

600V DC Tram Electrical Safety Instructions

Procedure

ENG-PRO-ELM-0001

Document Control

Table 1: Torrens Connect Document Control

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Definitions

Table 2: Definitions

Term	Definitions
AP	Electrical Authorised Person
TC	Torrens Connect
Form C	Certificate of Isolation
NP	Electrical Nominated Person
OCC	Operation Control Centre
OHW	Overhead Wiring System
SA	Switching Attendant
SCADA	Supervisory Control and Data Acquisition
SWMS	Safe Working Method Statement
JSA	Job Safety Analysis
EMS	Electrical Maintenance Supervisor
Bond	A cable or other electrical conductor, which electrically connects items of equipment.
Buried Feeder Cable	A 600V DC cable that runs parallel to the tram network in buried conduits. The feeder cable is regularly connected to the trolley wire at Tap to trolley connections. The cable shares the distribution of the electrical current around the tram network and is sometimes known as a Helper Cable.
Buffer Section	A Buffer Section is a length of Permanently Earthed section of OHW that acts as a buffer between existing OHW and OHW being constructed.
Cant Rail	The point on the side of a railcar where the bodyside meets the roof.
Cantilever arm	The boom tube and supporting parafil cables extending from a pole, to which overhead wiring is attached and supported.
Certificate of OHW Isolation (Form C)	Also known as a "Form C". This is the Certificate issued by a switching Crew to a PRES as confirmation that the OHW equipment is isolated and earthed between the limits stated on the Certificate. The Issue of a Certificate of Isolation does not mean that tram movements are stopped on the lines concerned.
Converter Station	A converter Station takes an 11kV supply from an electricity provider and transforms and rectifies the supply to 600V DC and feeds out to the tramway Trolley Wire through



Term	Definitions
	circuit breakers.
Contact Wire	The bare solid overhead conductor that the tram pantograph makes contact with. Also known as the Trolley Wire.
De-energised	Disconnected from any live electrical equipment, but not earthed and no caution notice has been applied.
Earth	Directly connected to the ground to maintain the effective dissipation of electrical energy.
Electrified Area	The AMPRN where one or more of the tracks are electrified.
Operations Control Centre (OCC)	The OCC accommodates the Tram Controllers and equipment required to manage the Traction Power system. The Tram Controllers also control the movement of trams and any infrastructure maintenance rolling stock and communicate with drivers.
Tram Controllers	The person responsible for managing the Traction Power System.
Emergency De-energisation	A de-energisation of part or the whole of the OHW which is usually performed remotely by the Tram Controllers. The Tram Controllers will give a verbal confirmation that the power has been turned off to the OHW, but it is not able to vouch that it is safe to approach until it has been earthed.
Low Voltage (LV)	Low Voltage is defined as a voltage ranging from 120-1500V DC or 50-1000v AC.
High Voltage (HV)	High Voltage is defined as a voltage above 1500V DC or 1000v AC.
Isolation (OHW)	Isolation is the action of causing electrical sections or sub-sections to be disconnected from all sources of electrical supply by opening, locking, and fixing a caution notice to switch(es).
Jumper Cable	A length of cable with special clamps to be used as a temporary electrical connection across broken rail or pipe.
Limits of Isolation	These are the locations between which electrical power has been turned off on the OHW by the opening, locking, and attaching caution notice to switch(es). This term must Not be confused with the Term "Working Limits".
Live (energised)	Live refers to electrical infrastructure where potentially dangerous voltages may exist. Unless proved dead, earthed, and a Certificate of Isolation has been issued, all OHW and traction equipment are to be considered live, and mandatory safe approach distances apply.
Overhead Wiring (OHW)	An arrangement of wires, suspended over the tram lines, for supplying electricity to trams, together with associated fittings, insulators and other attachments including feeders, switches, and jumpers.
Person Responsible for Electrical Safety (PRES)	A trained and qualified person within a work group that receives and holds the Certificate of OHW Isolation (Form C).

Term	Definitions
Pole	A pole or mast that is used to support a cantilever or overhead wiring.
Pole number	The unique identifier number given to each pole.
Rail Industry Workers Card	A generic course designed to ensure personnel understand the inherent dangers involved in working in the rail environment.
Red Bond	A bond that will carry traction current under normal tram operations. These bonds are identified with red paint and are dangerous if damaged or detached.
Road Rail Vehicle	A vehicle that can travel on the road using rubber tyres and, on the rails, using specially lowered steel rail wheels.
Spotter	A competent Person who is suitably qualified by experience, training, or both with the sole duty of observing and warning against unsafe approach of a crane, excavator, or elevating machinery or extendable, its lifting attachments or load to OHW equipment.
Safe Approach Distance (SAD)	The minimum (safe) distance, which must normally be maintained for personal safety between an exposed, live conductor and the maximum reach of any part of the body or any object or tool (except equipment specifically designed for testing, operating or working on live conductors).
Track Machine	An infrastructure maintenance machine that is permanently mounted on rail wheels, e.g., a tamper.
Working Limits	The limits stated on a Certificate of Isolation, within an isolation that has been earthed between which it is safe and permissible to work, provided the appropriate Track Protection is in place. The limits are usually identified by structure numbers. This phrase must not be confused with the phrase "Limits of Isolation".



1 Introduction

The Adelaide Tram Rail Network operates a nominal 600V DC Electrified Tram System, which may be higher in instances of regenerative braking, over parts of its network. The Electrified Network consists of Converter Stations, the overhead wiring (OHW) and buried Feeder Cables. This document outlines the safety requirements when on or around the Electrified 600V DC Tram System.

2 Purpose

The purpose of this document is to set out how the risks to safety associated with the parts of the Adelaide Tram Network electrified at 600V DC, are managed. It gives instructions to persons required to access the Electrified Network on how to do so safely. This document addresses the specific safety requirements in the 600V DC electrified network and is supplementary and subordinate to the Tram Rules and Procedures.

3 Scope

This document applies to all persons who require to access on or near an Adelaide Tram Network equipped with the 600V DC Electrification System.

Note: Local Isolation instructions apply to Glengowrie Tram Depot.

The following tram lines are electrified using the 600V DC system:

- Glenelg line, from Adelaide Railway Station Tram Stop to Moseley Square Tram Stop at Glenelg, South Terrace Siding and Glengowrie Tram Depot and Workshop.
- Hindmarsh line, from Adelaide Railway Station Tram Stop to the Entertainment Centre at Hindmarsh.
- Festival Plaza line, from the intersection of King William Street and North Terrace to the Festival Plaza Tram Stop on King William Road; and
- East Terrace line, from the intersection of King William Street and North Terrace to the Botanic Gardens Tram Stop on North Terrace.

4 Roles and Responsibilities

4.1 Tram Controller

The Tram controller is responsible for managing the Traction Power System. The Tram controller is:

- Implementation of OHW isolations.
- The point of contact to report Emergencies involving the 600V DC Electrification System.
- Has the ability to control electrical power to and from Converter Stations remotely.
- The point of contact, to whom the faults and damage to the Electrified Network must be reported.

4.2 Switching Crew

- The switching crew is a group of trained and authorised people, who carry out lineside switching, under the direction of the Tram Controller for isolations of the OHW.
- The switching crew also tests, apply, and remove earths on the OHW system.
- The switching crew is comprised of Electrical Authorised Persons (APs) and Switching Attendants (SAs).
- One AP is designated as the Nominated Person (NP).
- The NP issues the PRES with a Certificate of Isolation, Form C.

4.2.1 Electrical Authorised Person (AP)

- A person who has been trained in lineside switching and holds current certification at AP Level as detailed in Appendix 1.
- Carries out lineside switching (Switch Operator).
- Tests the OHW.
- Applies / removes local earths as required.

4.2.2 Switching Attendant (SA)

- A person who has been trained and Authorised as a Switching Attendant.
- Carries out Switching Attendant duties (Checker), under the supervision and authorisation of the AP.

4.2.3 Electrical Nominated Person (NP)

- The AP in the Switching Crew who has been nominated to direct other members of the Switching Crew, or multiple switching crews.
- Briefs the PRES on the working limits of an isolation and issue the PRES with a Certificate of Isolation, Form C.

4.3 Rail Infrastructure Manager

The Rail infrastructure manager is responsible for full content of this document and periodic reviews.

4.4 Rail Infrastructure Engineer/ Electrical Maintenance Supervisor

The Rail Infrastructure Engineer and/or Electrical Maintenance Supervisor is responsible for providing advice, making decisions and determinations on electrical matters. Evaluates Permit to Work applications to determine if an Isolation is required.

4.5 Permit to Work Coordinator

The permit to work coordinator is responsible for submitting all Permit to Work application requests to the Tram controller for evaluation of Isolation Requirements.

4.6 Person Responsible for Electrical Safety (PRES)

If a work group requires an isolation of the Overhead Wiring Equipment (OHW), then the tram controller will arrange with a switching crew for the relevant Electrical section(s) to be Isolated in accordance with 'Isolation and energization of 600V DC Tram OHW' ENG-WIN-ELM-0081. The Nominated Person, from the switching crew will issue a Certificate of OHW Isolation (Form C) for the Electrical Section(s) that has been isolated. **The person in the Work Group that holds this certificate is the PRES. The PRES:**

- Receives the Form C.
- Fully understands the working limits on the Form C.
- Briefs the work group on limits on the Form C.
- Monitors the work group to ensure adherence to Form C requirements.
- Ensures all the workgroup, tools, plant and equipment are clear of the OHW and that the workgroup now treat the OHW as live, before relinquishing the Form C.

The following personnel can undertake the Role of a PRES:

- A Person who has successfully completed the PRES course and holds a valid PRES Card issued by Torrens Connect.
- An Electrical Authorised Person.

At Glengowrie Tram Depot, Local Isolation work instructions apply to persons trained in those instructions. More details are in section 8.3 of this document.

4.7 Persons Accessing the Adelaide Tram Network 600V DC Tram Network.

Persons who access the tram network are responsible for ensuring that neither they nor their equipment comes within 3m of the OHW unless the OHW has been Isolated and Earthed and they have signed onto a Certificate of Isolation, Form C or in a depot the OHW equipment has been Isolated under local work instructions and persons are trained in those instructions.

5 Persons Required to go on or Near the Adelaide Tram 600V DC Network

5.1 Competence

You must not go on or near a tram line equipped with the 600V DC OHW system unless you hold a current Rail Industry Worker (RIW) Card or have completed the online Torrens Connect Operational Rail Induction.

In special circumstances a person without the above accreditation may be allowed on the electrified network in accordance with the Tram Rules.

5.2 Dangers of the System

Overhead Wiring, Overhead Wiring Support Equipment, Feeder Cables, Converter Stations and on trams pantographs and roof mounted equipment, are extremely dangerous and can be fatal if you touch them or go near them.

5.3 Overhead Wiring System

The following diagrams show the three typical configurations of the Tram OHW. The areas marked red denote live equipment.

All items marked in red shall be treated as being 'LIVE' at all times unless the overhead line equipment has been isolated and earthed and you have signed onto a Certificate of Isolation, Form C, after receiving a brief from the PRES who holds that Form C or in a depot the OHW equipment has been isolated under local work instructions and persons are trained in those instructions.

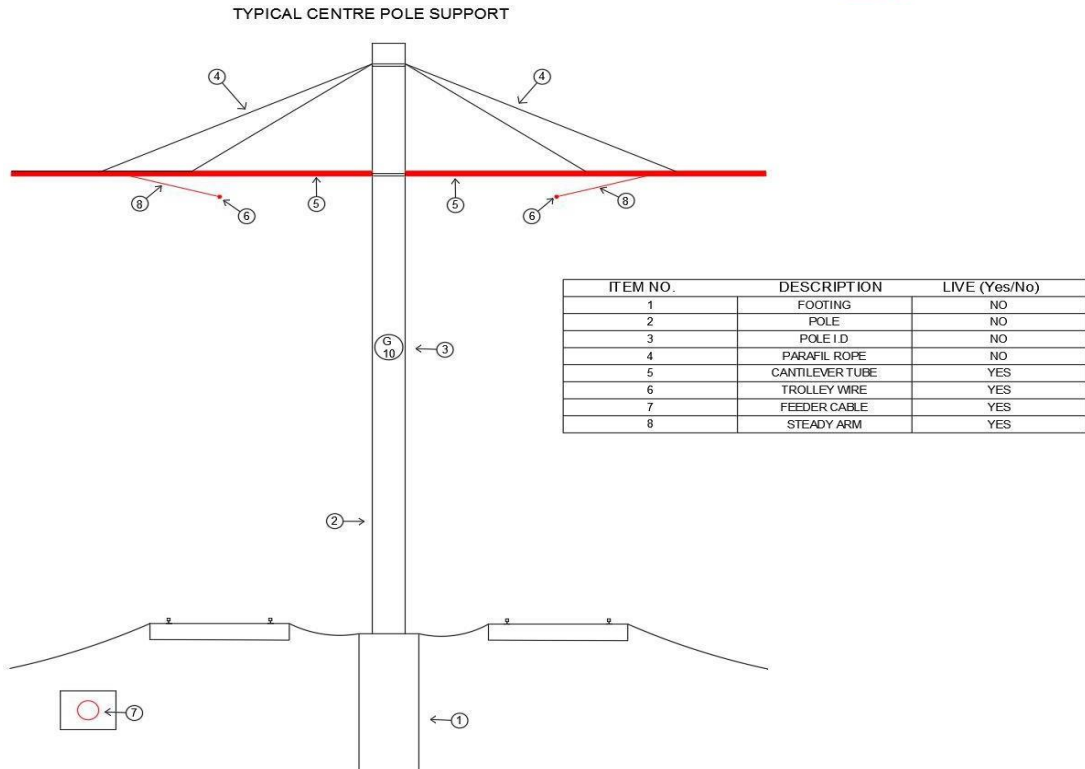


Figure 1: Typical Centre Pole Support

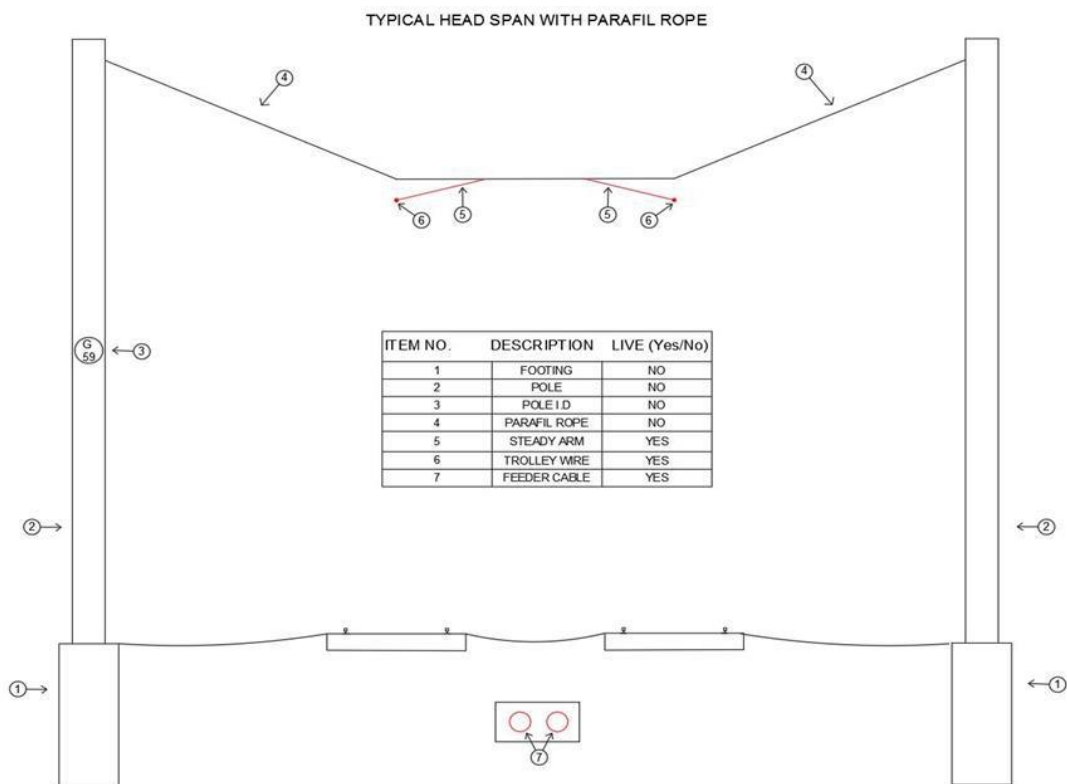


Figure 2: Typical Head Span with Parafil Rope

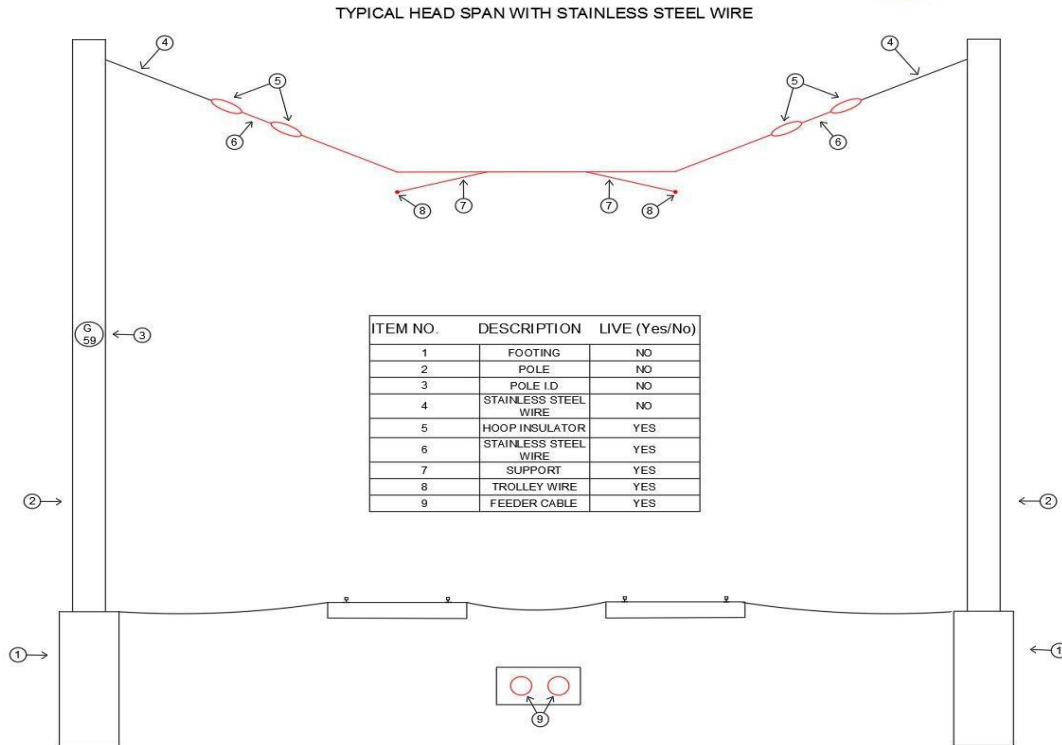


Figure 3: Typical Head Span with Stainless Steel Wire

5.3.1 Buried Feeder Cables

A 600V DC buried feeder cable runs the length of the tram line and connects to the trolley wire at regular intervals to increase the electrical capacity of the tram system.

The cable may be located under the cess or the 6 foot of the tram system and runs at a variety of depths.

The cable is accessible through a number of man holes along the length of the tram route.

Access into a man hole is not permitted unless the cable is isolated and earthed, and any other relevant precautions (confined space) are addressed. The location of the cable must be identified before any digging, driving of spikes or under boring is allowed to commence. If any of these activities are to occur within 1m of the feeder cable the Rail Infrastructure Manager must be advised. The Rail Infrastructure Manager will determine if further precautions are required.

5.4 Reporting Objects and defects to the OCC (Tram Control)

You must immediately make sure the following are reported to OCC (Tram Control) on 08 8473 0030 OR on **0458 107 315 in case of an emergency** .:

- Objects that have been thrown onto, are hanging from, or are otherwise touching the OHW.
- Damage to the OHW.
- OHW that is smoking, excessively sparking or fusing.
- Broken or displaced along-track conductors.
- Broken or displaced wires connected to the OHW.
- A broken or parted rail.

- A broken or defective bond, in which case you must tell the Tram Controller the colour of the bond.

You must not touch or approach any objects that have been thrown onto, are hanging from, or are otherwise touching the OHW.

You must not touch the rails if they are broken or parted neither must you touch a broken or defective bond if it is marked red, nor any equipment connected to that bond.

If the damage or defect will affect the safe operation of trams, you must first report this to the Tram Controller.

6 Personal Safety

6.1 Safe Approach Distance (SAD)

You must not place yourself or any equipment above or closer than 3m in any other direction of OHW except in the following circumstances:

- The OHW has been isolated and earthed **and** a PRES holds a certificate of Isolation (Form C) for the section of OHW you need to work above or approach within 3m in any other direction **and** the PRES has briefed you the working limits of the Form C **and** you have signed onto the Form C to confirm that you have understood the briefing given by the PRES.
- In limited circumstances work will be permitted between 3m and 1m of the live OHW, but no closer than 1m under any circumstances. In these cases, a written Safe Working Method Statement (SWMS) or Job Safety Analysis (JSA) must be provide that has a separate section that details what measures will be in place to ensure the 1m exclusion zone will not be breached and the safety of all personnel. The SWMS must be signed off by the Rail Infrastructure Manager.
- A Depot or part of the Depot has been Isolated in accordance with Local Instructions.

7 Communicating with the Tram Controller

You can contact the Tram Controller on **08 8473 0030** for general communications and on **0458 107 315** in **case of an emergency**.

When contacting the Tram Controller, you must state:

- If you are making an emergency call.
- Your name and job title.
- The tram line you are on.
- The location, for example the nearest bridge, tram stop or signal number.
- The number on the nearest tram pole.
- The telephone number on which you can be contacted.

8 Isolation of the OHW

Note: An Isolation of the OHW does not necessarily mean that rollingstock has stopped running, nor does it allow access on or near the line. The processes described in the Tram Rules and Procedures must be followed for accessing the Tram Corridor.

8.1 Emergency Isolations

If an Emergency Isolation is required then you must contact the Tram Controller and request the Emergency Isolation. The Tram Controller will make arrangements for the Emergency Isolation in accordance with document **ENG-WIN-ELM-0081**, 'Isolation and energization of 600V DC Tram OHW'.

8.2 Planned Isolation

Planned Isolations are to be in accordance with document **ENG-WIN-ELM-0081**, 'Isolation and energization of 600V DC Tram OHW'.

8.2.1 Applying for an Isolation of the OHW.

Except in an Emergency, all Isolations must be planned in advance. A Permit to Work application (ENG-PRO-PTW-0001) must be completed to work in the Adelaide Tram Network. When the access application is for an electrified Line the Permit to Work Coordinator will pass the application onto the Electrical Maintenance Supervisor (EMS) for determination if an Isolation is required. It is important that the Applicant includes their SWMS and any other documentation in order that the EMS can evaluate the request. If the EMS determines an Isolation is required, the applicant must appoint a PRES.

8.2.2 Issuing a Certificate of OHW Isolation- Form C

When the Nominated Person has made sure that the OHW has been isolated and earthed, he will hand the PRES a Certificate of OHW Isolation – Form C. The Nominated Person must make sure the PRES understands:

- The working limits on the Form C.
- Where live equipment is adjacent to, or crosses over earthed equipment, which equipment is live and which equipment is earthed.
- The date, time, and location that the Form C is to be returned by the PRES to the Nominated Person.
- The issue of a Form C does not mean that all rollingstock movements have been stopped.
- The PRES must sign Part 1 of the Form C to show that they understand the conditions.
- The PRES must make sure that everyone in the Work Group understands the conditions shown on the Form C. All members of the Work Group must sign onto Part 4 of the Form C to confirm that they understand these conditions, before work is allowed to start.

8.2.3 During The Work

The PRES must remain with the Work Group and must keep the Form C until:

- Work is completed and the PRES and all members of the work group the PRES is responsible for are clear of the OHW and have signed off on the Form C, or
- The PRES is relieved by another PRES, in which case the Form C must be handed over to the new PRES and both people must sign Part 2.

The new PRES must tell the Nominated Person (either directly or through the Tram Controller) that they have taken over the duties from the previous PRES.

The PRES must immediately tell the Nominated Person (either directly or through the Tram Controller) if the Form C is lost. The Nominated Person will arrange to issue another Form C endorsed "Duplicate". The PRES must ensure that all members of the Work Group sign onto the Duplicate Form C.

8.2.4 Changes of Personnel within the Work Group

The PRES must make sure that each person coming onto the site of work after the Form C has been issued, fully understands the conditions shown below before being allowed to start work:

- The working limits on the Form C.
- Where live equipment is adjacent to, or crosses over earthed equipment, which equipment is live, and which is earthed.

Each person must sign onto Part 4 the Form C to confirm they understand the conditions.

8.2.5 When the work is suspended or completed.

When the work is suspended or completed, the PRES must make sure all personnel and materials are removed from, and are no closer than 3 metres from, the OHW.

The PRES must then:

- Instruct each person in the work group to treat the OHW as live and dangerous to life.
- Require each member of the work group to sign Part 4 of the Form C to confirm that they understand the OHW is now to be considered live and dangerous.
- Complete Part 3 of the Form C.
- Return the Form C to the Nominated Person who will countersign Part 3.

If the PRES has lost the Form C, he must tell the Nominated Person. The PRES must carry out a visual inspection with the Nominated Person to make sure all persons and material are clear of the OHW.

8.2.6 A PRES performing other duties not associated with the PRES Role:

A PRES may perform other duties that are not associated with their role as a PRES provided:

- The other duties do not take the PRES away from the Work Group.
- The other duties are not so onerous that the PRES cannot satisfactorily carry out their PRES duties.
- Their PRES duties are not so onerous that the PRES cannot satisfactorily carry out his other duties.

8.3 Local Isolations of Depots.

Local Isolation Instructions apply to Glengowrie Depot. These are contained in work instructions ENG-WIN-ELM-0004, "Isolation Procedures for Glengowrie Depot Yards & Barn and ENG-WIN-ELM-0009, "Accessing Overhead Platforms".

8.4 Access and Isolation of Converter Stations

Document ENG-MAN-ELM-0001, Substation Access Manual, describes the process and requirements for accessing Converter Stations. Document ENG-WIN-ELM-0003 describes the process for Isolating Tram Converter Stations.

9 Rail Vehicles, Track Machines and Road Rail Vehicles

9.1 Stabling of Track Machines and Road Rail Vehicles

Track Machines and Road Rail Vehicles must not be stabled under or adjacent to live Overhead Wiring equipment if the vehicle has open platforms that if accessed could put a person within 3m of the OHW, or if the vehicle is fitted with unguarded ladders that allow access to the roof of the vehicle.

9.2 Working on Trams, Track Machines and Road Rail Vehicles

You must never go above the cant rail or climb above the floor level of the driving cab, or the open upper deck of a vehicle unless one of the following applies:

- The vehicle is on a line where there is no OHW above or adjacent to the vehicle; or
- The OHW has been isolated and earthed and a PRES holds a certificate of Isolation (Form C) for the section of OHW you need to work above or approach within 3m in any other direction and the PRES has briefed you the working limits of the Form C and you have signed onto the Form C to confirm that you have understood the briefing given by the PRES; or
- The OHW has been Isolated under local Depot instructions.

9.3 Track Machines and Road Vehicles Operating on the 600V DC Tram Network.

The Overhead Line must be Isolated and Earthed for the area in which the Track Machine or Road Rail Vehicle is to On Track, Travel or Work and must be accompanied by a PRES who holds a Certificate of Isolation for the OHW unless:

- The Road Rail Vehicle complies with document ENG-ENS-NIL-0023, "Requirements for Road Rail Vehicles accessing and Operating on the AMPRN" and is displaying a valid label.
- The Track Machine complies with document ENG-ENS-NIL-0041, "Requirements for Track Machines Accessing and Operating on the AMPRN".
- **And** SWMS or similar for the Road Rail vehicle or Track Machine details how that Machine will safely Travel and Work under live 600V DCV OHW Equipment.
- **And** the machine is listed on the approved register, held by the Rolling Stock Engineer, of Road Rail Vehicles and Track Machines that are permitted to travel or Operate under live 600V DC OHW Equipment.
- The Permit to Work application must state that the intention is for the machine to travel or work under live 600V DC and quote the ID number of the machine so it can be cross referenced to the register.

10 Cranes, Excavators and Elevating Machinery

In accordance with the principles of AS2550 Cranes, Excavators and Elevating Machinery working on the Electrified Adelaide Tram Network require an Isolation of the OHW equipment and to be accompanied by a PRES who holds a certificate of Isolation unless:

- No part of the crane, excavator or elevating machinery, lifting attachments or load will come above or within 3m in any other direction of the OHW.
- A spotter must be employed if the distance from the OHW is less than 6.4m.

- A SWMS /JSA must be completed.
- The SWMS/JSA must take into account any likely movements such as wind effects, mechanical or hydraulic failure, swinging of crane loads, operator error and control measures that have been implemented.

11 Other Plant Tools and Equipment

11.1 Using Long Items

Personnel must take extreme care when using or carrying long items and must make sure they do not come within 3m of live OHW.

Long items must be carried horizontally below shoulder height and, if necessary, get other people to assist.

When using ladders near OHW only ladders that are made of wood, or other non- conducting material may be used.

Ladders that are reinforced with metal attachments running along the sides must not be used.

11.2 Insulated Tools

Only Insulated tools that have been certified and tested for use on 600V DC systems are allowed to be used within 3 metres of the live OHW. The following must apply:

- The tool has an in-date test certificate.
- The operator has been trained in the use of the tool and has evidence that this training is up to date.
- The SWMS must have a section detailing how the insulated tool is to be safely used within 3m of the live OHW. This SWMS must be signed off by the EMS/ Rail Infrastructure Engineer.

12 Water Use in an Electrified Area

Nozzles or similar fittings shall not be used where it could be possible to direct water above or within 3m in other directions of live equipment.

All hoses and fittings shall be inspected prior to use to ensure that they are in good condition. A faulty hose including fittings shall not be used in electrified areas.

When hosing special care shall be taken to ensure that the water stream does not come within 3m or above live OHW, or electrical equipment mounted on trams.

13 New OHW Equipment on Non-Electrified Lines

If new OHW Equipment is being installed, or an electrified area is being extended, the instructions in this document will not apply until the equipment has been declared live. You will be notified of this by the publication of an Energisation Notice.

The project responsible for the construction or extension of the new OHW equipment is responsible for setting up their own Electrical safety System prior to the OHW being declared live.

14 Associated Documents

Table 3: Associated Documents

Document ID	Title
OPS-MAN-NTW-0002	Tram Rules – Volume 4 Work on Track Rules and Procedures
ENG-PRO-PTW-0001	Permit to Work
ENG-WIN-ELM-0009	Accessing Overhead Platforms
ENG-FRM-ELM-0004	Certificate of OHW Isolation (Form C)
ENG-WIN-ELM-0081	Isolation and energization of 600v DC Tram OHW
ENG-WIN-ELM-0004	Isolation Procedures for Glengowrie Depot Yards and Barn
ENG-WIN-ELM-0003	Isolation of Tram Converter Stations
ENG-MAN-ELM-0001	Substation Access Manual
ENG-ENS-NIL-0023	Requirements for Road Rail Vehicles Accessing and Operating on the AMPRN
ENG-ENS-NIL-0041	Requirements for Track Machines Accessing and Operating on the AMPRN
	Electricity Act/Regulations 23A (3) & Schedule 6
	AS 3000 Electrical Installations
	AS 4836 Safe working on low-voltage electrical installations
	AS/NZS 4292.4:2006 Railway Safety Management Part 4: Signalling and Telecommunications Equipment
	AS/NZS 2550.1-11 Cranes, hoists and winches – Safe Use
	AS/NZS 4576 Guidelines for Scaffolding
	Work Health and Safety Act/Regulations 2012
	Electricity Act 1996
	Electricity (General) Regulations 2012
	Electricity (Principles of Vegetation Clearance) Regulations 2010

Document ID	Title
	Energy Networks Association – National Electricity Network Safety Code ENA DOC 001-2008 and ENA NENS 01-2006
	National Rail Safety Law Act/Regulations 2012
	Joint Safety Guideline Working Safely Near Overhead Power lines
	Hazard and Incident Reporting Module



15 Appendix 1

Authorised Persons - Accreditation Category Descriptions

Category	Switchgear	Description
1	11 kV Tram Substation Switchgear	This category permits switching in 11 kV plant and equipment, and tram substation switchgear.
2	600V DC Tram Substation Switchgear	This category permits switching of 600V DC tram plant and equipment and tram substation switchgear.
3	600V DC Tram OHW Isolators	This category permits switching of all 600V DC lineside tram OHW isolators
3 a	600V DC Tram OHW Isolators – Glengowrie Depot	This category permits switching of 600V DC tram OHW isolators in Glengowrie Depot
4	SCADA Switching/Monitoring and supervision in OCC	This category permits the monitoring, switching and supervision of the train and tram traction systems using SCADA in the OCC

