



**AUSTRALIAN RAIL TRACK CORPORATION LTD**

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**Discipline**

**Engineering Standard - NSW**

**Category**

**Electrical**

**Title**

**Work Near High Voltage Equipment - Permit Requirements and Safe Working Distances**

**Reference Number**

**PMP 09 - (RIC Standard: EP 95 10 00 01 SI)**

**Document Control**

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## About This Standard

There are two basic criteria for working safely near exposed high voltage equipment:

- Stay outside the safe working distance, or
- Be signed onto an appropriate Permit.

This publication sets out the safe working distances for the nominal voltages used in the ARTC high voltage system. Special safe working distances apply for some types of work and work using some types of equipment.

Exceptions apply for work on disconnected equipment within substations, the construction of new high voltage overhead lines, and also for work on abandoned cables.

## Document History

**Primary Source** – RIC Standard EP 95 10 00 01 SI Version 1.0

### List of Amendments –

ISSUE	DATE	CLAUSE	DESCRIPTION
1.1	11/03/2005	Disclaimer	Minor editorial change

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## 1 General

A permit must be obtained when it is foreseeable that:

- A person will be required to, or might inadvertently, come within the minimum safe working distances shown in Table 1 of exposed high voltage equipment, either directly or through tools, equipment, materials or other conducting objects, or
- A crane or an item of plant will be required to, or might inadvertently, come within the minimum approach distances of exposed high voltage equipment as detailed in PMP 04 – "Requirements for Work Using Cranes and Plant".

Unless:

- The equipment is within a substation and is disconnected equipment;
- The work is for the construction of a new high voltage overhead line and the work is carried out in accordance with section 6; or
- The work is carried out on an abandoned cable in accordance with section 7.

For work above exposed high voltage equipment, additional requirements apply. These are set out in Section 5.

For the following work, additional requirements and special safe working distances apply. These are set out in separate publications as follows:

- For work using cranes and plant see PMP 04 – "Requirements for Work Using Cranes and Plant".
- For work using scaffolding and metal ladders see PMP 07 – "Requirements for Work Using Scaffolding and Metal Ladders".

The contractor's Permit System shall specify the type of Permit to be issued if a Permit is required.

When it is necessary to isolate a service belonging to another Network Operator for the work, an Operating Agreement must be received from that Network Operator and the conditions of the Operating Agreement complied with. Alternatively, a Permit may be received from the other Network Operator.

Voltage	SAFE WORKING DISTANCE – metres	
	Suitably Authorised Persons *	All Other Persons
Above 1000V but not exceeding 11 kV	0.7 **	1.2 ***
Above 11 kV but not exceeding 66kV	1.0	1.5 ***
Above 66kV but not exceeding 132kV	1.5	2.0
Above 132kV but not exceeding 220kV	2.5	3.0
Above 220kV but not exceeding 330kV	3.0	3.5
Above 330kV	4.0	4.5

**Table 1 : Safe Working Distances to Exposed High Voltage Equipment for Persons**

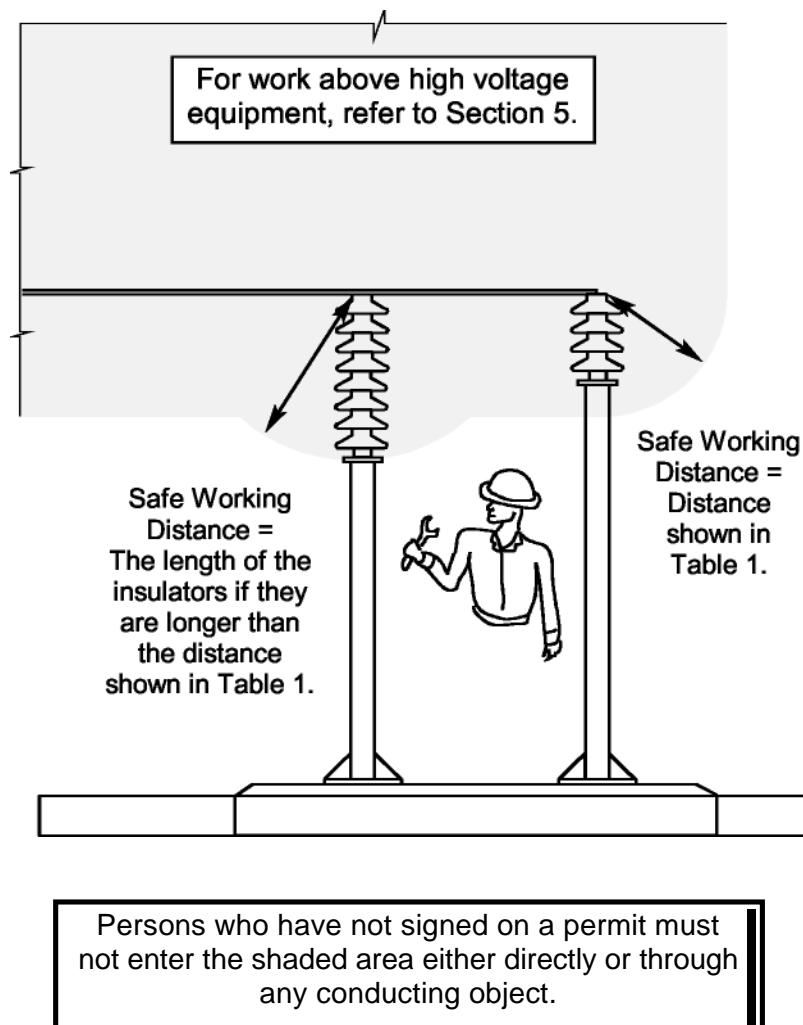
- \* Persons training to become suitably authorised persons may come closer than the safe working distances shown under "All Other Persons" of Table 1 provided that the safe working distances under "Suitably Authorised Persons" are maintained and the work is continuously and closely supervised by a person suitably authorised to perform the work. The person supervising the work will be responsible for the safety of the person in training.
- \*\* Testing and earthing procedures on certain 2kV and 11kV equipment may bring the operator within the specified 0.7m safe working distance. This work must only be carried out by an authorised person who has been trained in the procedures and in accordance with written instructions.
- \*\*\* When passing under substation busbars, a person who is not authorised may come to 1 m of the busbars at voltages up to 66kV provided that an authorised person has instructed the person at the site of the dangers existing and the precautions that must be taken, and accompanies that person.

**WARNING**

Table 1 does not imply that it is always safe to work up to these distances. An additional distance must be added to that shown in the table if inadvertent movement or mishandling of material would infringe on the safe working distance.

## 2 Diagrammatic Example of Safe Working Distances

Diagram 1 shows a situation within a substation where the safe working distance and the insulator length has to be considered. This diagram is a guide only and each situation must be assessed individually.



**Diagram 1 - Safe Working Distance to Exposed High Voltage Equipment for Persons**



### **3 Inspection and Testing of High Voltage Equipment**

#### **3.1 General.**

All aspects of testing work, including connection & disconnection of the test equipment and the actual testing operations must be carried out in accordance with Section 1 except as set out in Sections 3.2 and 3.3.

#### **3.2 Tests where the equipment is energised from the high voltage system.**

If a Permit is required for the connection of the test equipment, that permit must be cancelled before the equipment is energised for the test.

#### **3.3 Other tests (where the equipment is energised from the test equipment).**

When testing requires test equipment to be connected to high voltage equipment and earths to be removed, the work must be carried out under an appropriate Permit.

### **4 Replacement of High Voltage Fuses**

Operation of high voltage equipment for fuse replacement must be carried out under the direction of the Electrical System Operator.

A Permit is not required for fuse replacement where:

- The enclosed switchgear has withdrawable type fuses or switch fuses that become disconnected equipment when fully withdrawn. In these cases, fuses are to be replaced in accordance with Local Instructions.
- Fuses and fuse links can be removed and replaced using approved insulated sticks.

A Permit must be issued for all high voltage fuse replacement that requires isolation and the application of earths.

## 5 Work Above Exposed High Voltage Equipment

When work is above exposed high voltage equipment, either:

- the work must be carried out under an appropriate Permit, or
- the work must be carried out in accordance with an approved procedure and the specific work must be authorised by an Electrical Engineer, or
- a special barrier must be erected, and the work must be carried out in accordance with a documented procedure.

Where a special barrier is to be used, the barrier and the documented procedure must be:

- (a) approved by an Authorised Person who understands sufficient detail of the work process for which the barrier is required, to assess its adequacy to prevent infringement of the relevant safe working distances, and
- (b) approved by a competent person who understands sufficient detail of the structural limitations of the proposed barrier to assess its adequacy to resist the forces that may be imposed during the work process.

The person giving these approvals for the special barrier is responsible for ensuring that:

- the necessary restrictions on the work process arising from the barrier, and
- the maximum loads that may be applied to the barrier

are documented in the procedure and are applicable for the work.

## 6. Construction of New High Voltage Overhead Lines

When work on or near high voltage overhead lines under construction is carried out, a WHVI and a Permit will not be required for the line under construction provided that:

- The new construction work is not supported on poles or structures carrying any high voltage equipment that is, or which has previously been, in service;
- There are no switches or other electrical equipment by which the new high voltage overhead line can be made live and there is a physical separation of at least 3m between the new high voltage overhead line and any source of supply to which it is to be connected;
- Care is taken to ensure that the line under construction cannot be energised from other adjacent services;
- No person, material or construction equipment comes within the safe working distances shown in Table 1 of other exposed high voltage equipment; and
- The high voltage overhead line under construction is earthed as the conductors are erected to prevent the risk of injury as a result of static or induced voltages.

## 7 Work On Abandoned Cables

When it is necessary to carry out work on abandoned high voltage cables or near the exposed cores of abandoned high voltage cables:

- The cable must be identified by its former identifier and designated as abandoned e.g. "Former IS 12 (abandoned) ",
- If the cable is to be cut, the cable must be proved dead by spiking, and
- An appropriate Permit endorsed "Abandoned" must be issued.

If the above dot points are met, a WHVI is not required, the Permit need not be numbered and the cable need not be earthed.

If the cable is visually and continuously traced from end to end, the cable need not be spiked and a Permit is not required.

### Note

Care must be exercised when tracing cables to include any tee-offs emanating from the cable.