



AUSTRALIAN RAIL TRACK CORPORATION LTD

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Discipline

Engineering Standard - NSW

Category

Electrical

Title

Work on or Near Low Voltage Distribution Equipment - Permit Requirements and Safe Working Distances

Reference Number

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Document Control

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The technical content of this document has been approved by the relevant ARTC engineering authority and has also been endorsed by the ARTC Safety Committee.

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About This Standard

There are three basic criteria for working safely near exposed low voltage equipment:

- Stay outside the safe working distance,
- Be trained to work at a close distance, (including working on live equipment), or
- Be signed onto an appropriate Permit.

This publication sets out the safe working distances for the ARTC low voltage distribution system.

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

Aspects of work that a maintenance contractor must document and include in its Electrical Safety System are also set out.

This publication applies to ARTCs low voltage distribution system. The contractor's electrical safety system must also address competencies and procedures for work on or near ARTC low voltage installations.

Document History

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List of Amendments –

ISSUE	DATE	CLAUSE	DESCRIPTION
1.1	05/01/2005		Reformatted to ARTC Standard
1.2	11/03/2005	Disclaimer	Minor editorial change

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1 General

No person is permitted, either directly or through any conducting object, to come within the safe working distance of 0.5m of exposed low voltage equipment unless:

- the equipment has been isolated and proved dead and the person has signed on the appropriate Permit, or
- the work is carried out in accordance with the relevant provisions of Section 2.4 "Provision For Exemptions From Issuing Permits" or Section 3 "Work on Low Voltage Distribution Equipment", which vary the requirement to issue a Permit in certain circumstances, or
- the equipment is disconnected equipment, or
- the person has been trained to perform specific non-electrical work near exposed equipment and this training is documented, or
- the person is an Electrical Engineer performing testing.

For work using cranes and plant see publication PMP 04 – "Requirements for Work Using Cranes and Plant".

For work using scaffolding see publication PMP 07 - "Requirements For Work Using Scaffolding and Metal Ladders".

WARNING

This does not imply that it is always safe to work up to 0.5m of exposed low voltage equipment. An additional distance must be added if inadvertent movement or mishandling of material would infringe on the safe working distance.

Where considered necessary, marker tapes or barriers should be used to distinguish the limits of an area within which low voltage equipment has been made safe for work.

WARNING

When work is above live exposed low voltage equipment special precautions are necessary. Refer to Section 5.

Isolation of Low Voltage Distribution Equipment must be carried out in accordance with PMP 15 - "Isolation of Low Voltage Distribution Equipment for Work."

Operation of Low Voltage Distribution Equipment must be carried out in accordance with POP 06 - "Operating Work - Low Voltage Distribution System."

2 Permits

2.1 General

Permits issued for work on or near low voltage equipment shall comply with the requirements of PMP 06 - "Permit System", as varied by the requirements of 2.2, 2.3, and 2.4.

2.2 Permit Numbers

In lieu of Clause 3 of PMP 06 "Permit System", the contractor's Permit system shall specify an appropriate and distinctive numbering system for Permits issued for work on or near low voltage equipment.

2.3 Authorisation or Accreditation of Permit Holders

The requirements of Clauses 4.1 and 6.1 of PMP 06 "Permit System" with regard to Authorisation or Accreditation of Permit Holders are not mandatory for the issuing of Permits for work on or near low voltage equipment. However, the person issuing the Permit must still satisfy themselves that the Permit Holder fully understands their responsibilities.

2.4 Provision For Exemptions From Issuing Permits

A contractor's electrical safety system may provide for exemptions from issuing Permits for the carrying out of certain work on or near low voltage equipment, and for the Authorisation of personnel to carry out work on or near low voltage equipment without the requirement to issue a Permit.

Such exemptions and Authorisations shall be clearly documented, and appropriate records kept for any personnel concerned.

2.5 Isolation in Conjunction with High Voltage Equipment

For work where:

- low voltage equipment has been isolated in conjunction with work on high voltage equipment, or
- high voltage equipment has been isolated in conjunction with work on low voltage equipment,

the contractor's Permit system should require the low voltage equipment to be included on the Permit issued for the high voltage equipment.

3 Work on Low Voltage Distribution Equipment

3.1 General

3.1.1 Principles

Work on low voltage distribution equipment shall only be carried out by Authorised Persons, or by a person continuously supervised by an Authorised Person.

In general, supply should be removed from exposed low voltage equipment prior to work on or near such equipment.

Supply must be removed before work is to be performed which may result in:

- the connection between the main neutral and the earthing system being removed, or
- a neutral conductor which is carrying load current becoming discontinuous.

If work may result in the earth conductor for a portion of the system becoming discontinuous, supply must be removed from that portion of the system.

When supply is removed for the work, each conductor must be tested dead prior to work commencing. Where a low voltage conductor can not be tested dead it must be treated as being live even though it may have been isolated.

Special precautions must be taken when working on or near live equipment. The contractor's Electrical Safety System user documentation must include details of safe systems for live work if this technique is to be used.

WARNING

Electrical workers often risk contacting live parts when:

- **Altering or adding to switchboards.**
- **Cutting into cables, conduits and other wiring enclosures.**
- **Making connections in junction boxes which contain numerous circuits.**
- **Touching parts of installations not isolated by a main switch, eg consumers mains.**
- **Dual supplies are connected to appliances, eg hot water service, emergency lighting.**
- **Circuits are not isolated by control switches, eg switch wires.**
- **Supply could be readily reconnected by others.**

Always ensure all circuits being worked on are isolated, or otherwise use live work techniques.

3.1.2 Supervision

Any person who is required to supervise electrical work must:

- give directions that are adequate to enable the work to be carried out correctly,
- require the person being supervised to advise on progress of the work,
- be present when the work is being carried out and be available for advice, and to give directions relating to how the work is to be carried out,
- personally ensure that the work is correctly carried out,
- be responsible for the electrical safety of the persons being supervised,
- warn persons being supervised of any electrical hazards,
- warn persons being supervised before equipment is energised, and
- check that any necessary Danger Tags are still attached prior to work commencing at each shift.

3.2 Work on Low Voltage Overhead Lines

3.2.1 Work on Isolated Low Voltage Overhead Lines

A Permit must be issued for work on low voltage overhead lines that requires the line to be isolated and tested dead.

The contractor's electrical safety system may provide for appropriate Authorisation to allow work on an isolated low voltage overhead line without a Permit being issued.

3.2.2 Work on or Near Live Low Voltage Overhead Lines

Before work is carried out aloft on or near live low voltage equipment, a rescue kit must be placed, open ready for immediate use, at the base of each pole or structure where work is to be carried out. A visual check of the kit should be made at the time of placement to confirm that all items are present, and that the rescue rope is clipped to the rescue belt.

A person must not work on or near live low voltage exposed overhead lines unless:

- the person is trained in the safe performance of the work,
- the conductors have been identified as low voltage,
- the work is carried out in accordance with an accredited live low voltage training procedure,
- a clearance of 0.5m is maintained from any exposed low voltage conductor, except the one being worked on, and from any earthed metal,
- suitable insulating material or barriers are used to prevent inadvertent contact with other live exposed conductors or earth, and
- the person is attended by another person who has been trained in:
 - resuscitation
 - releasing a person from live electrical equipment, and
 - rescuing a person from a pole, structure or elevating work platform.

A person is not permitted to pass between the conductors of a live low voltage overhead line at any point where the conductors are spaced less than 1.2m apart unless the conductors are permanently insulated or temporarily covered with suitable insulating material, for a minimum distance of 1.0m in each direction from the point nearest to the person's body on each conductor.

Care must be taken with permanently insulated conductors to check that the insulation is in good condition and that there are no exposed connections on the conductor.

Approved insulating covers shall be used for temporary covering of conductors.

The Person in Charge of the Work must ensure that this gear is available, is in good condition and is used in the correct manner.

Persons carrying out the work must check that the insulating gear is in good order prior to commencing work.

3.2.3 Construction of New Low Voltage Overhead Lines

When work on or near low voltage overhead lines under construction is carried out, a Permit will not be required provided that:

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

3.3 Work on Low Voltage Substation Controls and Auxillaries

All work on low voltage substation controls and auxiliaries that are not part of the general power and lighting installation must be carried out by or under the supervision of an Authorised Person.

All work on live low voltage substation equipment must be carried out by an Authorised Person.

Note

Work on the general power and lighting installations in substations must be carried out on the same basis as work on other low voltage installations.

3.4 Abandoned Cables

When it is necessary to carry out work on abandoned cables or near the exposed cores of abandoned cables (cables which are classified as disconnected equipment and which will not be energised again), the cable must be identified as abandoned.

Provided the cable is positively and continuously traced from end to end, a Permit is not required.

Note

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

4 Insulation Testing of Low Voltage Equipment

When carrying out insulation testing using test equipment that applies a voltage in excess of 50 volts ac or 120 volts dc to the equipment, the following precautions must be observed:

- there must be no Permits in force for the equipment unless they are held by the person carrying out the tests,
- the equipment must be isolated and proved dead prior to connecting the test equipment, and
- all persons near the equipment must be warned to keep clear prior to the test voltage being applied.

5 Work Above Exposed Low Voltage Equipment

When work is above exposed low voltage equipment, either:

- the work must be carried out under an appropriate Permit, or
- the work must be carried out by an Authorised Person, 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:

- (i) 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 contravention of the relevant Safe Working Distances, and
- (ii) 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.