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Technical Note - TN 073: 2015

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Subject: Withdrawal of EP 00 00 00 16 SP Electrical Power System Signage

This technical note is issued by the Asset Standards Authority as a notification to remove from use the following RailCorp documents:

- EP 00 00 00 16 SP Electrical Power System Signage, Version 2.1

ASA standard T HR EL 00006 ST Electrical Power System Signage, Version 1.0 supersedes this document.

Authorisation:

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Superseded by T HR EL 00006 ST

Engineering Specification
Electrical

EP 00 00 00 16 SP

ELECTRICAL POWER SYSTEM SIGNAGE

Version 2.1

Issued May 2013

Owner:	Chief Engineer, Electrical		
Approved by:	Neal Hook Chief Engineer Electrical	Authorised by:	Neal Hook Chief Engineer Electrical

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Engineering Specification

NSW Transport RailCorp

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Document control

Version	Date	Summary of change
	November 2009	Last Technical Review
2.0	May 2010	Application of TMA 400 format
2.1	May 2013	• Update references section of RailCorp Documents and Drawing • Update section 6.3, add " High Voltage Aerial Lines And Cables Electrical Cable Route Markers" • Update section 6.7, to include "Substations Confined Space - Danger Sign – With Arrow" • Add new section 8.10 " Electrical Permit – Warning Sign" • Update references drawing

Superseded by T HR EL 00006 ST

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1 Scope

This document identifies minimum compliance standards for safety and safety related signage that shall be used in and around railway system substations, sectioning huts, distribution substations and LV lighting in tunnels.

This version of the document does not include signage that is for operating within substations. It does cover the safety signs that are mandatory and provide a warning to both staff and the general public that a Danger exists and that caution should be taken in that area

Signage for other railway power system, locations, including Overhead Wiring and HV aerial lines, shall be included in later versions of this document.

This document provides general guidance for selection and placement of signage and includes judgement criteria to assist in determining whether action is required for amendment to pre-existing signage.

Signage recommended within this document will be available through the Corporations stores and procurement system.

2 Application

If signage installed prior to the issue of this document is in good condition and meets the essential purpose of signage as defined in this document then they may remain in service. New and replacement signs shall be as stated in this document.

This document covers minimum practice and does not restrict the use of additional warning, hazard and emergency signs where additional local hazards have been identified.

Where equipment manufacturers have supplied equipment with various hazard warnings and operating instructions attached, these warning signs should remain on the equipment, provided they do not impede their operation or provide misleading or contradictory information.

Where signs are developed because of a specific need not covered by this document then the sign is to be manufactured in accordance with the relevant Australian Standard.

For the purpose of safety the signage that covers 1500V dc is to be dealt with in the same manner as high voltage.

3 References

3.1 Australian Standards

The following Australian Standards are either referenced in this document or can provide further information.

AS 1319:1994	*Safety signs for the occupational environment*
AS 2067:2008	*Substations and high voltage installations exceeding 1 kV a.c.*
AS 2293.1:2005	*Emergency escape lighting and exit signs for buildings*
AS 2444	*Portable fire extinguishers and fire blankets, selection and location*
AS 2676.1:1992	*Guide to the installation, maintenance, testing and replacement of secondary batteries in buildings - vented cells*

Superseded by T HR EL 00006 ST

AS 2700S:1996 (R13) Colour standards for general purposes – Signal Red
AS/NZ 3000:2007 Electrical installations / Australian wiring rules

3.2 RailCorp Documents and Drawings

The following RailCorp documents and drawings are either referenced in this document or can provide further information.

A10-14-N032 Safety Identification and Signage
SMS-06-EN-0553 Electrical Hazards and Warnings
SMS-06-GD-0268 Working Around Electrical Equipment
SMS-06-GD-0035 Confined Spaces
EP 00 00 00 07 SP Requirements for Handling & Disposal of Material Containing PCB (Polyclorinated biphenyls)
EP 99 00 00 01 SP RailCorp Substation Minimum Construction Standard
EP 99 00 00 07 SP Substation Fencing
EL0008409 33kV / 500 - 250 V Transformer Single Pole Structure Operating Notice
EL0228600 Substations Earth Disc
EL0284401 Substations Confined Space – Danger Sign – With Arrow
EL0283014 Substations Confined Space – Danger Sign
EL0283015 Substations First Aid & Battery – Safety Sign
EL0283016 Substations HV Authorised Personnel Only – Danger Sign
EL0283017 Substations Personal Protective Equipment – Safety Sign
EL0283018 Substations Capacitor HV Discharge – Warning Sign
EL0283019 Substations 1500 Volt Negatives – Danger Sign (large)
EL0283120 Substations 415 Volts - Danger Sign
EL0283021 High Voltage Overhead – Danger Sign
EL0283022 Substations 11kV/415-240V Transformer – Warning Sign
EL0283023 Substations Voltmeter Test Rail – Warning Sign
EL0474383 Substations High Voltage – Danger Sign
EL0474385 Substations Electrical Emergency - Sign
EL0474387 Substations Danger High Voltage Keep Out - Fence Sign
EL0474485 Substations Danger High Voltage Keep Out - Padmount
EL0474490 Substations Danger Electrical Equipment Authorised Personnel Only
EL0474502 Substations 1500 Volt Negatives – Danger Sign (small)
EL0474613 Substations Traction Negative – Warning Sign
EL0483952 Substation Electrical Permit – Warning Sign
EL0535899 Tunnel Light Switch – Lights On Sign (Metal)

3.3 Other Documents

The following documents are either referenced in this document or can provide further information.

EC 7 (Electricity Council of NSW) Guide to the Prevention of Unauthorised Access April 1992

Superseded by T HR EL 00006 ST

4 Definitions and Abbreviations

For the purpose of this specification the definitions specified in the referenced Australian Standards apply. The following definitions should particularly be noted:

DCCB Direct Current Circuit Breaker

ESAA Electricity Supply Association of Australia

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

High Voltage A voltage normally exceeding 1000V alternating or 1500 volts direct current

Low Voltage A voltage normally exceeding 50 volts alternating or 120 volts direct current but not normally exceeding 1000 volts alternating or 1500 volts direct current

MSDS Material Safety Data Sheet

5 General

5.1 Signage Purpose

The purpose of signs on electrical infrastructure is to:

- Warn personnel of potential hazards
- Provide a deterrent for unauthorised personnel to gain access or perform unauthorised activities in the area
- Provide contact information to the general public concerning the site
- Meet any legal obligation arising from duty of care to the public and staff
- Meet the requirements of Australian Standards

5.2 General Signage Requirements

Signs must be selected, properly located and secured in the areas of concern according to the appropriate circumstances and hazards associated with a particular site. They should not contribute to any misunderstanding in relation to the potential hazards that may exist at the site or mislead personnel about safe working practices and procedures.

The assessment of the appropriateness of the signs to be used should carefully consider whether any symbol or symbolic sign used, accurately conveys the message which needs to be conveyed by the sign. It may be necessary to add words to support the message.

Safety signs draw attention to installations affecting health and safety. Where it is proposed to display a new sign or to change the location of an existing sign, employees should be informed beforehand, and an explanation given for the introduction of the new sign or the change in location of the existing one. If appropriate, local community consultation should occur to ensure maximum exposure to the change in circumstances.

Safety signs should support any initiative to restrict unauthorised access to electrical infrastructure; it does not replace those measures.

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5.3 Signage Placement

Signs should be securely installed wherever there is any risk of unauthorised access to electrical infrastructure. The following criteria are a guide in the correct placement of signage.

a) Signs shall be constructed and erected so that they do not create an additional hazard.

b) Signs shall not be placed in a position so as to create a climbing aid.

c) All signs must be removed immediately when the information they contain is no longer relevant, and replaced with more appropriate signage. It is considered that failure to observe this practice is likely to diminish the effect of all signs relating to the infrastructure.

d) All superseded signs must be removed, particularly if an obsolete telephone number or address is displayed.

e) Signs shall be installed to meet *AS 1319*, they shall be placed at 1.5 metres from the ground and at a spacing of at least every 3 fencing panels apart. Changes of height of the fence panels require additional signs.

f) Care should be taken when considering the placement of several signs in close proximity. Be aware that information overload may result with the message(s) being misunderstood, overlooked, forgotten, trivialised etc.
The visual impact of multiple messages may lead to confusion and make it difficult for the observer to distinguish individual messages.

5.4 Sign Visibility

Signs should be located where the messages are clearly visible to all persons and attract their attention so that they are easily seen and read with correct understanding.

Sign visibility will be enhanced when the predominant colour of the sign contrasts with the background colour of the immediate surroundings, eg. A white sign placed on a white wall, will be more visible if it has a red surround.

Signs should be mounted as close as practicable to the observer's line of sight in the vertical plane. For a standing adult this will be approximately 5 degrees up or down from a point 1500 mm above ground or floor level in front of the observer. A review of the fixing height of the sign should be considered as detailed in *AS 1319* where the target audience is specifically children. High voltage danger signs should be attached to at least every third panel of an installation fence, as well as on each entrance to a substation enclosure.

External or internal illumination of signs should be considered where the ambient lighting, either natural or artificial, does not provide for adequate visibility of signs. This needs to be decided on a case by case basis, and having consideration for the general amenity of the site, and the impact on neighbouring premises.

If the sign is inside an enclosure, sufficient space should exist to allow the observer to see and understand the sign and move away safely from the hazard. Signs should be installed as required by Australian Standards. Signs should, unless impractical to do so for reasons of visibility or safety, always be placed behind the fence so as to reduce the opportunity for the sign to be used as a climbing aid, and to reduce the opportunity for theft or vandalism of the sign. Signs can be mounted on a freestanding plinth or post inside the structure providing that all clearances and safety considerations are met.

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When a sign must be located externally to the site, make sure it cannot be used as a climbing aid and securely fasten it with tamper resistant fittings to prevent theft.

Safety signs that are accessible to the public may be coated with a protective anti-graffiti coating. This protective coating may be a permanent application such as Wattyl Protective & Marine Coating, Avery FasFiti or 3M anti-graffiti screen coating. The application of these coatings must be in accordance with the manufacturer's MSDS and must not cause reduction in the legibility of the sign information.

In a high vandalism area where the safety sign is mounted on the outside of the location it must be treated with anti-graffiti coating.

5.5 Signage Mounting

Signs mounted on the external side of the fence must be attached with a twisted single strand galvanised or plastic coated fencing wire, of sufficient wire gauge that it can only be removed with the use of tools. The use of stainless steel bindings may be used with additional drilling of the signs to allow for a neat finish.

Signs located on walls, poles and other fixed locations must be attached with a permanent mechanical mounting method such that it may be readily removable in the event of damage and normal deterioration.

Signs that are free standing or mounted overhead shall be placed so that they are not a hazard to pedestrians or personnel in the area.

Signs nominating equipment used for operational purposes must be mounted using a permanent bolted or screwed method. Operating signs layout and information requirements are covered by the Substation Minimum Construction Standard *EP 99 00 00 01 SP*.

6 Substation Safety Signs

6.1 Substation External Fencing

External fencing surrounding substations and sectioning huts with exposed high voltage conductors must have danger signs warning of high voltage hazards. The signs on the fences and external enclosures of such locations shall contain the three basic elements:

- DANGER
- HIGH VOLTAGE
- KEEP OUT

The preferred sign for this application is the RailCorp sign shown in Figure 1. This sign originally designed by ESAA has been adopted generally by the electrical supply industry. The sign shall be 750 x 350 mm in size, manufactured from aluminium, has a protective covering and meet the specifications as shown on the drawing *EL 0474387*.

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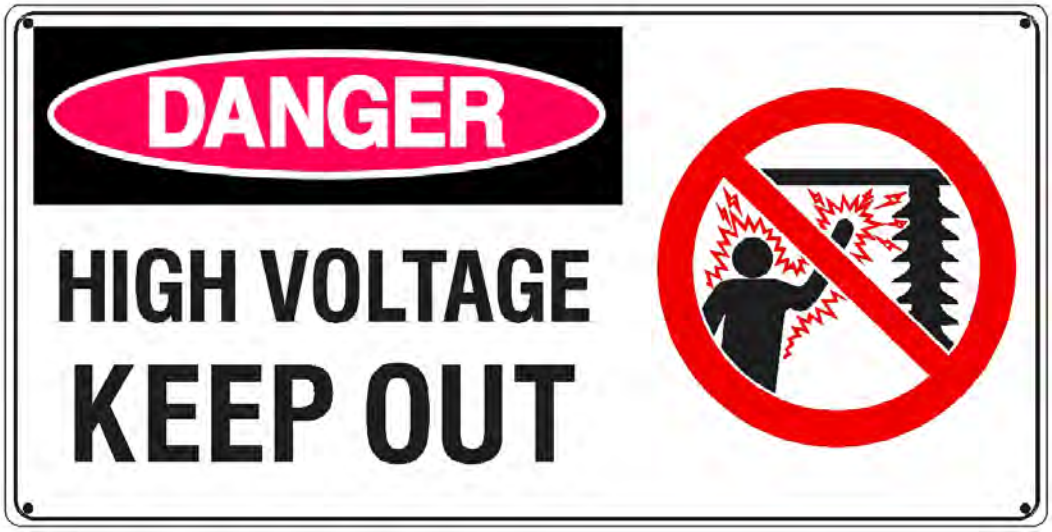

Figure 1 - Danger High Voltage Keep Out – Fence Sign

The distance between all signs must not exceed a distance equivalent to the length of 3 fence panels or 15 metres, which ever is the lesser of the two. Change of levels in the fencing must also have a sign. Specific voltage signs should not be used on substation fences.

This sign is not to be used at access gates in the fence, the sign for substation external access doors and gates is to be used, see Section 6.2. The signage spacing is to be adjusted so to avoid too many signs in one area.

6.2 Substation External Access Doors and Gates

A sign warning of DANGER, stating the hazard to be HIGH VOLTAGE and access is only by AUTHORISED persons must be placed on the external entrance doors and on the external access gates of the high voltage and 1500 V area fenced enclosures of substations and sectioning huts.

The sign is not required on doors where the only access to that door is through a high voltage or 1500 V area already displaying the warning on the access gate or door.

The warning may be painted directly onto the access door if it satisfies the criteria for word and letter size. The preferred wording is DANGER HIGH VOLTAGE AUTHORISED PERSONNEL ONLY, as shown in Figure 2. The sign is to be 400 x 300 mm in size and manufactured in aluminium. The lettering on the sign shall not be less than 40 mm in height, and meet the specifications as shown on the drawing *EL 0283016*.

Superseded by T HR EL 00006 ST

Figure 2 - Danger High Voltage Authorised Personnel Only

6.3 Internal Fences and Barriers

Fences and barriers internal to substations and sectioning huts that protect against access to dangerous voltages require a sign warning of the high voltage hazard associated with that equipment. The preferred sign is shown in Figure 3. These signs should not include the wording KEEP OUT or AUTHORISED PERSONNEL ONLY as would be required for external fences.

This sign should be used to identify substation equipment where it is possible for staff to encroach safe working distances. The Danger High Voltage sign must be used to identify live equipment with voltages at 1500 V and having exposed equipment within a substation building. A sign that states DANGER 1500 VOLTS may also be used for this purpose.

This sign can be used for both high voltage and 1500 V dc situations. The sign must be used where there is exposed equipment. The sign can be made of steel, aluminium or polypropylene. The size of the sign shall be 450 x 300 mm minimum letter height shall be 40 mm. The sign detail is specified on drawing *EL 0474383*.

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Figure 3 - Substations High Voltage – Danger Sign

Figure 4 – High Voltage Aerial Lines And Cables Electrical Cable Route Markers

Superseded by T HR EL 00006 ST

6.4 Electrical Emergency - Telephone Number

A sign displaying the phone number to use in the event of an electrical emergency must be used at all substations and sectioning huts. The placement of the sign shall be such that people outside the area can easily read it. The phone number shown on the sign must be the number for the railway Electrical Operating Centre as shown in Figure 5.

The signs are to be mounted high on the wall or fence in the vicinity of the substation or section hut main entrance door or gate or in the area that would most readily be visible to the general public. The preferred wording and layout to be used is specified in drawing *EL 0474385*.

Figure 5 – Electrical Emergency Drawing

6.4.1 Cable route marker

A caution cable route marking plate placed along an electrical cable route, readily visible to the public, indicating RailCorp underground cables in the vicinity, phone contact numbers prior to digging and emergency railway electrical operating centre as shown in Figure 4.

The sign is to be mounted on the wall, fence or post in the vicinity of the cable route. The preferred wording and layout to be used is specified in drawing *EL 0282878*.

6.5 High Voltage Equipment

Any enclosed equipment that contains exposed conductors, whether high voltage or 1500V dc shall have a DANGER HIGH VOLTAGE sign on each door or cover that provides access to the exposed conductors. Equipment requiring these signs includes, but not limited to, high voltage switchgear, cable termination cubicles, voltage transformers, 1500V dc circuit breakers, rectifier units, harmonic filters and isolating switches for surge arresters and harmonic filters.

Warning signs must be used on equipment where the access door or covers to the exposed equipment is accessible with the removal of these covers by the use of locking mechanisms or bolted covers.

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Where High Voltage cables are enclosed in Galvanised Steel Troughing, self adhesive DANGER HIGH VOLTAGE signs to be attached to the side of the troughing at regular intervals. These Warning Signs (125mm x 90mm) are available from various sign manufacturers.

Figure 6 – Equipment High Voltage Sign

The preferred sizes for "DANGER HIGH VOLTAGE" and "WARNING SIGNS" are to be suitable for outdoor condition and may comply with following specification.

	Figure 6	Figure 21
Layout Drawing	EL 0283395	EL 0483952
Size (mm)	125 x 90	230 x 110
Standard	*AS/NZS 3000*	*AS/NZS 1906 & AS 1319*
Material	PVC	1.2mm Aluminium

6.6 DC Circuit Breakers

The front panel door of the DC Circuit Breakers must have a warning stating that either High Voltage or 1500V dc is present behind the front panel as opening of these panel doors permits access to exposed conductors. The sign shown in Figure 7 should be used. Due to the large number of warning signs that are not identical to the preferred sign stated here, older existing signs may be retained and used on the dc circuit breakers provided the sign contain the wording of DANGER HIGH VOLTAGE or DANGER 1500 VOLTS

An example of this is dc circuit breakers supplied by Mitsubishi (MEAUST) have a red engraved label, as shown in Figure 7 below.

This warning and similar warnings may be used on dccb access doors.

Figure 7 - Mitsubishi DCCB Warning Sign

Superseded by T HR EL 00006 ST

6.6.1 Specific Voltage

Inside a substation location access doors and covers that provide access to exposed low voltage conductors (typically 220 V or 415 V) shall have a warning label stating the DANGER and the VOLTAGE of the hazard. An example is shown in for a 415V panel and is detailed in drawing *EL0283020* and is shown in Figure 8.

Figure 8 - Specific Voltage Sign

6.7 Confined Space

Within a substation that is designated as a confined space in accordance with SMS-06-GD-0035 Confined Spaces. The confined space is to be identified with a sign as detailed in drawing *EL 0283014* Figure 9 and *EL 0284401* Figure 10.

Figure 9 - Confined Space Danger Sign

Figure 10 – Substations Confined Space - Danger Sign – With Arrow

Superseded by T HR EL 00006 ST

6.8 1500 V Negatives

Where 1500 V Negative cables are located exterior to the substation or sectioning hut then a Danger sign warning not to break the cables shall be displayed next to the cable termination at the trackside negative busbar.

There are two different sized signs and the use will be dictated by the location that the sign is to be used at. The larger sign shall be as detailed in drawing *EL 0283019* and the smaller sign as detailed in drawing *EL 0474502*.

Figure 11 - 1500 Volt Negatives Danger Sign

7 Substation Emergency Information

7.1 Resuscitation Instructions and First Aid

7.1.1 Resuscitation Instructions

Resuscitation instructions must be prominently displayed in all substations and sectioning huts. Any chart may be used provided that the information displayed reflects the current methods in which personnel are trained.

Charts should be sourced from organisations like St Johns Ambulance. A chart having dimensions of 400 x 285 mm shall be suitable. Charts with outdated methods must be replaced with up-to-date charts. This is to ensure that the information displayed is current practice.

7.1.2 First Aid Kits

First aids kits are to be located in an area within the substation or sectioning hut that has identifying signs detailed in drawing *EL 0283015* showing the first aid kit location.

Figure 12 - First Aid Kit Location

First aid areas like the staff room are to be identified within the substation or sectioning hut that has identifying signs detailed in drawing *EL 0283015* showing the first aid location.

Superseded by T HR EL 00006 ST

7.2 Battery Rooms and Areas

Battery room and battery area signage shall comply with *AS 2676.1:1992*. Signs are to be placed on the exterior of battery room doors or in close proximity to the battery stand if not located in a separate room. The signage to be fitted is detailed in drawing *EL 0283015*.

- A regulatory sign stating the Risk of battery explosion 'Danger, NO Smoking, Sparks, Flames'. Figure 13 is the preferred sign.

Figure 13 – Risk of battery explosion

- A sign displaying emergency information for the treatment of electrolyte burns. Figure 14 shows the preferred sign.

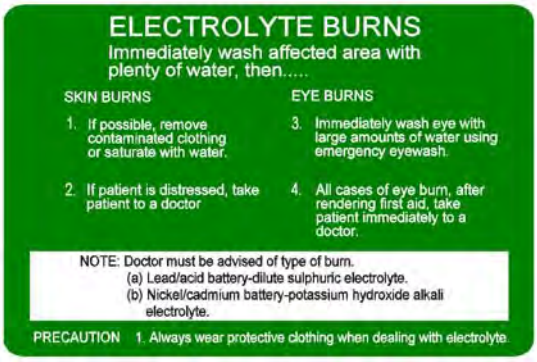

Figure 14 - Electrolyte Burns

- An emergency eyewash; shower; first aid and safety sign shall be displayed prominently in close proximity to the facility they represent. The recommended signage for the emergency eyewash is detailed in drawing *EL 0283015* and is shown in Figure 15..

Figure 15 - Emergency Eye Wash

Superseded by T HR EL 00006 ST

8 Substation Information & Warning Signs

8.1 High Voltage Busbars

High voltage bus bars shall have their phases labelled.

Exterior bus bar signs are to be located on the feeder termination structure. The labels for the phases shall consist of a coloured plate showing the letter corresponding to their phase. The label background colours shall be, A phase - red, B phase - white and C phase - blue.

Interior bus bars are to have cable phases indicated on the exterior of the cable termination panel of the high voltage switchgear. Interior panels only need to have a colour patch showing the phase. Cables are to be identified with their phases so they can still be identified if the termination panel cover is removed.

There is no drawing for these signs.

8.2 Earth Points

In substation high voltage yards, Earth points where portable earths are connected to the substation earth grid shall be identified with a sign that displays the letter E. The preferred earth disc layout is specified on drawing *EL 0228600* and is shown in Figure 16. The preferred earth point signs shall be a reflective yellow E on a green background.

Pre-existing signs consisting of a black E on a white background may remain in service if they are still in a serviceable and legible condition. The preferred sign shall be used if existing signs are to be replaced.

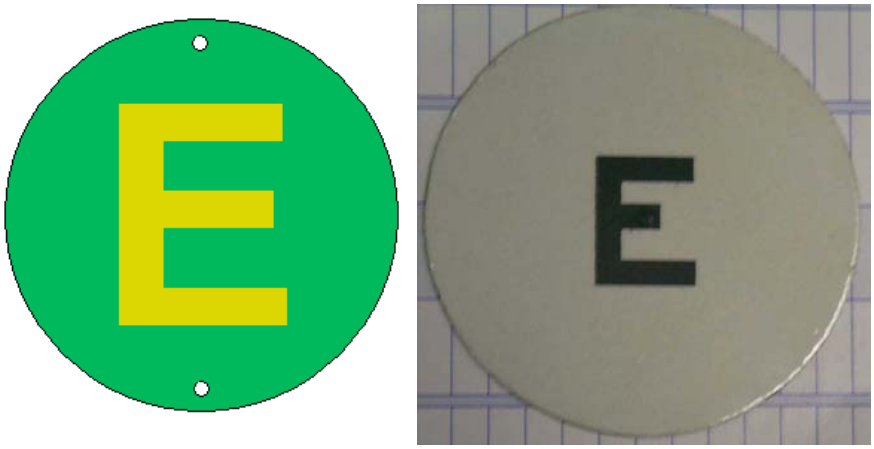

Figure 16 – Substation Earth Disc

Superseded by T HR EL 00006 ST

8.3 Voltmeter Test Rail - Warning

Located next to the 1500V dc Voltmeter Test Rail there is to be a sign indicating that the test rail is not to be connected to earth. The sign is to be in accordance with drawing *EL 0283023* and is shown in Figure 17. The sign should be located close to the voltmeter test rail.

Figure 17 – Warning Voltmeter Test Rail

8.4 Traction Negative Do Not Bridge To Earth - Warning

Located next to the 1500V dc Negative Bus bars there is to be a sign indicating that the Traction Negative is not to be bridged to earth. The sign is to be in accordance with drawing *EL 0474613* and is shown in Figure 18.

The sign should be located close to the protective cover on the negative bus bars connected to the Negative Reactor in newer substations on or adjacent to the exposed negative bus bars in older substations.

Figure 18 – Traction Negative Do Not Bridge To Earth

Superseded by T HR EL 00006 ST

8.5 Fire Equipment

Fire equipment locations shall comply with *AS 2444:2001* “Portable fire extinguishers and fire blankets, selection and location”.

The number and type of fire fighting equipment used shall be nominated with consultation of the local Fire Protection Officer. Fire equipment and signage is to be inspected in accordance with the relevant location Technical Maintenance Plan and Service Schedules.

Sign size:

- The size of the sign shall be determined by:
  - the location at which the sign should be legible; and
  - the distance at which the sign should be legible.

Sign location:

- A sign shall be provided above or adjacent to an extinguisher. A single sign may be employed to indicate multiple extinguishers in one location, even if different types are grouped together. Signs shall be positioned so as to be clearly visible to persons approaching the extinguisher.

Mounting height:

- Signs shall be mounted not less than 2.0 m above floor level or at a height that makes them most apparent to a person of average height approaching the extinguisher location.

Location signs:

- The extinguisher and fire point location signs shall have symbol, border and letters in white on a red field approximating R13 signal red of *AS 2700:1996*.

Superseded by T HR EL 00006 ST

8.6 Hazardous Materials

8.6.1 Hazardous Materials

Flammable liquid lockers are to have a permanent sign advising of the hazardous material and the class of the material. Examples are:

FLAMMABLE LIQUID 3

CORROSIVE 8
for battery acid

NON-TOXIC GAS 2
for nitrogen gas

Equipment containing hazardous materials must be labelled to identify the hazardous nature of the materials. These signs are available commercially and should be displayed where required to warn staff or emergency services.

8.6.2 DCCB Asbestos

DCCB with arc chutes and contactor arc chutes containing asbestos must be labelled: DANGER CONTAINS ASBESTOS. These signs may be a small self-adhesive vinyl sign and must be placed on the front panel of the circuit breaker.

The existing practice of labelling dc circuit breakers arc chutes that are ASBESTOS FREE must continue.

8.6.3 PCB

Transformers and equipment containing oil shall have a metal tag wired to the oil drain tap of the equipment tagged to show either No PCB (green) or Contains PCB amount ppm (yellow). Equipment identified as containing PCB content above 2 PPM shall also have a Warning label predominately displayed on all sides. PCB tags are covered in *EP 00 00 00 07 SP* - Requirements for Handling & Disposal of Material Containing PCB (Polyclorinated biphenyls).

8.7 Capacitor Warning

Where equipment like rectifiers, harmonic filters and power factor correction units are fitted with capacitors with a value greater than 0.5 µF a sign shall be placed next to the handle or handles that provide access to the conductors of the equipment.

The warning shall comply with 4.6.3.1 of *AS 3000* and the details of the sign are as per drawing *EL 0283018*.

Superseded by T HR EL 00006 ST

Figure 19 - Capacitor Warning Sample

8.8 Mandatory Signs

Mandatory signs are to be displayed where specific risks are present. The signs are to be displayed in a predominant position at the entrances to the substation. These signs should be permanently mounted where the sign can not be vandalised. In practice the risk should be eliminated or reduced to a level where there is no requirement for a warning sign.

Figure 20 – Mandatory sign to be displayed at the entrance to substations

RailCorp has made the following items mandatory within a substation:

- Hard hats
- Eye protection
- Safety footwear
- Long trousers & long sleeve shirts (overalls)

Details of the sign are in drawing *EL 2283017*. The sign is to be 600 x 900 mm and constructed of aluminium plate.

Hearing protection and the use of orange safety vests is to be considered on a risk assessment as these items may not be required when inside the substation area. Gloves may be made mandatory as site conditions dictate.

Superseded by T HR EL 00006 ST

8.9 Exit Signs

An exit sign in accordance with *AS 2293.1:2005* Emergency escape lighting and exit signs for buildings - Part 1: System design, installation and operation. The signs are to be located on the internal side of each substation access door that has been fitted for emergency exit.

8.10 Electrical Permit – Warning Sign

Located within a 1500V Switch Srea, a warning sign is to be displayed in a predominate position to entrance, warning that both a substation access permit and permit to work is required to work on 1500V switches in accordance to *SMS-06-0577*. This also includes 1500v field switches that are supplied directly from a DCCB that are not located within a substation Switch Area. This Warning sign shall also be displayed on the structure supporting the 1500v Field switches directly beside the switch identification label. Details of the sign are contained in drawing *EL 0483952*.

Figure 21 – Substations Electrical Permit – Warning Sign

Superseded by T HR EL 00006 ST

9 Distribution Substations

9.1 33 kV Pole Mounted Distribution Substation

Pole mounted distribution substations which have a pole mounted earthing arrangement on the high voltage fuses which is operated with an interlocked operating handle at ground level are required to have a warning sign affixed to the pole as shown in Figure 22.

This sign must be placed so that it is clearly viewable by persons commencing to climb the pole. The approved sign as shown in Figure 22 locations the sign is detailed in drawing *EL 008409*.

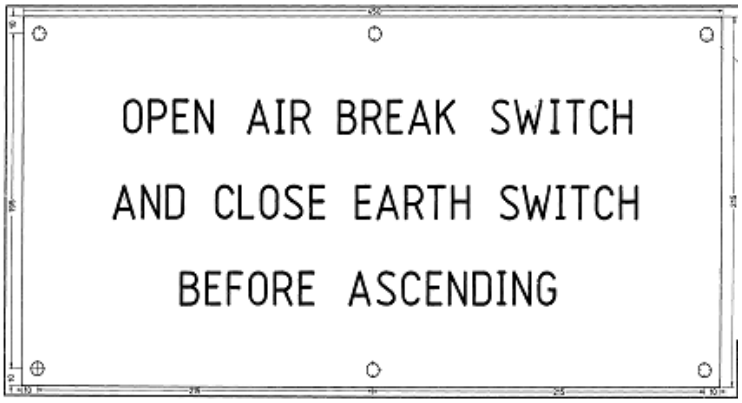

Figure 22 – 33 kV 500 / 250V Transformer Single Pole Structure

9.2 11 kV Pole Mounted Distribution Substation

Pole mounted distribution substations which have a pole mounted earthing arrangement on the high voltage fuses or feeder cable termination located where the operator must climb the pole to operate the earthing device are required to have a warning sign affixed to the pole as shown in Figure 23.

This sign must be placed so that it is clearly viewable by persons commencing to climb the pole.

Details of the sign are contained in drawing *EL 0283022*.

Figure 23 – 11 kV Pole Mounted Distributed Substation Sign

Superseded by T HR EL 00006 ST

9.2.1 Danger High Voltage Overhead

A small DANGER HIGH VOLTAGE OVERHEAD sign must be positioned on the pole closer to the conductors to warn staff of the hazard above.

Figure 24 – Distribution Pole Warning

All signage lettering shall be a minimum of 40mm high on a reflective background. The sign shall be black lettering on a white reflective background and comply with drawing *EL 0283021* and Figure 24 shows the sign for this purpose.

Pole substations must have a sign indicating the correct substation location name. The name on the sign must correspond exactly to the information shown on the relevant operating diagram for that location. The numbering for the pole at pole mounted substations shall be numbered in accordance with HV aerial Line standards *EP 10 01 00 06 SP*.

9.3 Walk-In Distribution Substations

9.3.1 High Voltage Rooms

A sign warning of DANGER, stating the hazard to be HIGH VOLTAGE and access is only by AUTHORISED persons must be placed on the external entrance doors to rooms that contain high voltage switchgear and/or transformers that have high voltage windings.

The lettering on the sign shall not be less than 40mm in height, and meet the specifications as shown on the drawing *EL 0283016* and is shown in Figure 25.

The warning may be painted directly onto the access door, if it satisfies the criteria for word and letter size.

Superseded by T HR EL 00006 ST

Figure 25 – Danger High Voltage for Distribution Substations

9.3.2 Low Voltage Rooms

Outside of substation locations where access doors provide access to low voltage equipment areas like main switchboards on stations, shall have a warning label stating as shown in sign Figure 26 and shall be in accordance with drawing *EL 0474490*.

Specific voltage signs should not be used on low voltage room doors.

Figure 26 – Low Voltage Rooms And Equipment Access Doors

Superseded by T HR EL 00006 ST

9.4 Padmount Locations

9.4.1 High Voltage Padmount End

Padmount substations that contain high voltage equipment shall have a minimum of one sign that contains the wording, DANGER HIGH VOLTAGE KEEP OUT on the exterior of the padmount housing. The sign is to be located on the access door or panel which provides access to high voltage operating controls of the equipment in the padmount. The sign shall be in accordance with drawing *EL 0474485*.

The sign used for High Voltage Rooms as shown in Figure 25 may also be used for this purpose.

Figure 27 - High Voltage Danger Sign For Padmounts

A further DANGER HIGH VOLTAGE KEEP OUT sign shall be used at any panel or door where access can be gained from the exterior of the padmount to high voltage equipment in the padmount substation. The signs described in Sections 6.1 and 6.2 shall not be used for this application. Panels or doors that provide access to high voltage equipment, where the access can only be achieved by internally unlocking the panel or door, do not require signs.

The name of the location that matches the relevant operating diagram should be shown on the exterior of the padmount.

9.4.2 Low Voltage Padmount

DANGER ELECTRICAL EQUIPMENT AUTHORISED PERSONNEL ONLY shall be used to indicate the access door to any low voltage switchboard equipment or low voltage isolating transformer.

The wording High Voltage is not to be used on the low voltage end of a padmount and must not be used on a padmount that only contains low voltage equipment.

The voltage of the equipment is not required to be displayed on the exterior of the padmount location and specific voltage signs should not be used. The sign shall be in accordance with drawing *EL 0474490* and shown in Figure 26.

Superseded by T HR EL 00006 ST

10 Tunnel Normal Lighting Signage

Normal lighting in tunnels is supplied through a 3 phase power distribution network. Under normal operation lights connected to one phase only are energised and every third light in the tunnel is switched on. Push button switches are provided at each tunnel portal and at strategic locations within the tunnel to switch on all normal lights to undertake maintenance or related work. A bi-directional sign, as per drawing number *EL 0535899* (see Figure 28), shall be installed immediately below the push button for easy identification of its function and location."

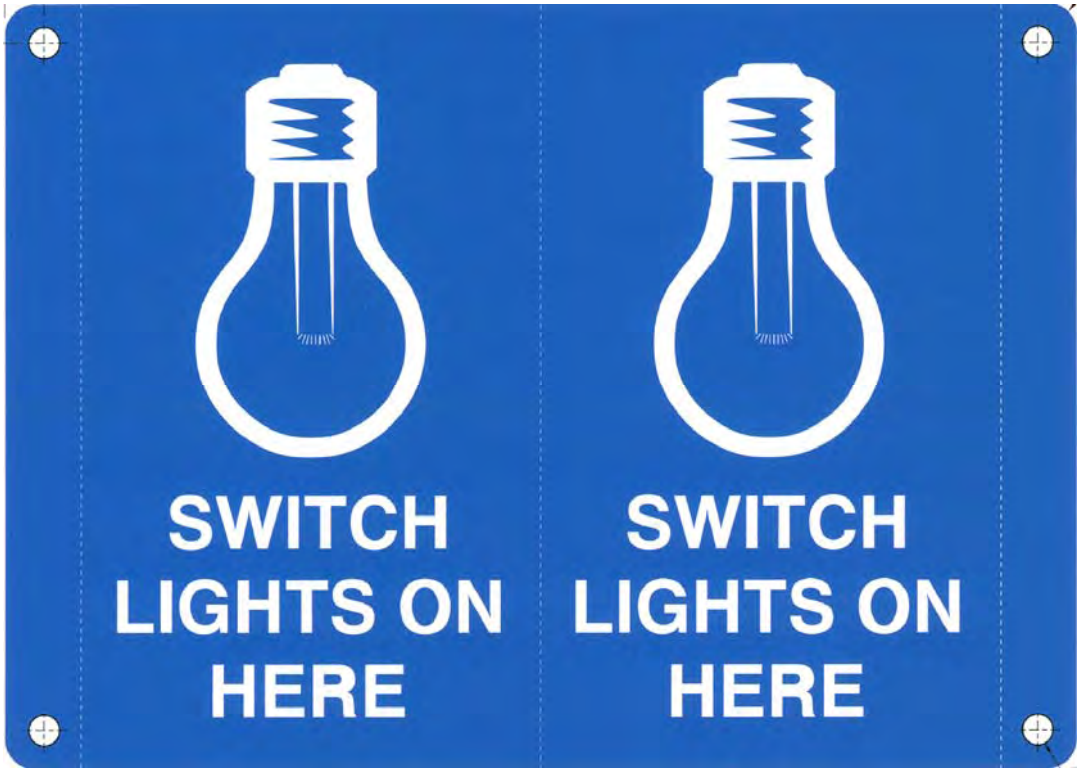

Figure 28 – Tunnel Lighting Signage