

# **Substation Signage**

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## **This functional requirements document is in line with the organisation's 1-11-ACS-12 Substation Signage Asset Class Strategy**

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## 1. Definitions

In this document the following words and expressions will have the following meanings:

Item	Meaning
AS	Australian Standard, as publication by Standards Australia (Standards Association of Australia).
Contractor	A contractor engaged by ElectraNet or a Customer (including a third party IUSA provider engaged by a Customer or any contractor engaged by such third party IUSA provider) to perform any design, construction or related services in relation to assets or infrastructure which are connected, or to be connected, to ElectraNet's transmission network
CT	Current Transformer
Customer	A party who wants to establish or modify a connection to ElectraNet's transmission network but does not include a third party IUSA provider
DPTI	Department of Planning, Transport and Infrastructure.
EMF	Electric and Magnetic Field
Labelling	Labelling conveys specific information about an asset.
MSC	Master Security Cubicle.
Signage	The use of signs and symbols to communicate a message.
SSC	Slave security cubicle.
Standard Drawing	A drawing developed by ElectraNet as a complete design to be used for construction. Standard Drawings are not intended to be revised or renumbered.
Template Drawing	A drawing developed by ElectraNet as the basis for design. Template Drawings are intended to be revised and renumbered as required to complete the design.
third party IUSA	Has the same meaning as defined in the National Electricity Rules
VT	Voltage Transformer

## **2. Purpose**

The purpose of this document is to describe the functional requirements for Substation Signage and their integration into the overall substation requirements.

## **3. Scope**

This document states the functional requirements with regard to Substation Signage and their integration into the overall substation requirements. The scope includes all configurations at all voltages.

## 4. Referenced Documents

The table below lists applicable legislations, standards, referenced documents:

<b>Legislation</b>	
SAEA	Electricity Act 1996 (SA)
SAER	South Australia Electricity (General) Regulations 2012 (SA) under the SAEA
NER	National Electricity Rules
ETC	Electricity Transmission Code TC/08
SAA HB59:1994	Ergonomics - The human factor A practical approach to work systems design
<b>International Standards</b>	
AS 1319:1994	Safety signs for the occupational environment
AS 1744:2015	Standard alphabets for road signs
AS 2342:1992 (R2013)	Development, testing and implementation of information and safety symbols and symbolic signs
AS 2067 :2016	Substations and high voltage installations exceeding 1 kV a.c.
AS/NZS 3000:2007	Electrical Installations (known as the Australian/New Zealand Wiring Rules)
AS/ISO 1000:1998	The international system of units (SI) and its applications.
<b>ElectraNet's Documentation</b>	
1-05-ADM-03	Drafting and Document Control

## 5. Signs

### 5.1 Signage Functional

#### 5.1.1 General Requirements

- 5.1.1.1 Substation Signage must be designed to communicate messages to workers and the public.
- 5.1.1.2 Substation Signage must be interpreted by workers and the general public.
- 5.1.1.3 Signage is distinct from Labelling. Labelling must be used to convey specific information about an asset, protocol or operational requirement.
- 5.1.1.4 Labelling must have a specific intent to be interpreted by workers, as a minimum.
- 5.1.1.5 The substation Signage must identify all hazards and potential hazards on site.
- 5.1.1.6 Substation Signage must comply with relevant standards, codes, regulations and guides.
- 5.1.1.7 Substation Signage must have 100% availability.
- 5.1.1.8 Substation Signage must have a 20 year minimum design life.
- 5.1.1.9 Signs must be large enough to view without straining the eyes.
- 5.1.1.10 The placement of signs must, consider the environment, lighting and viewing distance.
- 5.1.1.11 The type of sign must be suitable for the intended purpose according to AS 1319.
- 5.1.1.12 Colour and shape requirements must be in accordance with AS 1319-1994 Table 2.1.
- 5.1.1.13 Sign size, legend and legibility must be in accordance with AS 1319-1994 clause 3.4.
- 5.1.1.14 All Signage must be made from materials which will meet the design life of the assets to which they are mounted and must appropriately cater for indoor or outdoor installation as needed.
- 5.1.1.15 All of the lettering and colours used for Signage must meet the design life of the assets to which they are mounted.
- 5.1.1.16 Signage must be installed correctly. The installation method must ensure that the Signage remains correctly installed to meet the design life of the assets to which they are mounted.
- 5.1.1.17 Signage must be clearly visible.
- 5.1.1.18 Signage must be legible.

- 5.1.1.19 Signage must be unambiguous to workers and the general public.
- 5.1.1.20 Fire safety and warning signs must be provided in accordance with AS 1319.
- 5.1.1.21 All operation, identification and warning Signage details must be indicated on the appropriate drawings. The presentation and details must comply with those shown on ElectraNet's Standard Drawings and Template Drawings.

## **5.1.2 Mandatory Signs**

- 5.1.2.1 Mandatory signs must specify an instruction which must be carried out.
- 5.1.2.2 Mandatory signs must have symbols or pictograms depicted in white, on a blue circular background.
- 5.1.2.3 Mandatory signs must have wording in black lettering (if applicable).

## **5.1.3 Emergency Information Signs**

- 5.1.3.1 Emergency Information signs must indicate the location of, or directions to emergency-related facilities.
- 5.1.3.2 Emergency signs must feature a white symbol and/or text on a green background.
- 5.1.3.3 Emergency signs can include exits signs, first aid signs, safety equipment signs etc.

## **5.1.4 Danger Signs**

- 5.1.4.1 Danger signs must provide warning when a hazard or hazardous condition is likely to be life-threatening.
- 5.1.4.2 Danger signs must feature the word 'Danger' inside a red oval, which is inside a black rectangle.

## **5.1.5 Prohibition Signs**

- 5.1.5.1 Prohibition signs must specify behaviours or actions which are not permitted.
- 5.1.5.2 Prohibition signs must display the annulus and slash in red, over the action symbol which is in black.
- 5.1.5.3 Prohibition signs must have wording (if required) in black over a white background.

## **5.1.6 Warning Signs**

- 5.1.6.1 Warning signs warn of hazards or a hazardous condition which is not life-threatening.
- 5.1.6.2 The hazard symbol must be in black on a yellow background, and a triangle depicted around the hazard symbol.



5.1.6.3 Wording, if required, is in black lettering on a yellow background.

### **5.1.7 Fire Signs**

5.1.7.1 Fire signs must advise the location of fire alarms and firefighting equipment.

5.1.7.2 Fire signs must contain a white symbol and/or text on a red background.

### **5.1.8 General Information Signs**

5.1.8.1 General information signs communicate information of a general nature and often refer to housekeeping, company practices and logistics.

### **5.1.9 Substation (Including Construction) Site**

5.1.9.1 The Contractor must supply and install a construction site sign at each site, which must be positioned adjacent to the main entrance gates.

5.1.9.2 Substation entrance signs must be provided at each site, which must be positioned adjacent to the main entrance gates.

### **5.1.10 Substation Infrastructure and Equipment Identification Labels**

5.1.10.1 All items of high voltage switchgear, power transformers, reactors, capacitor banks, auxiliary supply transformers, instrument transformers and bus bars must be provided with Signage showing the operational numbers or identification labels.

5.1.10.2 Two sets of signs showing operational numbers must be provided per item of switchgear where one sign must be visible from the direction of the control building and the other must be visible from the point of operation for that item.

5.1.10.3 Operational Signs must follow the naming conventions defined in ElectraNet's document, 1-05-ADM-03 Drafting and Document Control, and must be consistent with the operational numbers shown on single line diagrams and Substation Switching Diagrams.

5.1.10.4 Phase identification letter signs or stencils must be provided for all CT and VT structures as well as in a number of bus bar support structures. The phase identifiers must be visible from at least two directions. CT and VT phase identification letters must be visible from outside the vehicle access barriers.

5.1.10.5 Outdoor marshalling boxes must be provided with identification labels.

5.1.10.6 All gantry columns, gantry beams, floodlight poles, and lightning masts must be provided with identification labels. These labels must have sufficient space for bar codes to be fixed to them.

### **5.1.11 Substation Buildings**

5.1.11.1 Substation buildings must have adequate and well-signed exit routes.

5.1.11.2 Fire evacuation procedures in buildings must be clear with well-signed escape routes.

5.1.11.3 Fire safety and warning signs must be provided in accordance with AS 1319: Safety Signs for the Occupational Environment, (e.g. Fire risk, no smoking, no naked lights or welding plant except when authorised, electric shock risk, in the event of a fire phone...XXXX... before firefighting etc.)

5.1.11.4 All buildings, including sheds, must be provided with identification labels.

### **5.1.12 Interface to Government Roads**

5.1.12.1 Any Local Council or DPTI requirements with regards to the interfaces to the government roads (such as sight distances, Signage, slow lanes, etc.) must be included in the project specific documentation.

### **5.1.13 Fire Extinguishers**

5.1.13.1 Fire extinguisher location signs or labels must be installed above all extinguishers and they must be clearly visible at all times.

### **5.1.14 Warning Signs on Fences**

5.1.14.1 Substation perimeter or security fences must have a number of outdoor warning signs fitted at multiple locations as shown on ElectraNet's Standard Drawings.

5.1.14.2 Danger high voltage warning signs must be provided for each capacitor bank fenced compound.

5.1.14.3 Adjacent to the personnel access gate for each capacitor bank fenced compound an entry procedure sign must be installed covering the safety and interlocking requirements to be met prior to entry.

5.1.14.4 High EMF warning signs are to be installed on the fences that surround restricted access areas where normal occupational EMF levels will be exceeded.

### **5.1.15 Security System**

5.1.15.1 A sign must be installed on the inside of each exit door from a building to warn users that all doors must be closed before resetting security system alarms.

5.1.15.2 A sign must be installed above each security system keypad, covering all buildings within the substation to warn users to close all doors prior to leaving the substation and arming the security system.

5.1.15.3 Each building, excluding sheds, must have an outdoor sign to indicate which door is the designated entry door to allow the system to be disarmed for authorised entry.

5.1.15.4 All other entry and exit doors to buildings must have an outdoor signs to indicate these doors are not a designated entry door for disarming the security system for authorised entry.

5.1.15.5 'Do not open' signs must be located on MSC and SSC doors.

### **5.1.16 Miscellaneous Warning Signs**

- 5.1.16.1 Warning signs are to be placed on all items of switchgear or plant where residual hazards can impact the local switching operations or routine inspections.
- 5.1.16.2 All confined spaces must have warning signs placed at all entry points.
- 5.1.16.3 All motorised disconnectors and earth switching must be fitted with signs which identify the mechanical lock off and motor supply isolation points.
- 5.1.16.4 All high voltage leads connection to earthing and neutral terminals from power transformers and voltage transformers, as well as link boxes and earth bars must have outdoor warning labels applied.
- 5.1.16.5 Where rainwater tanks are in use indoor and outdoor non-potable water warning signs must be mounted near all taps.



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