 Volt cable**

Persons may touch a screened 1500 Volt cable provided it is visually inspected and found to be in good condition.

For further information refer to *SP D 79052 Cables – Work near or on/within*.

3.3.4 Jacking rolling stock

Reduced clearances are permitted where rolling stock is to be jacked under or adjacent to live 1500 Volt overhead wiring provided the work is carried out in accordance with PR D 78700 Section 15 Jacking rolling stock.

3.3.5 Authorised persons in training

Persons training to become Authorised Persons may come closer than the SADs specified under Accredited Persons of Table 1 provided:

- the person is assessed as competent to carry out the work under supervision, and
- the SADs under "Authorised Persons" of Table 1 are maintained, and
- the work is under the direct/constant supervision by a person suitably authorised to perform the work.

NOTE

The person supervising the work is responsible for the safety of the person in training.

3.4 Examples of SADs

The following diagrams are to be used for guidance only. Assess each situation individually.

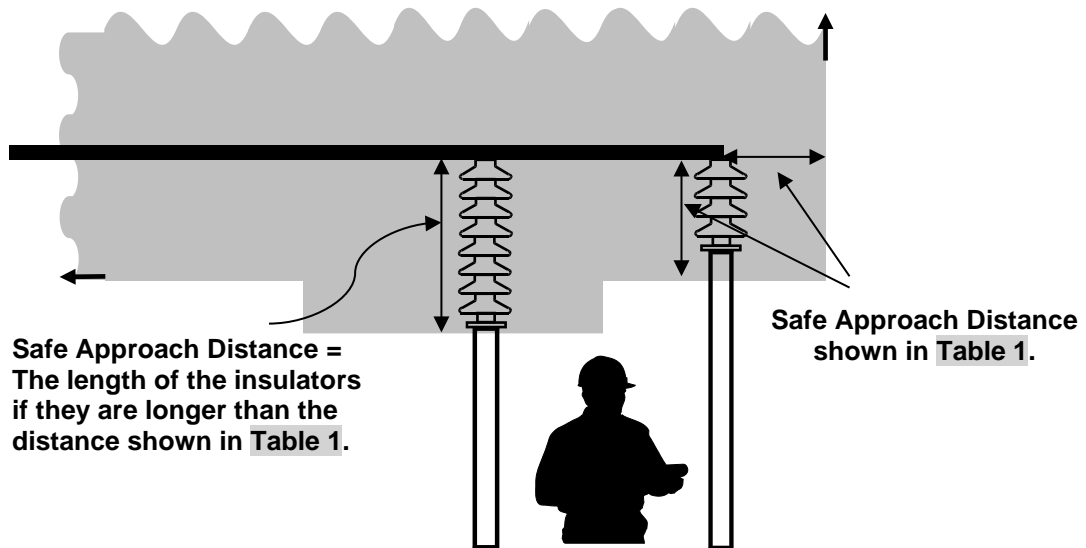


Figure 3: Exposed busbars in substations

WARNING

Unless signed on to a relevant Electrical Permit, persons and any objects they carry are not to enter the SAD as shown in the diagrams.

NOTE

For work above exposed electrical equipment, refer to PR D 78700 Section 10 Work above exposed electrical equipment.

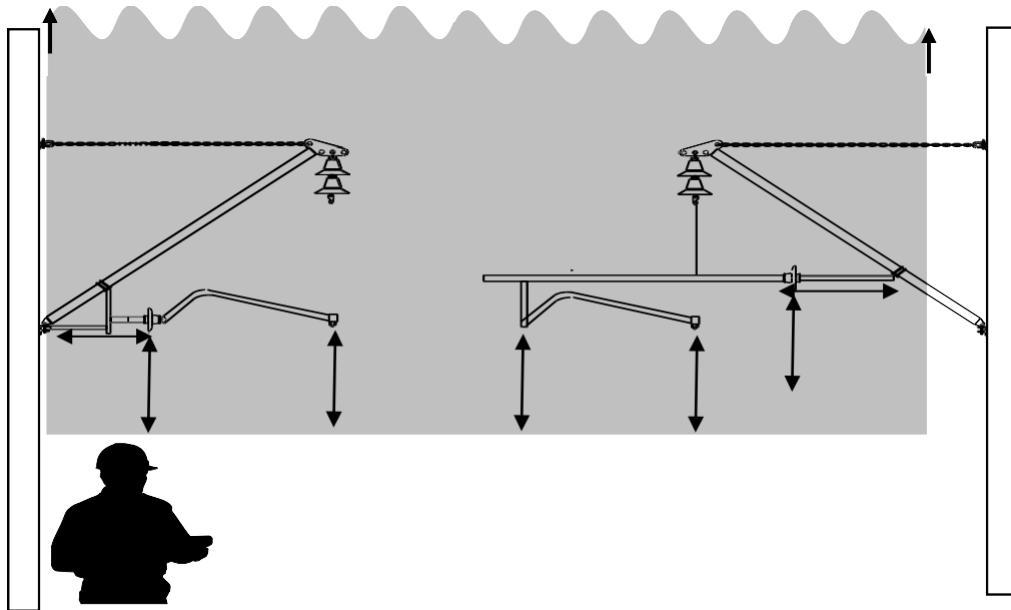


Figure 4: SADs to OHV equipment – Accredited Persons

NOTE

For work above exposed electrical equipment, refer to PR D 78700 Section 10 Work above exposed electrical equipment.

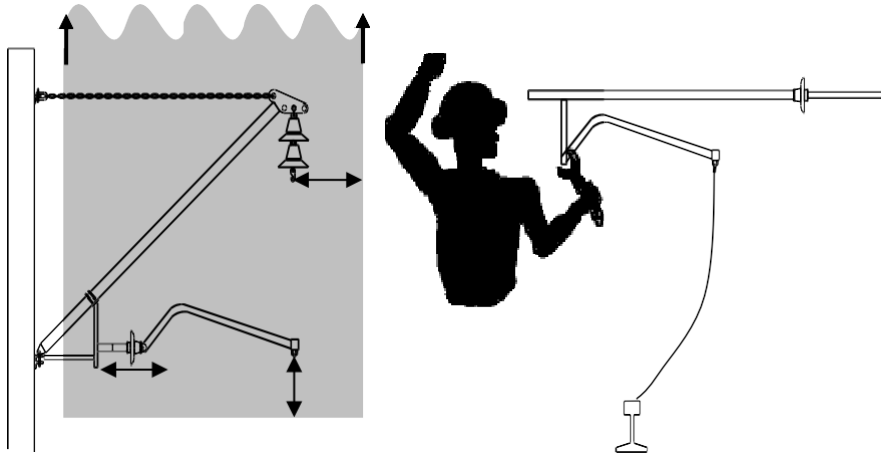


Figure 5: Work on OHV equipment by Authorised Persons (Case 1)

NOTE

Authorised Persons working on structures or rail connected equipment near live 1500 Volt equipment are not to enter the SAD either directly or through any conducting object.

NOTE

For work above exposed electrical equipment, refer to PR D 78700 Section 10 Work above exposed electrical equipment.

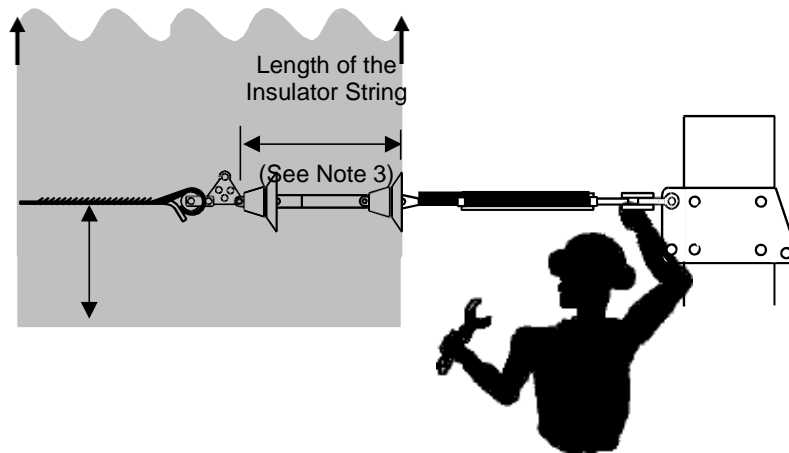


Figure 6: Work on OHW equipment by Authorised Persons (Case 2)

NOTE

Authorised Persons working on structures or rail connected equipment near live 1500 Volt equipment are not to enter the SAD either directly or through any conducting object.

NOTE 3

The SAD for an Authorised Person is as shown in Table 1 or the length of the insulator string if it is longer.

NOTE

For work **above** exposed electrical equipment, refer to PR D 78700 Section 10 Work above exposed electrical equipment.

4 Exceptions and Exclusions

Special minimum SADs apply for some types of work and when using some types of equipment. Increased minimum SADs apply for some plant and equipment. Refer to *PR D 78102 Electrical Hazards and Warnings* for relevant instructions.

Exceptions and exclusions apply for certain types of work.

4.1 Working near or on/within electrical equipment

4.1.1 1500 Volt traction return system

Work near or on/within the 1500 Volt traction return (negative) system is excluded from the scope of this document. Generally it is not necessary to maintain a SAD from this equipment. However, it is important that connections are not broken and that the equipment is not damaged. Refer to PR D 78102 Section 6 Traction System for more detail about the particular hazards.

Work on the 1500 Volt traction return system is undertaken by electrical or signalling discipline personnel. The instructions to be followed by electrical discipline personnel are set out in instructions *PR D 78303 Work on 1500V Negative Equipment outside Substations* and *PR D 78304 Work on 1500V Negative Equipment inside Substations*.

4.1.2 Lamp replacement

Replacing general service lighting globes and tubes is not considered to be work near Low Voltage electrical equipment.

4.1.3 Routine maintenance of Signal Equipment near Registered Dead Leg Pennants

Replacing lighting globes, cleaning lenses, inspecting electrical connections, wiring and operation of lamps ONLY of signalling equipment is not considered to be working near 1500 Volt Overhead Wiring, if such work is carried out in accordance with policies and procedures maintained by Sydney Trains engineering Signalling discipline. Person in charge of work must contact Sydney Trains interface manager for more information.

4.1.4 Work that does not bring the operator within the relevant electrical SADs

For the purpose of this Specification, the following activities, when carried out by Authorised Persons and provided the work does not bring the operator within the relevant electrical SADs, are not considered to be work near electrical equipment:

- operation of switches and link switches
- use of specially insulated apparatus
- application and removal of earths
- application and removal of rail connections
- work on disconnected equipment within a substation
- work on disconnected Low Voltage equipment.

4.1.5 Work utilising a continuous rigid barrier

If a continuous rigid barrier is used, the SWMS are to be approved by an Authorised Officer (Mains or Substations) who understands sufficient detail of the work process for which the continuous rigid barrier is required and to assess the documented work process for its adequacy to prevent infringement of the relevant SADs.

Particular requirements apply to work above exposed electrical equipment using mobile plant. Refer to SP D 79050.

Particular requirements also apply to temporary structures, scaffolding work and the use of temporary structures and scaffolds above exposed electrical equipment. Refer to SP D 79051.

5 Reference documents

D2013/80862 Portable Ladders, Stepladders and Step Platforms

D2013/80873 Work on Low Voltage Installations

PR D 78102 Electrical Hazards and Warnings

PR D 78303 Work on 1500V Negative Equipment outside Substations

PR D 78304 Work on 1500V Negative Equipment inside Substations

PR D 78402 Work on Low Voltage Distribution System

PR D 78700 Working around Electrical Equipment

PR D 78701 Personnel Certifications – Electrical

SP D 79050 Safe Use of Mobile Plant around Electrical Equipment

SP D 79051 Temporary Structures around Electrical Equipment