



**AUSTRALIAN RAIL TRACK CORPORATION LTD**

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## **About This Standard**

This publication provides definitions to terms used throughout the set of documents that comprise the RailCorp Electric Power System Safe Operation Manual EP 95 00 00 00 TM.

## Document History

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### List of Amendments –

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## 1. Definitions

### "Abandoned cables":

cables which are disconnected equipment and which will not be energised again

### "Alive" : see "Live"

### "Approved":

unless otherwise stated, means approved, in writing, by a person with the appropriate authority.

### "Authorised":

means has the permission of the appropriate organisation in writing for the duty concerned.

### "Authorised Person":

a person who is currently authorised.

### "Authority":

the standard ARTC form, "Authority for Removal of Supply from 1500 Volt Sections", completed and signed, used whenever it is necessary to organise the removal of supply from a section/subsection of the 1500 volt overhead wiring system.

### "Bridging Equipment":

equipment consisting of two conductor clamps joined together by a length of flexible insulated cable designed to electrically connect different 1500 volt overhead wiring sections.

### "Connection":

in reference to the 1500 volt overhead wiring system, a connection is a conductor joining different sections or portions of 1500 volt overhead wiring, appropriately rated to adequately handle the corresponding traction current.

### "Crane":

any type of crane, including an elevating work platform, whether independent or an integral part of another piece of equipment (including an agricultural tractor), or any other apparatus used or capable of being used for raising, lowering, handling or transporting materials or equipment in a similar manner, and includes any supporting structure and any other equipment ancillary to the use of the crane or apparatus, but excludes any grab crane or floating crane.

### "Danger Tag":

a warning device attached to a controlling switch or other equipment as a warning not to operate such equipment where this could cause injury to staff or damage to equipment. This tag must be a label, tape or other device with the word DANGER displayed on it along with other relevant details.

**"Dead" :**

below a voltage at which it is safe to apply earths.

**"De-energised"**

not connected to any source of electrical supply but not necessarily isolated.

**"Disconnected Equipment":**

equipment to which there are no electrical connections, and which can not be made live by switching or the making of bridges.

Withdrawable type circuit breakers, switches and switch fuses become disconnected equipment when fully withdrawn.

**"Double-Shuffle Action ":**

the process, when opening a switch or link, where the operator opens the switch or link enough to break contact momentarily, checking for any arcing, and in the same action closes the switch or link again prior to fully opening the switch or link.

**"Earthed" :**

connected to a general mass of earth in the approved manner so as to ensure the immediate effective discharge of electrical energy in the event of the equipment concerned being or becoming live.

**"Electrical Engineer":**

a person with the appropriate delegated authority and electrical engineering competency to make judgements concerning electrical safety.

**"Electrical Equipment" :**

For the purposes of this publication, electrical equipment includes, but is not limited to the following :

- 1500V overhead wiring, and
- overhead lines.

**"Electrical Safety Document":**

a Permit, an Authority, a Working High Voltage Instruction (WHVI), a Special 1500 Volt Work Instruction, a Notification of Removal of 1500 Volt Supply for Engineering Work in Electric Vehicle Maintenance Centres, or an Operating Agreement or other similar or related document.

**"Electrical System Operator" (ESO):**

the State Rail Authority Electrical System Operator, Sydney or Newcastle.

**"Electrically Safe Work Area":**

an area described on a Permit within which all electrical supplies have been isolated and made safe unless specifically listed on the permit.

**"Elevating Work Platform" (EWP):**

a vehicle mounted elevating work platform primarily designed to position personnel and their associated tools in an elevated work position. The motion of the EWP may be extensible or articulating or both in combination with rotation. For the purposes of this publication, any references to EWP refer to an insulated EWP which complies with the Electricity Association of NSW, specification ISSC 25.

**"Equipment":**

electrical equipment which includes any generator, transformer, switchgear, conductor, cable or electrical apparatus, parts of which may normally be energised at a high voltage, low voltage or 1500 volts dc.

**"Exemption Certificate 5099":**

a certificate, issued by WorkCover Authority of NSW, granting exemption from the provisions of Regulation 133A.

**"Exposed Equipment":**

equipment where approach to the normally live portion of the equipment is not prevented by a barrier, insulating material or an earthed metal shield.

**"Harmonic Filter"**

an updated term for resonant shunt

**"High Level Platform" :**

an elevated walkway and platform area that enables persons to gain access to roof top equipment, including pantographs, on rolling stock. Access to the platform, which is typically via a flight of stairs, is normally barred.

**"High Voltage":**

a voltage normally exceeding 1000 volts alternating or 1500 volts direct current. 1500 volts dc is treated as a separate case in the Electric Power System Safe Operation Manual.

**"Isolated" :**

disconnected from all possible sources of supply by opening of switches, withdrawal of circuit breakers, removal of fuses, links an/or connections, and rendered incapable of being made live without premeditated and deliberate operation.



**"Live" :**

the term applied to equipment when it is connected to a source of supply.

**"Live Line work" :**

all work performed on components of a line capable of being energised, without implementing the full protective practice of isolating, proving de-energised and earthing at the worksite.

**"Low Voltage":**

a voltage normally exceeding 50 volts alternating current or 120 volts direct current but not normally exceeding 1000 volts alternating or 1500 volts direct current. 1500 volts dc is treated as a separate case in the Electric Power System Safe Operation Manual.

**"Low Voltage Distribution System":**

a system comprising all the low voltage electric wiring, cables, overhead lines, accessories, fittings, consuming devices, control and protective gear and other equipment used by an Electricity Distributor for the purpose of the conveyance, measurement and control of electricity to one or more installations. This includes all service mains, all supply main switchboards, all air compressors for the operation of distribution switchgear, and the low voltage controls of high voltage distribution equipment. A low voltage Distribution System may also include: isolating transformers, earthing systems, changeover contactors, metering equipment, and other equipment.

**"Low Voltage Installation":**

all the low voltage electric wiring, accessories, fittings, consuming devices, control and protective gear and other equipment associated with the wiring situated in, on, or beyond any building, structure or premises to which electricity is supplied or is to be supplied through any one or more low voltage service mains from a low voltage distribution system.

Low voltage electrical equipment for ancillary lighting and power within substations is a low voltage installation.

A low voltage installation does not include:

- any part of any Low Voltage Distribution System,
- any part of any Railway Signalling Electric System, or
- any appliance, wires, fittings or other equipment connected and extending or situated beyond any electrical outlet socket:
  - i. which is installed for the purpose of connecting portable electrical appliances, fittings or other equipment; and
  - ii. at which fixed wiring terminates.

A Low Voltage Installation commences at the consumer's terminals. Generally, where supply is from the Australian Rail Track Corporation's low voltage distribution system, the consumer's terminals are deemed to be at the line side of the installation main switch. A Low Voltage Installation may also commence at a point within another installation or at a point within a Railway Signalling Electric System.

**"Low Voltage Overhead Line":**

a low voltage aerial conductor together with insulators, hardware, crossarms, or other associated electrical equipment erected, or in the course of erection, out-of-doors. A Low Voltage Overhead Line may be either part of a Low Voltage Distribution System or part of a Low Voltage Installation.

**"Maintenance Centre" (Electric Vehicle Maintenance Centre):**

a defined geographical area comprising buildings, track, overhead wiring and associated infrastructure for the purpose of maintaining electric rolling stock. Maintenance Centres may include stabling roads, elevated roads, inspection roads and high level platform roads.

**"New Work" :**

Work relating to various types of electrical equipment which involves significant alterations or additions to the existing electrical system.

These alterations may be due to

- new construction and/or
- the removal of existing electrical equipment.

**"Operating Agreement":**

A form completed and signed which is issued by one Network Operator to another, as an undertaking that the listed electrical equipment will remain isolated, proved dead and if required earthed or rail connected as appropriate until the form is returned.

The work on the listed electrical equipment is carried out in accordance with the conditions specified on the Operating Agreement and the receiving Network Operator's safety instructions and permit system.

**"Operating Diagrams":**

the set of electrical diagrams comprising 1500 volt Sectioning Diagrams, Substation AC Diagrams, Substation DC Diagrams, Reticulation and System Diagrams, Signaling and Lighting Diagrams

**"Operating Work":**

work involving the operation of switches, the opening or closing of links or other connections intended for ready removal, the removal or replacement of fuses, proving that electrical apparatus is de-energised and the earthing and short-circuiting of electrical apparatus.

**"Overhead Line":**

means any aerial conductor or conductors with associated supports, insulators and other apparatus erected, or in the course of erection, for the purpose of the transmission, distribution or conveyance of electrical energy.

**"Overhead Wiring" or "1500 Volt Equipment" or "1500V Overhead Wiring":**

all 1500 volt direct current (dc) overhead wires and associated equipment that normally conducts, isolates or may be energised with a voltage of 1500 volts dc including the secondary circuit of rectifier transformers. For the purpose of safe working distances, negative equipment which is normally at rail potential (connected to rail) is not considered to be 1500 volt equipment.

**"Permit":**

a pre-printed form which, when completed and issued in accordance with a documented procedure adopted by the contractor, gives permission to the recipient to work on or near to, or test, electrical apparatus as set out on the Permit.

**"Plant":**

includes any machinery, equipment and appliance, and any article designed for use as a component in, or as an accessory to, any machinery, equipment or appliance and includes earth moving machines and hoists.

**"Portable Earthing Equipment":**

transmission line earthing sets or substation earthing sets.

**"Portable Equipment":**

A portable rail connecting equipment set consists of an OHW Connection Clamp applied by an Operating Stick, a Rail Clamp and associated cable. The equipment is designed to be applied from ground level.

**"Proving Dead":**

the process of proving that equipment is dead.

**"Rail Connected" or "Rail Connections":**

the connection of the 1500 volt overhead wiring to the negative return rail (traction rail) in the approved manner to ensure the immediate effective discharge of electrical energy from the 1500 volt overhead wiring equipment to the rail in the event of the equipment concerned being or becoming live.

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**"Railway Signalling Electric System":**

all the low voltage electric wiring, cables, overhead lines, accessories, fittings, consuming devices, control and protective gear and other equipment associated with the wiring, installed for the operation of railway signals, points and associated control equipment to which electricity is supplied, or is to be supplied, through any one or more low voltage service mains from a low voltage distribution system.

A Railway Signalling Electric System does not include:

- any part of any Low Voltage Distribution System, or
- any part of any Low Voltage Installation.

A Railway Signalling Electric System generally commences at the secondary terminals of the isolating transformer(s).

**"Regulation 133A":**

a regulation under the Construction Safety Act 1912 which regulates the use of appliances (including cranes and plant) near overhead electrical apparatus.

**"SAFE Telegram":**

A safeworking telegram issued detailing the work, isolation, times and train alterations required for a specific possession.

**"Safe Working Distance":**

the minimum distance that must be maintained, during work, between persons, materials or equipment that are at different potentials.

**"Safety Earths"**

Safety earths are applied as close as practicable to the source of supply on each side of a worksite in order to ensure that the protection equipment operates quickly in the event of the equipment being accidentally energised.

It is not necessary that the conductors be continuous between the point at which the safety earths are applied and the worksite.

Where a number of sources of supply are connected on one or both sides of the worksite, the source of supply may be considered as being the worksite side of the "Tee" connection closest to the worksite

**"Safety Observer":**

a member of the on-site work team certified to carry out the particular live line technique being observed.

**"Spark Gap ":**

is a device used to connect specific types of 1500 V structures to rail when the potential difference between the two rises above 750 V.

**"Special 1500 Volt Work Instruction":**

the form, completed and signed, used whenever it is necessary to put electrical arrangements in place to protect staff working on live 1500 volt overhead wiring.

**"Special Train Notice (STN)":**

A safeworking document issued detailing the work, isolation, times and train alterations required for a specific possession.

**"Substation" :**

a substation, traction substation, transformer room, switchroom, sectioning hut, pole or pad mounted transformer location, containing high voltage electrical equipment.

**"Substation Earthing Set"**

a set of equipment used to electrically connect isolated high voltage equipment within ARTC's system substations to earth.

**"System Control Engineer":**

the State Rail Authority engineer in charge of the Electrical System Operators and responsible for the co-ordination of all electrical switching and system monitoring.

**"Temporary Connection":**

Temporary connections are those connections which are made via an appropriate bolted clamp arrangement to the catenary and a corresponding bolted connection to either :-

- the neutral point of an impedance bond, or
- the trackside negative bus rail at a substation or sectioning hut, or
  - directly to the traction rail in a single traction rail return area.

**"Token":**

a unique identifier (eg a key or a card), compatible with the interlocking system that is required to gain access to and from the high level platform in electric vehicle maintenance centres.

**"Track Possession":**

Sections of track which have had special train operational arrangements made to divert trains or provide alternative services so that the track is available for infrastructure works.

**"Track Possession Number":**

The identifying number allocated to an approved track possession

**"Traction Rail" (negative return rail):**

the rail(s) by which a return path is provided for the 1500 volt dc traction current from the train to the traction substation.

**"Train":**

as defined in the publication "Safeworking procedures for Engineering work" and includes any unpowered rolling stock.

**"Transmission Line Earthing Set"**

a set of equipment used to electrically connect isolated high voltage transmission line conductors together (including overhead earth wire, where installed) and to earth.

(Commonly referred to as transmission line "working or safety earths").

**"WHVI":**

the standard ARTC form, "Working High Voltage Instruction", completed and signed, used whenever it is necessary to organise the removal of supply from high voltage conductors or cables outside substations.

**"Working Earths"**

Working earths are applied to all conductors on which the work is being carried out on each side of the worksite in order to ensure equipotential conditions at the worksite. At least one set of working earths must be near the work site and positioned to be readily checked. Where safety earths are in the work area they can be considered as working earths provided that they are connected to the equipment on which the work is being carried out

**"Z.609A":**

the standard ARTC form, "Notification for the Removal of 1500 Volt Supply for Engineering Work in Electric Vehicle Maintenance Centres", completed and signed, used whenever it is necessary to carry out engineering work, other than that on vehicle roofs, in Electric Vehicle Maintenance Centres.