



AUSTRALIAN RAIL TRACK CORPORATION LTD

This document has been adopted by the ARTC with the permission of the NSW Government and will continue to apply under the authority of the ARTC General Manager Infrastructure, Strategy & Performance until further notice

Discipline

Engineering Standard - NSW

Category

Electrical

Title

Requirements for Work Using Scaffolding and Metal Ladders

Reference Number

PMP 07 - (RIC Standard: EP 95 00 00 11 SI)

Document Control

| Status | Date | Prepared | Reviewed | Endorsed | Approved |
|-----------------------|-------------|---------------------------|-------------------------------|--|--------------------------------------|
| Issue 1 Revision 1 | Mar 05 | Standards and Systems | Signalling Standards Engineer | GM Infrastructure Strategy & Performance | Safety Committee |
| | | Refer to Reference Number | T Moore | M Owens | Refer to minutes of meeting 24/01/05 |

Disclaimer

Australian Rail Track Corporation has used its best endeavors to ensure that the content, layout and text of this document is accurate, complete and suitable for its stated purpose. It makes no warranties, express or implied, that compliance with the contents of this document shall be sufficient to ensure safe systems of work or operation. Australian Rail Track Corporation will not be liable to pay compensation in respect of the content or subsequent use of this document for any other purpose than its stated purpose or for any purpose other than that for which it was prepared except where it can be shown to have acted in bad faith or there has been willful default.

Document Approval

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.

Document Supply and Control

The Primary Version of this document is the electronic version that is available and accessible on the Australian Rail Track Corporation Internet and Intranet website.

It is the document user's sole responsibility to ensure that copies are checked for currency against the Primary Version prior to its use.

Copyright

The information in this document is Copyright protected. Apart from the reproduction without alteration of this document for personal use, non-profit purposes or for any fair dealing as permitted under the Copyright Act 1968, no part of this document may be reproduced, altered, stored or transmitted by any person without the prior written consent of ARTC.

About This Standard

This document sets out the minimum requirements for work involving scaffolding near exposed electrical equipment. The publication defines the safe working distances, clearances and special conditions relating to scaffolding in close proximity to the Australian Rail Track Corporation's 1500 volt Overhead Wiring Traction System or Electricity Distribution System.

Document History

Primary Source – RIC Standard EP 95 00 00 11 SI Version 1.0

List of Amendments –

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

Contents

| | |
|---|-----------|
| About This Standard | 3 |
| Document History | 4 |
| 1. Introduction | 6 |
| 2. Scaffolding Material | 6 |
| 3. Normal Electrical Clearances | 7 |
| 4. Erection, Alteration or Dismantling of Scaffolding | 8 |
| 5. Scaffolding in Substations | 8 |
| 6. Clearances to Scaffolding where the Normally Accessible Areas are Screened by Continuous Rigid Barriers | 9 |
| 7. Scaffolding in Electric Vehicle Maintenance Centres | 10 |
| 8. Mobile Scaffolding | 10 |
| 9. Portable Metal or Metal Reinforced Ladders | 11 |
| 9.1. Ladders Near Exposed High Voltage or 1500 volt Equipment | 11 |
| 9.2. Ladders Near Exposed Low Voltage Equipment | 11 |

1 Introduction

Work with scaffolding near electrical equipment can only be performed while maintaining clearances set out in this document.

Additional distances must be allowed to ensure that any possible inadvertent movement of scaffold members or conductors does not result in the clearances being infringed.

Safe working distances and clearances from exposed and insulated electrical equipment are determined by the:

- type of electrical equipment,
- operating voltage of the electrical equipment,
- location of the electrical equipment,
- construction material comprising the scaffolding, and
- style of the scaffolding construction.

Table 1 shows the safe working distance and clearance for scaffolding under normal circumstances. It is recognised that special circumstances arise when scaffolding is used in secured areas or where equipment design allows reduced clearances while maintaining a safe work environment such as substations or where continuous rigid barriers are installed. The Contractor must develop written procedures and train staff appropriately where reduced clearances in these special circumstances are to be utilised

WARNING

If the distances in Table 1 cannot be maintained, all persons carrying out the work must sign onto an appropriate Permit.

2 Scaffolding Material

Scaffolding members may be either metal or non conductive.

Non conductive scaffolding comprises long members of non-conductive material such as dry timber or fibreglass. A non conductive scaffolding system may include small metal components of a compact nature such as couplings, adjustable bases and castors.

Note

Regardless of the material from which the scaffolding is constructed, the work process must be controlled so that persons, material, tools, equipment and scaffolding do not come within the relevant electrical safe working distances and clearances in Table 1.

3 Normal Electrical Clearances

| | Safe Working Distance for Scaffolding in the Vicinity of Electrical Equipment. (metres) | | | |
|---|--|-----------------------|-----------------------------|-----------------------|
| Scaffolding Material | Metal | | Non-Conductive | |
| | Vertical¹ | Horizontal | Vertical¹ | Horizontal |
| 1500 Volt Equipment | | | | |
| Aerial Feeders | 4.0 | 4.0 | 2.7 | 1.5 |
| Overhead Wiring (clearance to OHW and extremity of pantographs) | 4.0 | Structure Gauge + 4.0 | 2.7 | Structure Gauge + 1.5 |
| High Voltage Equipment | | | | |
| Above 1000V but not exceeding 33kV | 4.0 | 4.0 | 3.5 | 2.1 |
| Above 33kV but not exceeding 132kV | 4.0 | 4.0 | 4.0 | 3.0 |
| Low Voltage Equipment | | | | |
| Not exceeding 1000V | 4.0 | 4.0 | 2.7 | 1.5 |

Table 1 Safe Working Distance and Clearance for Scaffolding

Notes:

Vertical distances are measured from the highest part of the scaffold. The working deck is assumed to be not less than 1000mm below this to allow for a 900mm handrail.

4 Erection, Alteration or Dismantling of Scaffolding

The power supply must be removed and the work party signed onto permit when it is foreseeable that scaffolding or portions of scaffolding will be required to, or might inadvertently, come within the minimum safe working distances of exposed electrical equipment set out in Table 1.

Additional distance must be added to that shown in table 1 for:

- conductor movement due to the effects of wind and temperature, and
- inadvertent movement or mishandling of material which would infringe on the safeworking distance.

When handling scaffolding members in the vicinity of exposed electrical equipment, work methods must be planned and documented to minimise this risk. Long members should be handled by two persons, one on each end.

5 Scaffolding in Substations

Substations by their design and security arrangements are a more controlled environment for maintaining safe clearances than overhead lines. For this reason it is permissible to reduce the distances shown in Table 1 when using scaffolding inside a Substation provided that:

- written approval is provided by an Electrical Engineer to reduce the clearances based on a documented risk assessment that includes the work situation and the extent to which the exposed conductors are affected by wind conditions or temperature variations, and
- where the scaffolding is of metal members, it is effectively earthed in the case of clearance to high voltage and low voltage equipment, or connected to rail via a spark gap in the case of clearance to 1500 Volt equipment, and
- Prominent signs are affixed to the scaffolding to provide a warning that there is exposed electrical equipment in close proximity to the scaffolding.

6 Clearances to Scaffolding where the Normally Accessible Areas are Screened by Continuous Rigid Barriers.

Where scaffolding has been erected in accordance with Section 4 but is closer than the distances specified in Table 1, supply may be restored provided that:

- The scaffolding is no closer than the absolute limits as nominated in Table 2, and
- written approval is provided by an Electrical Engineer to reduce the clearances based on a documented risk assessment that includes the work situation and where the normally accessible areas are screened by continuous rigid barriers, and
- where the scaffolding is of metal members, it is effectively earthed in the case of clearance to high voltage and low voltage equipment, or connected to rail via a spark gap in the case of clearance to 1500 Volt equipment, and
- Prominent signs are affixed to the normally accessible side of any barriers to provide a warning that there is exposed electrical equipment behind the barriers and that the barriers should not be removed, and
- written approval is provided 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 rigid 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.

| | Absolute Clearance Limits for Scaffolding Erected with Continuous Rigid Barriers (meters) | |
|---|--|-----------------------|
| Scaffolding Material | Metal and/or Non-Conductive | |
| | Vertical¹ | Horizontal |
| 1500 Volt Equipment | | |
| Aerial Feeders | 2.7 | 0.6 |
| Overhead Wiring (clearance to OHW and extremity of pantographs) | 2.7 | Structure Gauge + 0.6 |
| High Voltage Equipment | | |
| Above 1000V but not exceeding 33kV | 3.7 | 1.5 |
| Above 33kV but not exceeding 132kV | 4.5 | 2.5 |
| Low Voltage Equipment | | |
| Not exceeding 1000V | 2.7 | 0.6 |

Table 2: Clearance for Scaffolding Erected with Continuous Rigid Barriers

Notes:

Vertical distances are measured from the continuous rigid barrier.

7 Scaffolding in Electric Vehicle Maintenance Centres

Where special instructions are in place at Electric Vehicle Maintenance Centres to carry out specific functions, the clearances specified in this document may be reduced in accordance with those special instructions.

8 Mobile Scaffolding

Extra care must be taken when using scaffolding mounted on wheels or castors. Such scaffolding must be positively restrained or blocked to prevent it coming within the distances specified in Table 1 to exposed electrical equipment.

9 Portable Metal or Metal Reinforced Ladders

9.1 Ladders Near Exposed High Voltage or 1500 volt Equipment

Portable metal ladders or metal reinforced ladders must not be used for any work that requires the ladder to be placed within **6m** of exposed high voltage or 1500 volt equipment.

When using long metallic ladders due consideration must be given to the possibility of the ladder slipping or tipping towards the exposed equipment.

Metal ladders or metal reinforced ladders must not be taken into a substation. The issue of a Permit will not vary the requirements of Section 9.1.

9.2 Ladders Near Exposed Low Voltage Equipment

Portable ladders with metal or metal reinforced styles must not be used for work on or near live low voltage equipment. The only exception is for work on low voltage overhead lines supported by steel towers.

The issue of a Permit will not vary the requirements of Section 9.2.