



**Network Safety Management System
SPECIFICATION
SAF/SPC/5178/ELE/NET**

**High Voltage Electric Traction
System—
Working in Electrified Areas**

Version 2.0

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Authorisation

Approved by: Manager Network Electrical Asset Management and Engineering

Authorised by: Head of Network Asset Management

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Revision History

Version	Issued	Details	Approved
1.0	08-09-2014	First publication	VP Network Operations
2.0	01-02-2018	<p>Complete administrative and technical review:</p> <ul style="list-style-type: none"> Document title changed (previously 'Working in the Electrified Area'). Added Glossary of Terms. Inclusion of 'Competencies'. Inclusion of 'Role Definitions'. Referenced document numbers updated. Form AE/AT replaced with 'Electric Blockage'. Replaced "Linesmen" with "Linespersons". Replaced "Train Controller" with "Network Control Officer (NCO)". Replaced "trains" with "rail traffic" where the usage context permitted. Module 1: Updated Figure 1-1. Added clause 6.2 Working with Height-Limited Plant and Machinery. Added clause 6.3 Callemondah ON TRAIN REPAIR Facility. Section 8 wording changes to enable flexibility in permit management. Section 9 bonding requirements prior to Form C issue. Module 2: Removed Figure (photograph) of "Example Limit of Isolation". Updated clause 4.8.1.2 Process. Module 3: Clause 4.4 Figure 3-1. Clause 4.5.2. Isolation Pack Content. Clause 4.10 De-Energised Equipment ("floating sections") included. Module 4: Updated clauses 4.1 and 4.1.1. Added Table 4-1 Minimum requirements for earths during an isolation. Updated Figures 4-1 and 4-2. Added Figure 4-4. Clause 4.5 Buffer Sections description added. Clause 4.6 Bonding requirements added. Module 5: Updated clause 3.3. Removed "Preparation of Switching Sheets". 	Scott Jamieson

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Terminology

Shall or Must

Indicates a statement is mandatory to achieve compliance with this Standard.

Should

Indicates a statement is preferred (considered best practice,) but is not mandatory.

May

Indicates the existence of an option.

Competencies

The roles outlined in this Specification shall be carried out by workers who have been trained and deemed competent to undertake the necessary tasks and associated responsibilities.

Abbreviations

AP	Authorised Person
DNOB	Do Not Operate Board
ECO	Electric Control Operator
GIS	Gas Insulated Switchgear
HV	High Voltage (AS/NZS 3000)
LV	Low Voltage (AS/NZS 3000)
NCL	Network Control Leader
NCO	Network Control Officer
NP	Nominated Person
OHLE	Overhead Line Equipment
OTR	On Train Repair
SMS	Safety Management System
SNP	Subsidiary Nominated Person
SWMS	Safe Work Method Statement

Role Definitions

Authorised Person (AP)

An Authorised Person — for the High Voltage electric traction system — means a person who has received training and assessment to be responsible for the electrical safety of workers performing work that involves contact with, or being near to, the electric traction infrastructure.

Manager Network Electrical Asset Management and Engineering (Aurizon Network) shall determine the training and assessment requirements for Authorised Persons.

Authorised Persons may supervise work with a reduced electrical exclusion zone of **1.3 metres** from **LIVE** equipment with the appropriate risk control measures in place.

Electric Control Operator (ECO)

The Electric Control Operator is the worker who monitors, manages and controls the power supply to the overhead line equipment and is responsible for controlling all switching operations and isolations of High Voltage electric traction infrastructure:

- Blackwater ECO controls the Blackwater System;
- Goonyella ECO controls the Goonyella System.

Form B Holder

The Form B Holder is a qualified Nominated Person Category 1 / 2 or a Trainee Nominated Person under the direct supervision of a qualified Nominated Person Category 1 / 2 who is responsible for:

- Development and issue of the Isolation Works Planner;
- The isolation process in conjunction with the Electric Control Operator;
- The field copy of the Form B – Authority for Testing, Earthing; and
- Issuing Permits to Work Near (Form C) and Access Permits.

The Form B Holder is the only person who shall communicate the details of the Form B with the Electric Control Operator during the isolation and as such shall follow the Electric Control Operator's instructions.

Instructed Person

An Instructed Person — for the High Voltage electric traction system — means a person who is acting under the direct supervision of an Authorised Person.

Instructed Persons may work with a reduced electrical exclusion zone of **1.3 metres** from **LIVE** equipment with the appropriate risk control measures in place.

Network Control Leader (NCL)

The Team Leader in the Network Control Centre. For the purpose of this Specification, where the electrified area is in a Yard, the term *Network Control Leader* shall be read to mean *Network Yards Leader*.

Network Control Officer (NCO)

A Competent Worker who manages and authorises the safe and efficient movement of rail traffic within a defined area. For the purpose of this Specification, where the electrified area is in a yard, the term Network Control Officer shall be read to mean Network Area Controller.

Nominated Person (NP)

A Nominated Person is a person who is qualified and approved by Aurizon Network to switch, test, apply earths and issue permits depending on the category of their qualification, i.e. Category 0, 1 or 2.

Nominated Persons are deemed to be Authorised Persons by Aurizon Network.

OTR Switching Operator

The OTR Switching Operator is a person who is qualified and authorised to carry out switching operations for isolation of the Callemondah On Train Repair (OTR) Facility.

Permit Recipient

A Permit Recipient is a person who has been authorised by the Manager Network Electrical Asset Management and Engineering (Aurizon Network) to receive Access Permits for work on:

- Substation Equipment as specified by a Switching Sheet;
- Trackside Overhead Line Equipment under a Form B.

Safety Observer

A safety observer or “spotter”, for the operation of operating plant, means a person who—

- a) observes the operating plant; and
- b) advises the operator of the operating plant if it is likely that the operating plant will come within an electrical exclusion zone for the operating plant for an overhead electric line.

Typically this is a person who has undergone specific training and is competent to perform the role in observing, warning and communicating effectively with the operator of the operating plant.

An Authorised Person can perform this role.

Subsidiary Nominated Person (SNP)

A Subsidiary Nominated Person is a qualified Nominated Person, acting under the instructions of the Form B Holder or the Access Permit Recipient.

Switching Assistant

A Switching Assistant is a person who is competent to assist a Nominated Person or Subsidiary Nominated Person during switching, testing and earthing activities.

Untrained Person

An Untrained Person means a person who is not an Authorised Person or an Instructed Person for the High Voltage electric traction infrastructure. An electrical exclusion zone of **3 metres** applies to Untrained Persons — see MODULE 1 Figure 1-1.

Glossary of Terms

Buffer Sections

Buffer Sections are additional isolated subsections directly adjacent to a worksite where an Access Permit is planned. They provide a control measure to mitigate the consequence of pantographed rail traffic breaching an isolation point during Working ON the High Voltage Electric Traction equipment.

Complete Closure

A Complete Closure isolation follows the planning process and satisfies the following criteria:

- From Neutral Section to Neutral Section, or Neutral Section to End of Line;
- Complete electrical sections only;
- All adjacent tracks shall be isolated;
- Last less than 7 days.

(see also 'Partial Closure')

Dedicated Earthing Point (DEP)

Connection point on the OHLE equipment specifically designed for the mechanical connection of Operator Earths and or Working Earths.

Electric Blockage

Process carried out between the ECO and the relevant NCO to identify the lines and tracks affected by an electrical isolation of the OHLE system.

This may be appropriate for electric trains only, or all rail traffic dependent on the requirements. Electric Blockage may be carried out using approved electronic means in the UTC system or paper based AE/AT forms with the blockage applied manually by the NCO or Area Controller.

Height-Limited Plant and Machinery

Plant or machinery which has been fitted with an approved height-limited system and certified and approved by the Aurizon Plant Engineering Leader.

Height-Limited Plant and Machinery mandatory conditions of work within the **3 metre** Electrical Exclusion Zone:

- Authorised Person to supervise the operating machine;
- Completion of the approved Prestart Checklist for Plant fitted with Height Limiters;
- The approved and current Safe Work Method Statement for the activity is onsite;
- Plant may not come closer than **1.3 metres** to the OHLE.

Isolation Works Planner

Isolation Works Planner documents all the tasks and resources associated with the implementation of the isolation. It is produced by the NP Form B Holder and includes but is not limited to:

- Isolators to be operated, Earth locations;
- Any approved Permit worksite locations;
- Nominated Persons and other responsible switching personnel.

Operator Earths

Operator Earths are suitably rated earths connected to high voltage conductors at locations that enable the worksite to be de-energised in the shortest possible time in the event of inadvertent re-energisation. They shall be—

- clearly identified by the attachment of a DNOB in a prominent position; and
- applied prior to the issue of any permits (Form C or Access / Test Permit).

Partial Closure

A Partial Closure isolation follows the planning process but does not satisfy the conditions for a Complete Closure Isolation or an emergency.

(see also 'Complete Closure')

Working Earths

Working Earths are suitably rated earths applied by or under the instructions of the Access Permit Recipient (NP qualified). All Working Earths shall be recorded on the Access Permit.

MODULE 1 – BASIC SAFETY REQUIREMENTS FOR ALL WORKERS

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1 Purpose

The purpose of this Module is to outline the basic safety requirements for all personnel in Aurizon Network's High Voltage (HV) electrified areas.

2 Scope

This Module applies to all personnel working or walking in the Aurizon Network's HV electrified areas.

3 Associated Documents

Document Number	Document Title	Document Library
Legislation	Electrical Safety Act 2002 (Queensland)	Queensland Government
04-PRI-014	SHE Risk Management	Aurizon SMS
AN 2007 of SAF/STD/0148/SWK/NET	Network Communication	Network SMS
SAF-SPC-5181-ELE-NET	High Voltage Electrical Traction System – Training Requirements	Network SMS
SAF-FRM-5200-ELE-NET	Request to Work In Electrified Areas	Network SMS
NET-ELE-PRO-001	Technical Procedure – Isolation of Callemondah On Train Repair Facility Overhead Line Equipment	iN-Gauge
NET-ELE-RD-5177	Electric Traction – Useful Terms & Definitions	iN-Gauge
NET-ELE-BI-1425	Electric Control Room Instructions	iN-Gauge

4 Legislation

The Electrical Safety Act 2002 (Queensland) and associated documents apply.

5 Safety Principles

Workers shall always treat the HV electric traction infrastructure as **LIVE** and **DANGEROUS**.

Overhead line equipment, power systems equipment, pantographs and roof-mounted electrical equipment on trains are extremely dangerous and can be fatal if you touch or go near to them, or if you allow anything to touch or go near to them. You shall treat these items as being **LIVE** at all times.

No work shall commence within **3 metres** of the overhead line equipment without the correct level of approval. Approvals depend on the type of work activity to be performed within the electrified areas as outlined within this Module.

6 Electrical Exclusion Zones

6.1 General

The Electrical Safety Act 2002 (Qld), Electrical Safety Regulation 2013 (Qld), and the associated Statutory Codes of Practice specify exclusion zones for work around **LIVE** electrical equipment.

Aurizon Network's electrical exclusion zone for **Untrained Persons** is **3 metres** from any **LIVE** electric traction infrastructure — see Figure 1-1.

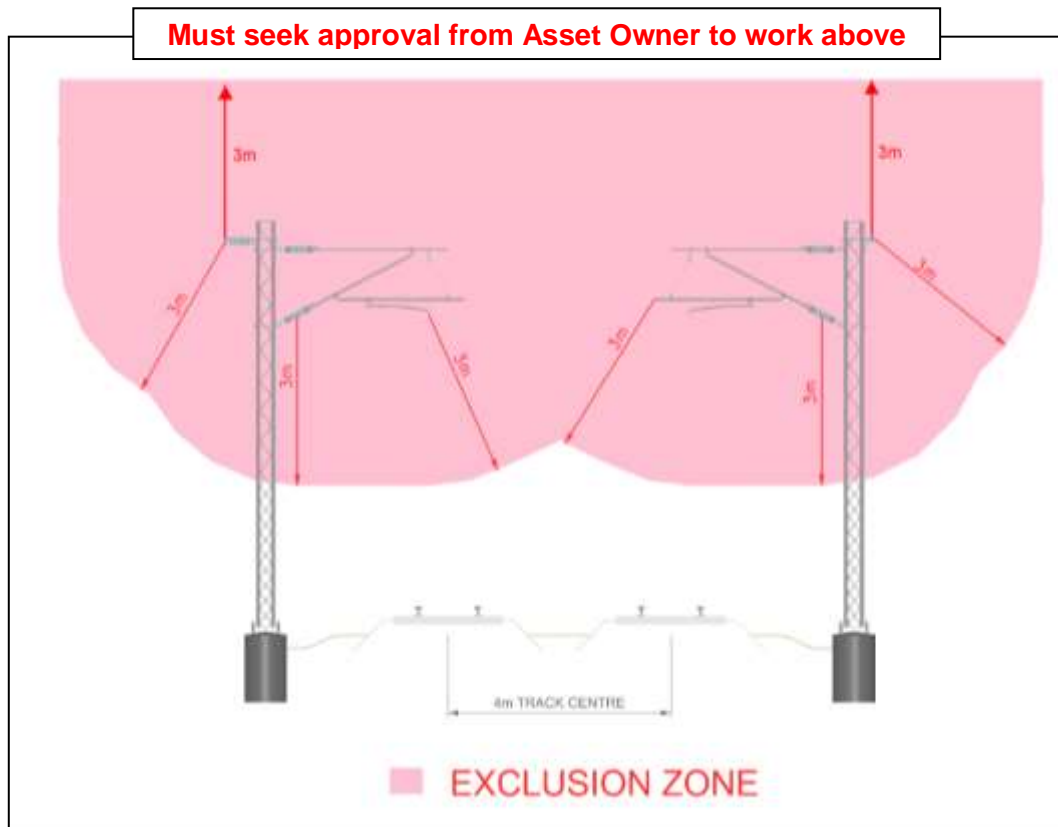


Figure 1-1 Electrical Exclusion Zone

If there is a potential for work — including the use of any plant, tools, or materials — to come within the **3 metre** electrical exclusion zone, there must be appropriate risk control measures in place before work commences.

Some of the appropriate risk control measures are as follows:

- Form C Permit to Work NEAR;
- Access Permit;
- Approved Safe Work Method Statement;
- Aurizon Authorised Person;
- Plant fitted with an Aurizon approved height limiting device;
- Aurizon Authorised Person performing the role of a Safety Observer.

Work must not be carried out **above LIVE** High Voltage electric traction infrastructure unless a written Safe Work Method Statement (SWMS) has been approved by the appropriate

Aurizon manager responsible for the proposed works, and the Manager Network Electrical Asset Management and Engineering (Aurizon Network) has formally approved the works.

Any work which is planned to encroach on the **3 metre** electrical exclusion zone shall comply with the conditions described in MODULE 3 PLANNING INSTRUCTION – Section 4.3 Application to Work in the Electrified Area.

Special conditions apply to the use of height-limited plant including—

- mandatory prestart and functional checklist for height limit controls;
- working in proximity to structures such as bridges and overpasses where there may be reduced wire clearances;

(see MODULE 1 Clause 6.2 Working with Height-Limited Plant and Machinery)

Advice from Aurizon Network's Traction Engineering Staff must be sought should there be any doubt in relation to the Electrical Exclusion Zone and separation requirements.

NOTE: Workers carrying out certain authorised activities (e.g. Rail Traffic Crew standing on locomotive footplates, or track workers walking along the track) who have received additional skills training relevant to the type of activity being performed, may be able to encroach the **3 metre** exclusion zone with relevant restrictions around the specific access needs.

6.2 Working with Height-Limited Machinery

Plant and machinery fitted with height-limiting devices shall be approved and certified by the Aurizon Plant Engineering Leader (Aurizon Network Operations) as being suitable for work in Aurizon Network's electrified areas.

The electrical exclusion zone for plant and machinery fitted with height limiting devices and which are operated by **Instructed Workers** is **1.3 metres**.

In all cases, if work has the potential to encroach on the **3 metre** electrical exclusion zone (see Figure 1-1), an **Authorised Person** shall be in place at all times to supervise the electrical safety aspect of the work. The **Authorised Person** shall have an approved **Safe Work Method Statement (SWMS)** in place.

Plant and machinery with either fixed or moving parts—

- that are height-limited to a maximum of **3 metres** above ground level will be accepted to operate in all of Aurizon Network's electrified areas.
- that are height-limited to greater than **3 metres** but less than or equal to **3.4 metres** above ground level shall not operate within **300 metres*** from an overhead bridge (road, rail, or pedestrian).

* Due to the potential of a reduced wire height in the vicinity of these structures.

6.3 Callemondah ON TRAIN REPAIR Facility

Isolation and earthing at the Callemondah On Train Repair (OTR) Facility will be carried out by the OTR Switching Operator who is authorised to undertake switching operations specific to this facility. This role is described in detail in *NET-ELE-PRO-001 Technical Procedure – Isolation of Callemondah On Train Repair Facility Overhead Line Equipment*.

7 Safe Work Method Statements

Working on and around the **LIVE** electrified track is classed as **High Risk Construction Work** and a Safe Work Method Statement (SWMS) must be in place.

A Safe Work Method Statement shall be a written statement for the activity to be performed in the **LIVE** electrified area. It shall be prepared by or under the direction of the relevant manager for the activity and shall contain all of the following:

- a) The activity to be performed.
- b) The specific control measures that the relevant manager proposes to use to discharge their work health and safety duty for the activity.
- c) The way the relevant manager proposes to perform the activity, including how the control measures are to be used.
- d) How the effectiveness of the control measures shall be monitored and reviewed.

An example of how the effectiveness of a control measure may be monitored:

Before work starts each day the Authorised Person and plant operator shall review the activity and the Safe Work Method Statement and conduct a pre-start brief for all workers involved in the activity.

The Safe Work Method Statement shall be signed off by the appropriate Line Manager who has the level of authority to sign off the risk as assessed when complying with *04-PRI-014 SHE Risk Management*.

The Safe Work Method Statement shall outline sufficient control measures to ensure the electrical safety of workers, plant and materials.

A Safe Work Method Statement may be a generic work method statement prepared for workplaces where the activity is to be performed in the same way in the same or similar circumstances.

8 Working During Isolations

All isolations shall be planned and approved in advance. To work during a Planned Isolation, work requestors and planning teams shall comply with the approved Isolation Planning process and timeframes as outlined in MODULE 3 PLANNING INSTRUCTION.

Electrical safety advice can be sought from Traction Engineering Staff.

8.1 Form C – Permit to Work NEAR

The planning process shall determine which workgroups are to be issued with a Form C – Permit to Work NEAR.

Form C – Permit to Work NEAR may be issued in either paper or approved electronic format.

An Authorised Person shall be appointed by line management. The Authorised Person is responsible for—

- receiving, transferring, and surrendering the Form C – Permit to Work NEAR;
- the electrical safety of the workers;
- giving a pre-start safety brief to the workers;
- visibly marking the worksite limits;
- reporting any contact with High Voltage infrastructure.

If contact is made with the High Voltage electric traction infrastructure, the Authorised Person shall contact the Form B Holder or Electric Control Operator (ECO) immediately.

8.2 Issuing Form C – Permit to Work NEAR

The Form B Holder or Subsidiary Nominated Person issuing a Form C – Permit to Work NEAR shall—

- check the Authorised Person's credentials (where on-site paper permit is issued);
- communicate worksite electrical safety information to the Authorised Person. This shall include, but not be limited to:
 - isolation duration and times;
 - worksite limits;
 - any nearby **LIVE** equipment and hazards.
- inform the Authorised Person of the rules associated with the Form C – Permit to Work NEAR.
- communicate the Authorised Person transfer process.
- ensure that the Authorised Person understands and completes the AP Acceptance declaration

8.3 Receiving the Form C – Permit to Work NEAR

Only an Authorised Person can receive permits from a Form B Holder or Subsidiary Nominated Person.

Authorised Persons receiving Form C – Permits to Work NEAR shall—

- satisfy the Form B Holder / Subsidiary Nominated Person of their credentials;
- follow the Form B Holder / Subsidiary Nominated Person's instructions;
- complete the Authorised Person Declaration either electronically or in person and advise the Form B Holder / Subsidiary Nominated Person;
- remain on-site whenever work is being carried out;
- transfer the permit only to another Authorised Person;

- visibly mark the worksite limits;
- ensure all workers are fully briefed on the electrical safety aspects for the work activities to be undertaken, including any **LIVE** infrastructure adjacent to the worksite.

8.4 Transferring Form C – Permit to Work NEAR

An Authorised Person may transfer the permit as required, however an Authorised Person can only be relieved by another current, competent Authorised Person.

It is the responsibility of the AP being relieved to confirm the qualification and currency of the relief AP prior to transfer commencement. If this cannot be achieved, the responsible AP must inform the Form B Holder or ECO immediately.

The transfer shall be documented either on the paper Form C – Permit to Work NEAR, or within the approved electronic system.

The relief Authorised Person shall inform the Form B Holder or ECO immediately following the transfer.

8.5 Surrendering the Form C – Permit to Work NEAR

The Authorised Person shall—

- ensure all workers and materials are clear of the track and treat the HV electric traction infrastructure as **LIVE** and **DANGEROUS**; and
- complete the Surrender Statement either electronically, or as per Part 3 of the Form C – Permit to Work NEAR where the paper version is used.

The Form B Holder / Subsidiary Nominated Person shall—

- confirm that the Authorised Person surrendering the Form C – Permit to Work NEAR is the duly appointed Authorised Person;
- confirm with the Authorised Person that no contact has been made with High Voltage electric traction infrastructure;
- confirm the Authorised Person has understood the Clearance Declaration of the permit and has advised their workers that the Form C – Permit to Work NEAR and all associated access has been cancelled;
- confirm the Authorised Person has completed the Clearance Declaration;
- instruct the Authorised Person that the overhead line equipment shall now be regarded as **LIVE** and **DANGEROUS**.

9 Bonding

Temporary bonds may be required to ensure electrical safety during rail and traction construction works. Bonding requirements are task specific, and differ depending on the location and proximity to Electric Traction infrastructure. Work requestors and planning teams shall comply with the bonding requirements as outlined in MODULE 4 EARTHING – Section 4.6 Bonding.

Where Temporary bonding is deemed necessary for an activity, any Form C - Permits to Work NEAR shall not be issued for that specific activity until the approved temporary bonding has been completed.

Advice from Aurizon Network's Traction Engineering Staff must be sought should there be any doubt in relation to bonding requirements.