Network Standard

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NW000-S0050 NS117 DESIGN AND CONSTRUCTION STANDARDS FOR KIOSK TYPE SUBSTATIONS
ISSUE

For issue to all Ausgrid and Accredited Service Providers’ staff involved with the design and construction of kiosk type substations, and is for reference by field, technical and engineering staff.

Ausgrid maintains a copy of this and other Network Standards together with updates and amendments on www.ausgrid.com.au.

Where this standard is issued as a controlled document replacing an earlier edition, remove and destroy the superseded document.

DISCLAIMER

As Ausgrid’s standards are subject to ongoing review, the information contained in this document may be amended by Ausgrid at any time. It is possible that conflict may exist between standard documents. In this event, the most recent standard shall prevail.

This document has been developed using information available from field and other sources and is suitable for most situations encountered in Ausgrid. Particular conditions, projects or localities may require special or different practices. It is the responsibility of the local manager, supervisor, assured quality contractor and the individuals involved to make sure that a safe system of work is employed and that statutory requirements are met.

Ausgrid disclaims any and all liability to any person or persons for any procedure, process or any other thing done or not done, as a result of this Standard.

All design work, and the associated supply of materials and equipment, must be undertaken in accordance with and consideration of relevant legislative and regulatory requirements, latest revision of Ausgrid’s Network Standards and specifications and Australian Standards. Designs submitted shall be declared as fit for purpose. Where the designer wishes to include a variation to a network standard or an alternative material or equipment to that currently approved the designer must obtain authorisation from the Network Standard owner before incorporating a variation to a Network Standard in a design.

External designers including those authorised as Accredited Service Providers will seek approval through the approved process as outlined in NS181 Approval of Materials and Equipment and Network Standard Variations. Seeking approval will ensure Network Standards are appropriately updated and that a consistent interpretation of the legislative framework is employed.

Notes:
1. Compliance with this Network Standard does not automatically satisfy the requirements of a Designer Safety Report. The designer must comply with the provisions of the Workplace Health and Safety Regulation 2011 (NSW - Part 6.2 Duties of designer of structure and person who commissions construction work) which requires the designer to provide a written safety report to the person who commissioned the design. This report must be provided to Ausgrid in all instances, including where the design was commissioned by or on behalf of a person who proposes to connect premises to Ausgrid’s network, and will form part of the Designer Safety Report which must also be presented toAusgrid. Further information is provided in Network Standard (NS) 212 Integrated Support Requirements for Ausgrid Network Assets.

2. Where the procedural requirements of this document conflict with contestable project procedures, the contestable project procedures shall take precedent for the whole project or part thereof which is classified as contestable. Any external contact with Ausgrid for contestable works projects is to be made via the Ausgrid officer responsible for facilitating the contestable project. The Contestable Ausgrid officer will liaise with Ausgrid internal departments and specialists as necessary to fulfil the requirements of this standard. All other technical aspects of this document which are not procedural in nature shall apply to contestable works projects.

INTERPRETATION

In the event that any user of this Standard considers that any of its provisions is uncertain, ambiguous or otherwise in need of interpretation, the user should request Ausgrid to clarify the provision. Ausgrid’s interpretation shall then apply as though it was included in the Standard, and is final and binding. No correspondence will be entered into with any person disputing the meaning of the provision published in the Standard or the accuracy of Ausgrid’s interpretation.

KEYPOINTS

This standard has a summary of content labelled “KEYPOINTS FOR THIS STANDARD”. The inclusion or omission of items in this summary does not signify any specific importance or criticality to the items described. It is meant to simply provide the reader with a quick assessment of some of the major issues addressed by the standard. To fully appreciate the content and the requirements of the standard it must be read in its entirety.

AMENDMENTS TO THIS STANDARD

Where there are changes to this standard from the previously approved version, any previous shading is removed and the newly affected paragraphs are shaded with a grey background. Where the document changes exceed 25% of the document content, any grey background in the document is to be removed and the following words should be shown below the title block on the right hand side of the page in bold and italic, for example, Supersedes – document details (for example, “Supersedes Document Type (Category) Document No. Amendment No.”).
KEY POINTS OF THIS STANDARD

Scope and Risks Addressed

This standard is limited to scope identified below and provides controls for associated risks as listed below:

- Applies only to kiosks, with Ausgrid type descriptors L and K
- Applies to nominal 11kV primary voltage systems
- Does not apply to nominal 5kV primary voltage systems
- Applies to nominal 400/230 volt distribution systems
- Does not apply to SWER systems
- Does not apply to nominal primary voltage systems higher than 11kV
- Applies to kiosk housings used for control points and for control of supply to high voltage customer installations (HVCs)
- Does not apply to kiosk housings used for other purposes.

General Information and Kiosk Types

The general information and requirements includes the following:

- All materials and equipment used must be free of Asbestos.
- All work must be carried out safely in accordance with the WHS Act and Regulations 2011 and Ausgrid’s Electrical Safety Rules.
- Project details requirements for both contestable and non-contestable work.
- Equipping Permit and Access permit requirements
- Appointment of an Ausgrid Liaison Officer
- All materials used to be either supplied by Ausgrid or approved by Ausgrid as meeting the relevant specifications.
- Details are provided for requirements relating to:
  - Testing and inspection
  - Warranty
  - Environmental constraints
  - Reporting of accidents/incidents
  - Locking and Security
- Details of LV boards suitable for each kiosk type is included.

Where to for more information?

Section 5 - 8

Tools and Forms

Annexure A List of drawings

Siting, Construction, Protection and Areas of Special Care

Construction requirements include the following:

- Detailed kiosk siting and foundation information is found in NS141 Site selection and site preparation standards for kiosk substations.
- Generally sites should be dry, clear of obstruction and not close to rivers, creeks and other sources of water.
- Kiosks have oil containment requirements
- Earthing requirements
- Protection requirements
- Special consideration should be given to:
  - Siting
  - Preventing corrosion
  - Cables and cable terminations
  - Restrictions on consumers mains
  - Phasing of connections
  - Sealing of conduits

Where to for more information?

Section 9 - 12

Tools and Forms

Annexure B Stockcodes
Annexure C Danger signs

Procurement, Testing, Inspection and Commissioning

The procurement of materials and post construction testing, inspection and commissioning requirements include:

- Materials either sourced from Ausgrid or approved as complying with specifications prior to use.
- Transformers and HV switchgear have specific requirements.
- Ausgrid will inspect the work undertaken by the Service Provider
- Testing in accordance with NS230 Testing of Distribution Substations applies
- Inspections will include progress inspections and milestone inspections.
- Commissioning of kiosk substations is undertaken by Ausgrid
- Acceptance of the construction of a kiosk will commence the warranty period and have the equivalent meaning as Practical Completion.
- Reporting requirements are listed.

Where to for more information?

Section 13 - 18

Tools and Forms

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Network Standard
NS117
Design and Construction Standards for Kiosk Type Substations

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1.0 PURPOSE

This Network Standard specifies the electrical design and construction requirements for kiosk substations for installation on Ausgrid’s network. Requirements are included for standard ratings up to 1500kVA, to provide three-phase four-wire nominal 400 / 230 volt supply.

The kiosk substations specified in this Network Standard are the current L and K types. These types are for installation throughout Ausgrid’s network, subject to the limitations indicated in this Network Standard and NS109, NS112 and NS141. Kiosk designs and materials must comply with Ausgrid standards and specifications.

Ausgrid is responsible for the management and operation of Ausgrid’s electricity supply network. The network is a major infrastructure investment, and is required to operate economically and reliably in all weather and environmental conditions.

The design and construction requirements specified in this Network Standard are intended to satisfy electrical performance and economy requirements, and to meet all statutory obligations. The kiosks specified utilise readily available components which have demonstrated reliability.

This Network Standard may be amended or updated at any time to reflect improvements in design, technology advances etc. The Service Provider shall ensure that the latest version of this Network Standard is used for the equipping of the kiosk substation to which it applies.

2.0 SCOPE

This Network Standard:

- applies only to kiosks, with Ausgrid type descriptors L and K
- applies to nominal 11kV primary voltage systems
- does not apply to nominal 5kV primary voltage systems
- applies to nominal 415/240 volt distribution systems
- does not apply to SWER systems
- does not apply to nominal primary voltage systems higher than 11kV
- applies to kiosk housings used for control points and for control of supply to high voltage customer installations (HVCs),
- does not apply to kiosk housings used for other purposes.
- does not cover the installation of high voltage and low voltage mains. These requirements are covered in other network standards.
3.0 REFERENCES

3.1 General
All work covered in this document shall conform to all relevant Legislation, Standards, Codes of Practice and Network Standards. Current Network Standards are available on Ausgrid’s Internet site at www.ausgrid.com.au.

3.2 Ausgrid documents
- Company Form (Governance) - Network Technical Document Endorsement and Approval
- Company Procedure (Governance) - Production / Review of Network Standards
- Company Procedure (Network) - Network Technical Document Endorsement and Approval
- Connection Policy – Connection Charges
- Customer Connection Contract documents
- Customer Installation Safety Plan
- Electrical Safety Rules
- Electricity Network Safety Management System Manual
- ES4 Service Provider Authorisation
- NS100 Field Recording of Network Assets
- NS104 Specification for Electrical Network Project Design Plans
- NS109 Design Standards for Overhead Developments and Distribution Centres
- NS110 Specification for Design Standards for URDs
- NS112 Design Standards for Industrial and Commercial Developments
- NS116 Design Standards for Distribution Equipment Earthing
- NS127 Specification for Low Voltage Cable Joints and Terminations
- NS130 Specification for Laying Underground Cable up to 11kV
- NS141 Site Selection and Site Preparation Standards for Kiosk Type Substations
- NS143 Easements, Leases and Rights of Way
- NS156 Working Near or Around Underground Cables
- NS158 Labelling of Mains and Apparatus
- NS161 Specification for Testing of Underground Cables
- NS171 Firestopping in Substations
- NS174 Environmental Procedures
- NS177 11kV Joints (including Transition Joints) and Terminations – Polymeric Insulated Cables
- NS181 Approval of Materials and Equipment, and Network Standard Variations
- NS195 High Voltage Connections
- NS212 Integrated Support Requirements for Ausgrid Network Assets
- NS230 Testing of Distribution Substations
- NS261 Requirement for Design Compliance Framework for Network Standards
- Policy for ASP/1 Premises Connections
- Public Electrical Safety Awareness Plan

3.3 Other standards and documents

3.4 Acts and regulations
- Electricity Supply (General) Regulation 2014 (NSW)
- Electricity Supply (Safety and Network Management) Regulation 2014
- Work Health and Safety Act 2011 and Regulation 2011
4.0 DEFINITIONS

Accredited Service Provider (ASP)
An individual or entity accredited by the NSW Department of Planning and Environment, Energy, Water and Portfolio Strategy Division, in accordance with the Electricity Supply (Safety and Network Management) Regulation 2014 (NSW).

Approved Materials
Approved Materials means materials acceptable to Ausgrid, purchased from suppliers satisfying Ausgrid’s Quality Assurance requirements or materials which have been supplied by or purchased from Ausgrid.

Business Management System (BMS)
An Ausgrid internal integrated policy and procedure framework that contains the approved version of documents.

Compliance Officer
As defined in Ausgrid’s Policy for ASP/1 Premises Connections, as amended.

Design Information
Design Information is as defined and specified in Ausgrid’s Policy for ASP/1 Premises Connections.

Document control
Ausgrid As a minimum requirement, controlled documents will be identified by a unique number, be signed or noted as approved by the appropriate approving officer, have the current amendment number and approval date clearly displayed.

Note: Ausgrid employees who work with printed copies of document must check the Business Management System (BMS) regularly to monitor version control. Documents are considered “uncontrolled if printed”, as indicated in the footer.

Liaison Officer
The Liaison Officer is the person who co-ordinates the project. For contestable work, this will be the Contestable Project Coordinator from the Network Contestability Section, who will provide a point of contact between the Service Provider and Ausgrid. The Liaison Officer is not the Compliance Officer referred to in Ausgrid’s Policy for ASP/1 Premises Connections as amended.

Major Defect
Major Defect means a defect in works which, in the opinion of Ausgrid, compromises, or may in the future compromise, the safe and reliable supply of electricity and, without limitation, includes the description of Major Defects in the Code of Practice for Contestable Works.

Network Standard
A document, including Network Planning Standards, that describes Ausgrid’s minimum requirements for planning, design, construction, maintenance, technical specification, environmental, property and metering activities on the distribution and transmission network. These documents are stored in the Network Category of the BMS repository.

Record Keeping

Review date
The review date displayed in the header of the document is the future date for review of a document which is one year for documents requiring annual review, two years for fraud control documents or the default period of three years from the date of approval. A review may be mandated at any time where a need is identified due to changes in legislation, organisational changes, restructures, occurrence of an incident or changes in technology or work practice.

Service Provider
As defined in Clause 6.5.
5.0 ASBESTOS

All materials and equipment used for construction of Ausgrid’s assets are to be free from Asbestos and or Asbestos related products. Suppliers are expected to Work with the Work Health and Safety Act 2011 (NSW) together with the Work Health and Safety Regulation 2011 (NSW) and confirm in writing that all products supplied to Ausgrid contain no Asbestos related materials.

6.0 GENERAL INFORMATION AND REQUIREMENTS

6.1 Safety

This Network Standard requires compliance with the National Electricity Network Safety Code (ENA Doc 001-2008) and Ausgrid’s network management planning documents. In addition, all work must be carried out in accordance with Ausgrid’s Electrical Safety Rules. If there is any conflict between the requirements of these documents, the Electrical Safety Rules shall prevail.

Kiosk design and construction shall (at least) comply with the minimum safe working clearances and other requirements detailed in the Electrical Safety Rules.

The installation of kiosk type substations by crane or other lifting device, near or in the vicinity of exposed high or low voltage mains must (at least) comply with the requirements of the Work Health and Safety Act 2011 (NSW) together with the Work Health and Safety Regulation 2011 (NSW), and the minimum safe working clearances detailed in the Electrical Safety Rules, and documents referred to in those Rules.

The Service Provider shall be responsible for ensuring that all construction staff are fully conversant with the necessary clearances from exposed live conductors.

6.2 Project Details

6.2.1 Design information for contestable work

For contestable work, Ausgrid’s Liaison Officer will issue the Service Provider with Design Information, as specified in the Policy for ASP/1 Premises Connections. The Design Information document provides job specific details of the substation project and should be used in conjunction with this Network Standard.

The appropriate kiosk and size of transformer will be determined by the Liaison Officer and detailed in the Design Information document.

Any proposed changes from the project details provided in the Design Information document must be approved by the Liaison Officer before being implemented by the Service Provider.

The Design Information will contain job specific information, as well as general information, and will normally include:

Project Identification details such as project name and number, issue date, required completion date, contact details for the Liaison Officer, etc.

Project Location details and any special conditions and requirements.

Substation Model information which clearly specifies the substation model type and rating together with any permitted alternatives and options.

Operational Details including the phasing details of the local primary and secondary distribution networks, the required transformer tapping ratio and the operational numbers and labels to be fitted to the substation.

Ausgrid Network Standards particular to the type of construction or the location of the substation.

Protection Details as relevant, including the rating and type of HV and LV fuses to be used, the protection drawings applicable, type of protection relays to be used, earth fault indicator installation
requirements, protection current transformer ratings and ratios, tripping sequence, relay settings, pre-commissioning test requirements, and protection equipment supply arrangements.

**Note:** In some cases, the Design Information document may not initially contain complete protection details. This may be the case when design proposals for the customer’s electrical installation protection have not been sufficiently developed and discussed with Ausgrid. In these cases, the Service Provider must provide the necessary information to the Liaison Officer as soon as possible to enable Ausgrid to specify the protection details for the substation, as an addendum to the Design Information. The Service Provider must not finalise the design of the customer’s installation until protection details for the substation are obtained from Ausgrid. The protection schemes for the substation and the customer’s electrical installation must be coordinated jointly by Ausgrid and the Service Provider.

### 6.2.2 Project details for work that is not contestable

For work that is not contestable, project details in accordance with NS104 Network Project Design Plans will be provided by Network Operations Division to the group that is responsible for construction of the project.

### 6.3 Equipping permit

Service Providers may only commence work at the substation site after they have received an Equipping Permit for the particular project. The purpose of the Equipping Permit is detailed in Ausgrid’s Electrical Safety Rules. In general, it is intended to prevent the energising of equipment until all staff have acknowledged by their signature that the work is complete and the equipment can be connected to the supply system and shall be considered as “live”.

Any further work after withdrawal of the Equipping Permit can only be performed under the authority of an Access Permit.

The Equipping Permit must be displayed at the substation construction site at all times while work is being carried out under the Equipping Permit. Refer to Ausgrid’s Electrical Safety Rules for further information, and for details of the Equipping Permit procedure.

### 6.4 Access permit

When the construction of the kiosk substation nears completion, the connection of high and/or low voltage cabling to the supply system will allow the substation to be energised. At this stage, the Equipping Permit that has been displayed on site, must be “signed off” and recovered by an Ausgrid officer. The officer will then issue an Access Permit for Work that will detail exactly the mains and equipment allowed to be worked on. By signing the Access Permit, the recipient acknowledges a full understanding of the extent of the equipment to be worked on, and claims to have completed a personal check and to have been satisfied that the isolation and earthing of the adjacent network components is effective.

The issue, acceptance and the conditions under which an Access Permit shall be issued are contained in Ausgrid’s Electrical Safety Rules. The Service Provider must work in accordance with the provisions of these Electrical Safety Rules.

The Access Permit must be displayed at the substation at all times while work is being carried out under the Access Permit. Refer to the Electrical Safety Rules for further information, and for details of the Access Permit procedure.

### 6.5 Service provider

In this Network Standard, reference to the term Service Provider includes Accredited Service Providers and Accredited Designers carrying out contestable works, and Ausgrid staff and its contractors carrying out non-contestable works.

Requirements for Accredited Service Providers and Designers are included in ES4 Service Provider Authorisation and the Policy for ASP/1 Premises Connections.
6.6 **Liaison officer**

For contestable works, Ausgrid will appoint a Liaison Officer to assist the Service Provider in all dealings with Ausgrid. The Liaison Officer will accept programs, reports, plans, documentation, etc. from the Service Provider and will arrange for milestone inspections and approvals.

The Liaison Officer will provide specific information on the requirements for each particular substation project.

The Liaison Officer can also provide advice on services available from Ausgrid that may assist the Service Provider in the completion of the project.

**Note:** The Liaison Officer is NOT responsible for the quality or the planning of the project. This is the responsibility of the Service Provider. From time to time during the project, Ausgrid, through the Liaison Officer, will arrange for inspecting of particular features of the project, but the final responsibility for the project rests with the Service Provider.

6.7 **Design life and maintenance periods**

The kiosk substation target design life of 50 years sets particular requirements for the careful selection of materials and equipment and for high standards of workmanship.

Maintenance periods for the substation and substation equipment are specified in the relevant Technical Maintenance Plan.

The Service Provider’s quality of work and materials supplied must be adequate for the kiosk to meet or exceed its design life and maintenance performance requirements.

6.8 **Provision of approved materials**

All materials necessary for contestable work shall be new Approved Materials supplied by the Service Provider and shall be in accordance with the Ausgrid Approved Material List available on the Ausgrid website under Network Standard NS181.

Refer to Section 8 and Annexures A and B; and to NS181 Approval of Materials and Equipment, and Network Standard Variations.

Ausgrid’s ASP Materials Sales can provide Approved Materials from its stores system at commercial rates. Whilst this method of obtaining materials has a number of advantages for Service Providers, it is not compulsory. Materials may instead be purchased directly from the manufacturers, in accordance with the Approved Material List.

To order any of the kiosk substation items from Ausgrid quote the appropriate stockcode number from Annexure B. Kiosk substations are available in kit form from Ausgrid to simplify ordering and handling. Email aspsales@ausgrid.com.au to request a quotation for these materials.

6.9 **Reporting**

The Service Provider shall provide Ausgrid with reports on the project as specified in NS100 Field Recording of Network Assets and NS104, and as indicated in Section 18.

6.10 **Testing and inspecting**

Refer also to the information on substation pre-commission testing in the Policy for ASP/1 Premises Connections.

Where required by the Policy for ASP/1 Premises Connections the Service Provider is responsible for testing, as specified in NS230 Testing of Distribution Substations, to ensure the completed substation is fit for its duty and meets the requirements.

Ausgrid will inspect the work being performed by the Service Provider. The level of inspection carried out on any particular project will depend upon the grade of accreditation of the Service Provider, the complexity of the project and the reports of the Liaison Officer.
6.11 **Warranty**
Refer to Customer Connection Contract documents and the Policy for ASP/1 Premises Connections for details of the responsibility for the warranty, and the warranty period, for contestable work.

Within the two months period prior to the completion of the warranty period, Ausgrid’s Compliance Officer shall carry out an end-of-warranty inspection. This inspection shall consist of at least the following actions:

- Thermographic check of all external electrical connections. This check shall be carried out with the substation in-service and supplying load.
- General in-service inspection of the substation, including assessment of the integrity of the corrosion protection finishes, oil containment of all oil filled equipment, and the integrity of the various fasteners.

6.12 **Environmental constraints**
Refer also to environmental assessment requirements in the Policy for ASP/1 Premises Connections, and to NS174 Environmental Procedures.

6.12.1 **Containment of silt**
The Service Provider shall comply with all EPA and local council regulations and requirements regarding the prevention of silt and other excavated spoil from entering any drain, creek, river or natural watercourse.

6.12.2 **Hours of work**
The Service Provider shall only engage in work at the substation site at times and on days as approved by the local council for the performance of building work.

6.12.3 **Noise restrictions**
The Service Provider shall comply with all relevant regulations and requirements of the EPA and/or the local council to restrict the emission of noise from construction activities.

6.12.4 **Site clean-up**
The Service Provider shall ensure that the kiosk site is left in a clean and tidy condition. The Service Provider shall be responsible for the correct disposal, in accordance with the local council and EPA requirements, of all items requiring disposal resulting from the construction of the substation. Disposal of rubbish and spoil shall comply with all EPA and local council regulations and requirements.

In addition, all ground levels shall be finished to the design levels set by the local council authority.

The Service Provider shall be held responsible for any claims for damages and for clean-up charges, and for the cost of inspecting and rectifying any complaints that are deemed to be reasonable by Ausgrid’s Liaison Officer, or the local council authority, or an inspector of the EPA.

6.13 **Reporting of accidents/incidents**
The Accredited Service Provider is responsible for the reporting of all injuries or accidents that occur to personnel or the general public. The Accredited Service Provider must also report damage to equipment owned by Ausgrid or others. Reports shall be made to the nominated Ausgrid Officer immediately, as well as to statutory authorities as required.

6.14 **Danger signs**
Kiosk substation housings must have two danger signs attached. If the danger signs are not already attached to the housing, or if existing danger signs are damaged or ineffective, the Service Provider shall supply and attach danger signs in accordance with the specifications and requirements indicated in Annexure C.
6.15 **Substation locking and security**

As well as the requirements indicated in Clauses 6.3 and 6.4, substation access, locking and security must comply with Ausgrid’s approved locking system. At the time the kiosk is delivered to site other than when it is already fitted with rim type cylinder locks, it is to be fitted with Contractor New Kiosk Entry ("construction X5") padlocks stockcode 179552. It is the ASP’s responsibility to provide and install these locks, which will be replaced by A000 keyed locks sourced by the ASP on commissioning. Additionally the ASP shall supply the equipment padlocks as detailed in Annexure B.

7.0 **KIOSK DESCRIPTIONS AND TYPES**

7.1 **Kiosk descriptions**

Kiosk distribution substations referred to in this Network Standard are for connection to the primary distribution system, which is a three-phase three-wire AC system generally with a nominal system voltage of 11kV (11,000 volts).

In all cases, the kiosk substation output is a nominal 415/240 volts three-phase four-wire AC supply.

Kiosk substations are connected into the 11kV network by use of either a ring main isolator fuse switch (RMIFS) or a ring main isolator circuit breaker (RMICB). The type of high voltage switch applicable is specified in Table 1. Fuse switches are not to be used unless specified for particular locations by Ausgrid.

Annexure A includes a listing of drawings for each type of kiosk substation, and Annexure B includes stockcodes.

Limitations on siting and usage of the various kiosk types are included in this Network Standard and the following Network Standards:

- NS109 Design Standards for Overhead Developments and Distribution Centres
- NS112 Design Standards for Industrial and Commercial Developments
- NS141 Site Selection and Site Preparation Standards for Kiosk Type Substations.

7.2 **Kiosk types**

7.2.1 **Kiosk type – L – with ring main isolator fuse switch (RMIFS)**

These kiosks are pre-assembled and delivered to site as finished units by the manufacturer. They are suitable for installation throughout Ausgrid’s network, subject to the limitations indicated in this Network Standard and NS109, NS112 and NS141. They are suitable for connection to 11kV radial or closed network feeders.

The RMIFS is connected with the isolators in series with the 11kV feeder and the fuse switch as a branch connection to the transformer.

Transformer ratings for type L are 400kVA, 600kVA, 800kVA and 1000kVA.

The low voltage switchboards are equipped with fused supplies of various configurations and ratings, as specified in Section 8 and Annexure B.

7.2.2 **Kiosk type – K – with ring main isolator circuit breaker (RMICB)**

K type kiosks are pre-assembled and delivered to site as finished units by the manufacturer. The protection relays are not included. These kiosks are suitable for installation throughout Ausgrid’s network, subject to the limitations indicated in this Network Standard and NS109, NS112 and NS141. They are suitable for connection to 11kV radial feeders only.

The RMICB is connected with the isolators in series with the 11kV feeder and the circuit breaker as a branch connection to the transformer. The circuit breaker is capable of making and breaking fault and load current.
Overload and transformer protection is provided which trips the RMICB. Protection details for K kiosks are outlined in Section 11.

The single transformer rating is 1500kVA.

The low voltage switchboard configurations are indicated in Section 8 and Annexure B.

### 7.2.3 Kiosk housings used for control points and for control of supply to high voltage customer installations (HVCs)

The requirements for supply to high voltage customer installations, as included in NS195 High Voltage Connections, must first be satisfied before supply will be provided at high voltage.

Where Ausgrid agrees to the provision of supply at high voltage from equipment installed in a kiosk housing; the use of housing type L will be specified by Ausgrid. The requirements of this Network Standard and NS141 then apply to the extent that they are relevant. Project details will be provided by Ausgrid as indicated in Clause 6.2, and NS195.

**Note:** The standard HVC control point kiosk is fitted with an RMICB having a tee-off circuit breaker rated current of 200Amps, higher rated current tee-off circuit breakers are by project specific specification only.

As well as high voltage switchgear of the type specified by Ausgrid; a kiosk housing used for a control point or for control of supply to a high voltage customer installation must be equipped with a lighting installation and a power installation equivalent to that provided in a kiosk substation of the same type. The kiosk housing will be delivered from the manufacturer with the necessary lighting and power equipment and provisions included. In the case of a kiosk housing supplied with RMICB high voltage switchgear; the relay panel, battery, battery stand and charger will also be included. In the project details, Ausgrid will specify the source of supply for the lighting and power installations. In general, for a kiosk housing used for control of supply to a high voltage customer installation, the source of supply will be the customer’s metered installation. In each case, the installation of cables and other equipment to provide supply to the kiosk lighting and power installations is the responsibility of the customer. Suitable labelling must be attached to each end of each circuit. Where the source of supply is not from within the customer’s metered installation, Ausgrid may charge for energy consumed in a kiosk with battery charger installed, on an ongoing unmetered supply basis.

### 7.3 Maximum demand indicators (MDIs)

#### 7.3.1 Transformer MDI

L and K kiosks are equipped with an MDI which indicates on an ammeter, (i) the maximum of the loadings reached for every 15 minute period since the MDI was last reset, and (ii) the loading on the transformer over the immediately preceding 15 minute period.

Type L kiosks are supplied with dual ratio CTs. When the L kiosk is equipped with a 400 or 600kVA transformer, the kiosk is supplied with CTs connected to the 800/5 ratio. When the L kiosk is equipped with an 800 or 1000kVA transformer, the kiosk is supplied with CTs connected to the 1600/5 ratio.

For details refer to the relevant drawing listed in Annexure B.

#### 7.3.2 Distributor MDIs

K kiosks are equipped with an MDI for each distributor. Current transformers are fitted to each phase of each distributor and wired to links. The MDI is connected to read B phase only. These MDIs are direct reading instruments (ie no K factor applies). The maximum demand is measured over a 15 minute period.

When the kiosk has a 1200/1600A distributor, a dual ratio 1200/1600/5 CT is supplied. The MDI connections at the links and the MDI scale must be changed if necessary to match the fuse size installed.
7.4 Ratings and fault levels
The nominal three-phase fault levels for the various kiosk substation options specified in NS112 and connected to the 11kV network are listed in Table 1. The nominal transformer impedance is selected to limit the fault current at the LV board to the value specified in the table.

Table 1 Nominal three-phase fault levels

<table>
<thead>
<tr>
<th>Substation Type and Transformer Size</th>
<th>High Voltage Switchgear (see Note (d))</th>
<th>Nominal Transformer Impedance %</th>
<th>Nominal Prospective Short Circuit Current at Substation Low Voltage Board (see Notes (a), (b) &amp; (c))</th>
</tr>
</thead>
<tbody>
<tr>
<td>L Kiosk 400 &amp; 600kVA 800 &amp; 1000kVA</td>
<td>RMIFS or Fuse Switch (see Note (e))</td>
<td>4</td>
<td>max. 25kA</td>
</tr>
<tr>
<td>K Kiosk 1500kVA</td>
<td>RMICB</td>
<td>6.25</td>
<td>28kA</td>
</tr>
</tbody>
</table>

**Note (a):** Refer also to Clause 1.10.4 of the Service and Installation Rules of New South Wales June 2015. This clause quotes nominal prospective short circuit current at the point of supply, of 25kA for commercial and industrial areas, and 10kA for suburban residential areas. Unless advised otherwise by Ausgrid, these values should be accepted by customer’s installation designers, as the maximum point of supply values in calculations for equipment fault duty from single transformer substation installations.

**Note (b):** The nominal prospective short circuit currents at the low voltage board, as quoted in Table 1 Column 4, and in Note (a), refer to the maximum point of supply values, relevant for calculations for equipment fault duty. They are not relevant for calculations of consumers’ mains length limitations as specified in NS109 and NS112. In these cases, if calculations are required, the minimum fault levels specified by Ausgrid must be used.

**Note (c):** For kiosk low voltage board fault rating design requirements, refer to Ausgrid’s specifications for each kiosk type. In summary, typical requirements for K kiosks, for example, are:
- Fault making 50kA peak,
- Fault withstand 28kA for 3 secs (at Z Tx 6.5%)

**Note (d):** 11kV system prospective fault levels are typically in the range 7kA to 13kA, however in some areas prospective fault levels may approach 20kA. For 11kV switchgear fault level requirements, refer to Ausgrid’s specifications for each kiosk type. For example, typical requirements for switchgear for K kiosks, are:
- Fault making 40kA peak,
- Fault withstand 16kA for 3 secs.

**Note (e):** Fuse switches are not to be used unless specified for particular locations by Ausgrid.

8.0 LOW VOLTAGE BOARDS

Ausgrid’s standard approved LV boards, as listed below, shall be used for all kiosk type substations. Where the Liaison Officer requires a board other than one of the standard options, the proposed board shall be submitted for approval in accordance with NS181.
LV circuit breakers shall not be used in types L or K kiosk substations.

L and K kiosk substations are supplied with Schneider SAIF LV boards. All L and K type kiosk LV boards for new kiosks installed in Ausgrid’s area shall be the enclosed Schneider SAIF LV boards.

SAIF LV boards have the following options. Refer to the stockcode numbers list in Annexure B for available combinations of transformers and distributors.

- For L type kiosks, SAIF boards may have up to five 400A distributor panels or any of the following combinations, where in each case one of the 400A panels is normally for an open interconnector:
  - 400/800/400
  - 800/400/800
  - 800/400/400/400
  - 1200/400 or 1600/400
  - 1200/400/400 or 1600/400/400

- For K type kiosks:
  - 1 x 2500A Interpact disconnector and 1x 400A interconnector (normally open, connected to the load side terminals).

(The 2500A Interpact disconnector has a visible circuit break when open.)

The SAIF 1600A panel is fully rated and must be equipped with 1600A, 1200A or 1000A “T” type bolt-in LV fuses. The SAIF 800A and 400A panels must be equipped with “J” type characteristic fuse cartridges (92 mm centres). Both the “T” type and “J” type fuse cartridges must have fast operating characteristics as specified by Ausgrid, and must be supplied from Ausgrid stocks.

The SAIF 400A distributor panel strip is intended for termination of one cable per phase (normally 240 mm², up to 300mm²). The termination is covered by an insulated boot designed for one cable. The 800A distributor panel strip is designed for two cables per phase (normally 2 x 240 mm², up to 2 x 300 mm²). This termination is also covered by an insulated boot, designed for the two cables.

Connections to the neutral bar must be made with bolts, washers and nuts of the sizes specified in the drawings. Where the bolt size is not specified, the bolt and bar hole must be of an appropriate size consistent with the diameter of the hole in the lug being attached. Each cable lug must be separately connected under its own bolt or bolts. Cable lugs must be connected directly to the bar. It may be necessary for additional holes to be drilled in the bar. Connection extension pieces, such as bar stubs, flags, etc must not be used. Slotted lugs are not permitted. Full hole compression lugs must be used. Bolts, washers and nuts must be stainless steel grade 316. Lug holes must not be enlarged to accommodate larger bolts. Brass bolts must not be used.

9.0 KIOSK SITING AND CONSTRUCTION

9.1 Kiosk site

It is essential to locate kiosk substations in areas that are well drained and clear of underground and overhead obstructions. The kiosk should preferably not be located near rivers, creeks, natural or man-made watercourses.

For more information on siting of kiosk type substations refer to NS141.

9.2 Kiosk foundations

Refer to NS141 for requirements for kiosk foundations and finished ground levels.

9.3 Oil containment
Kiosk types L and K are designed to contain oil spills. For kiosk type L oil is contained within the concrete base. For K type kiosks an in-built metal tub is provided within the kiosk. Refer to the additional oil containment requirements specified in NS141 and reference drawings.

10.0 SUBSTATION EARTHING

10.1 General
The substation earthing shall be arranged so that:

- the step and touch voltage limits will not be exceeded,
- the flow of fault current will not be restricted due to excessive resistance of the earthing circuit, and
- the short-time current carrying capacity of the earthing conductors and electrodes will not be exceeded.

The integrity of the substation earthing system is critical in providing a safe electricity supply. The earthing system must comply with the requirements of NS116 Design Standard for Distribution Equipment Earthing.

Unless directed otherwise by Ausgrid’s Engineering division, the MEN system of earthing shall be installed throughout the supply network.

The Service Provider shall be responsible for advising the Liaison Officer of any potentially hazardous situation arising from metallic structures in contact with or near the kiosk substation. Such structures include but are not limited to metallic fences, swimming pools, flammable gas or liquid storage tanks, electric railway lines, pipelines, high voltage substations, high voltage transmission lines, operating theatres or similar facilities, communication centres, pits, pillars and metallic sheathed communication cables. Any potentially hazardous situation shall be referred immediately to Ausgrid’s Transmission & Distribution Substation Engineering to allow if necessary for an individual earthing system design for the substation.
10.2 **Earthing arrangement**

A combined system of earthing shall be used consisting of two groups of electrodes, labelled as “Earth Electrodes group A” or “B”. These groups shall be located so as to minimise the interaction effects between them. The electrode system shall be installed as detailed in NS116.

The A and B earth electrode groups shall be independently connected to the earth busbar.

The combined earthing system shall have an in-service impedance not exceeding 1 ohm and an individual electrode group impedance not exceeding 15 ohms when measured in accordance with NS116.

Where the above minimum values of earth impedance cannot be achieved, the Service Provider shall advise the Liaison Officer. In such cases, a special earthing system design will be required for the substation. The Service Provider will be required to obtain Ausgrid’s approval for the design, or to obtain a design from Ausgrid.

Where more than one kiosk is to be installed at a premises (refer to NS141 for Multiple Kiosks), a site specific earthing system design must be obtained for the installations. The Service Provider will be required to obtain Ausgrid’s approval for the design, or to obtain a design from Ausgrid.

Cable connections to the kiosk substation earth bar must be made with bolts, washers and nuts of the sizes specified in the drawings. Where the bolt size is not specified, the bolt and bar hole must be of an appropriate size consistent with the diameter of the hole in the lug being attached. Each cable lug must be separately connected under its own bolt or bolts. Cable lugs must be connected directly to the bar. It may be necessary for additional holes to be drilled in the bar. Connection extension pieces, such as bar stubs, flags, etc must not be used for cable connections. Slotted lugs are not permitted. Full hole compression lugs must be used. Bolts, washers and nuts must be stainless steel grade 316. Lug holes must not be enlarged to accommodate larger bolts. Brass bolts must not be used.

11.0 **PROTECTION EQUIPMENT**

11.1 **General**

Kiosk substations other than type K and HVCs’ fitted with RMICB’s shall have high voltage and low voltage fuse protection. K type kiosks shall have transformer differential and low voltage overcurrent protection schemes installed to trip the RMICB.

For all probable faults and for normal switching conditions, grading of LV distributor and customer fuses with HV fuses and grading of HV fuses with feeder protection, shall be maintained in all cases. (For contestable work, refer also to Clause 6.2.1.)

On LV network distributors the maximum size of fuse shall be 400 amperes.

For contestable work, the Liaison Officer shall include in the Design Information document, protection requirements for the kiosk type substation, including as a minimum requirement:

- the high and low voltage fuse types and ratings to be used for L type kiosks
- the protection schemes to be installed for K type kiosks and HVC RMICB controlled kiosks, including type of protection relays in each scheme, current transformer class and ratio and any special protection requirements for the substation, and the low voltage fuse types and ratings.

11.2 **Protection relays**

As there is no substation SCADA system or DC supply supervision installed in kiosk type substations, Ausgrid’s present standard for protection relays is electromechanical type relays. No electronic or microprocessor relays shall be installed without the prior written approval of the Manager – Transmission & Distribution Substation Engineering.
11.3 **Protection current transformers**

On the high voltage differential current transformers, the current transformer secondary wiring polarity and non-polarity leads shall be a minimum of 4 metres continuous length, 7/0.67 stranded untinned copper conductor PVC insulated, soldered to the CT winding. The leads shall be colour coded, or numbered to ensure that the polarity and non-polarity leads are readily identifiable.

The low voltage differential and overcurrent protection CT’s shall have either a terminal block which is suitable for termination of a 7/0.67 stranded copper conductor fitted with a non-slotted type crimp lug, or shall be supplied with a minimum of 4 metre length of 6mm² stranded untinned copper conductor PVC leads soldered to the CT winding. In both instances the polarity and non-polarity connections of each winding of the current transformer must be available for termination to the protection equipment.

11.4 **Protection battery and battery charger**

The rating of the substation battery shall be 20 volt 10 ampere-hour comprising 16 x 1.25 volt nickel cadmium cells. The cells shall be housed in two PVC battery boxes and mounted on a steel stand fixed to the kiosk housing. The steel stand shall be insulated from the kiosk housing by stand-off insulators or other suitable material to achieve 1kV insulation. The battery charger shall be located as close as practicable to the battery. The charger shall be a 20 volt 15 mA DC rated output and 240 volt AC input suitable for trickle charging the battery. The battery charger shall have no boost charge option available. The battery charger supply is from a dedicated circuit fused on the auxiliary AC supply panel.

11.5 **Protection panels for K type and HVC RMICB controlled kiosks**

The protection panel shall be wired in accordance with Ausgrid’s drawings:

- 187815 Distribution centres RMICB wall mounted transformer protection panel.
- 178232 RMICB substations AC and DC schematic.
- 173997 High Voltage Customer Substation wall mounted protection panel

12.0 **AREAS OF SPECIAL CARE**

12.1 **General**

The experience of Ausgrid and of other supply authorities has shown that certain aspects of substation projects require special care so as to avoid reliability and/or maintenance problems. Service Providers’ attention is drawn to these areas so that they can ensure that special care is given during construction.

12.2 **Siting of kiosk substations**

Refer to NS141.

12.3 **Corrosion**

Kiosk type substations have been designed and constructed with coatings to minimise the effects of corrosion of the outer shell. The Service Provider must ensure that the integrity of these coatings is not compromised by scratches, chips or dents to the surface of the kiosk. Where any defect is detected in the outer surfaces of the kiosk, the Service Provider shall repair the damage to the satisfaction of the Compliance Officer.

12.4 **Cable terminations**

All cable terminations shall be in accordance with NS127 Specification for Low Voltage Cable Joints and Terminations and NS129 11kV Joints and Terminations – Paper Insulated Lead Covered Cables and NS177 11kV Joints (including Transition Joints) and Terminations – Polymeric Insulated Cables.

High voltage terminations shall be of a type approved by Ausgrid. Refer to NS181.
12.5 Cable installation

The high voltage cables shall be installed into the cable end-box of the high voltage switch in such a manner that the earth fault indicator CT’s can be installed over the single core cables and that the current in each of the single core cables can be easily measured using a “tong ammeter”. The earth fault indicator shall be mounted on the right hand side “B” feeder switch when viewed from the front.

Wherever practicable, where a HV phase cross is required for the substation to phase to the existing HV network, the cross is to be done in the cables between the HV switchgear and the HV terminals of the transformer.

In all kiosk type substations, the low voltage cables shall be installed in such a manner that the current in each of the single core cables can be easily measured using a “tong ammeter”. The use of spreaders will normally be required.

Generally, cables are to be direct laid within the kiosk easement. However in some instances Ausgrid may require cables to be installed in conduits. In such situations, at the entry holes in the kiosk base for high voltage and low voltage cables, conduit bends should be positioned carefully so as to facilitate installation of cables to their intended connection points at the high voltage switchgear and low voltage board. The high voltage conduit ends must line up as closely as possible with the cable entry points on the high voltage switchgear, so as to minimise the bending of cables. Similarly, the low voltage conduit ends must line up as closely as possible with the relevant cable connection points on the low voltage panel. Ausgrid will not accept excessive bending of cables, so failure to observe this requirement could necessitate costly relocation of conduit bends that may have been embedded in concrete.

All cables must be adequately supported to prevent undue stress on terminations.

12.5.1 Consumers mains

The following table outlines the restrictions on the maximum number and size of consumers mains cables that can be terminated at the low voltage board of kiosk customer substations:

<table>
<thead>
<tr>
<th>LV Panel Rating</th>
<th>Maximum Number of Cables per Phase</th>
<th>Maximum Size of Cables</th>
</tr>
</thead>
<tbody>
<tr>
<td>400Amp</td>
<td>1</td>
<td>300mm2 CU1XQZ</td>
</tr>
<tr>
<td>800Amp</td>
<td>2</td>
<td>300mm2 CU1XQZ</td>
</tr>
<tr>
<td>1200/1600Amp</td>
<td>4 (see Note)</td>
<td>500mm2 CU1XQZ</td>
</tr>
<tr>
<td>Interpact 2500Amp</td>
<td>4 (see Note)</td>
<td>500mm2 CU1XQZ</td>
</tr>
<tr>
<td>Switch Disconnector</td>
<td>3 (see Note)</td>
<td>630mm2 CU1XQZ</td>
</tr>
</tbody>
</table>

Note: It is essential to ensure that all consumers’ mains cable lugs, when terminated on the 1600/1200A panel or the “Interpact” Disconnector, are adequately insulated phase to phase. If necessary, supplementary insulation shall be added around the lugs. In all cases where more than two cables per phase are used, supplementary insulation will be required around the lugs between phases.

Equivalent sized fire rated cables can also be used, with the exception of MIMS cables.
12.6 Phasing
The connections within the kiosk type substation together with its high and low voltage cabling must “phase” with the surrounding high and low voltage networks. Phasing of the substation means the phase orientation of the high and low voltage cables and connections will exactly match with the phase orientation of the surrounding network.

The Service Provider is responsible for designing the cable installation such that it will phase with the existing and/or the new primary and secondary distribution systems. Phasing details will be provided by Ausgrid as part of the Design Information for contestable works.

The phasing of the new substation will be tested by Ausgrid at the time of commissioning. The Service Provider must be in attendance at the time of commissioning and will be responsible for any required alterations resulting from incorrect phasing.

Each kiosk with a SAIF low voltage board is to have phase labels attached. Unless Ausgrid staff elect to attach the labels, the labels must be attached by the Service Provider under the direction of Ausgrid staff, when the phasing is being tested.

Phase labels must comply with the requirements of NS158 Labelling of Mains and Apparatus, and must be attached as follows:

- Phase labelling must be attached to the right hand side (RHS) frame of the low voltage board in the correct phase sequence from top to bottom, eg ABC, or CBA, or BCA.
- A label must be placed on the inside of the RHS low voltage door to indicate the high voltage to low voltage phasing, eg ABC --- abc, or ABC --- cba if there is an a to c low voltage cross.

The main busbars of the switchgear frame are horizontal (top, middle & bottom) and the switchgear must be marked as follows to ensure the correct relationship between distributor connections:

- The left hand side (LHS) framework of the LV board will be marked T (top), M (middle) and B (bottom).
- The 400A and 800A cable connection busbars to be stamped T, M, B.
- The MDI designation labels to be marked T, M, B below each set of MDI CT links.
- The voltage test point fuses to be marked T, M, B below each fuse.
- The switchgear should come with these markings already installed by the switchgear manufacture, if not, they must be installed on-site with suitable labels. The markings must not be removed or otherwise obliterated.

12.7 Stainless steel bolts and set-screws – lubrication of threads
Before installation of each stainless steel bolt or set-screw, the thread shall be lubricated with specially formulated anti-seize grease containing nickel (eg Loctite Nickel Anti-Seize, or equivalent). Ausgrid stockcode is 177212.

Where the lubricating grease will be in contact with an electrical insulating medium (eg heatshrink), the supplier of the insulating medium shall be consulted to ensure product compatibility.

13.0 KIOSK EQUIPMENT PROCUREMENT

13.1 Approved materials
Only materials approved by Ausgrid shall be used in the equipping of distribution substations. These materials shall comply with the requirements of Ausgrid’s specifications. Refer to NS181.

Refer also to Clause 6.8 for information on provision of Approved Materials from Ausgrid.
Materials must be type and/or routine tested at the manufacturer’s works in accordance with the Ausgrid Specification for Procurement and/or the relevant Australian Standard. Should an Australian Standard not exist, the relevant International Standard or the standard referred to in Ausgrid’s Specification for Purchase shall apply. Where there is a discrepancy between the Australian (or International) Standard and Ausgrid’s Specification for Purchase, Ausgrid’s Specification for Purchase shall apply.

Acceptance testing and pre-commissioning testing by Ausgrid, or a third party nominated by Ausgrid, may be required for individual types of equipment as listed below. Refer also to Section 14.

- high voltage switchgear
- transformers
- protection relays
- high and low voltage fuses
- high and low voltage cables
- high and low voltage termination kits
- protection and metering current transformers and auxiliary transformers

13.2 Transformers
Transformers shall comply with the latest Ausgrid specification for purchase of distribution transformers. This specification includes the required transformer impedance percent and the tapping range. Table 1 of Clause 7.4 indicates nominal impedances for the transformer sizes and kiosk types shown.

13.3 High Voltage switchgear

13.3.1 Ring main isolator fuse switch (RMIFS)
RMIFS shall comply with the latest Ausgrid specification for the purchase of 11kV RMIFS.

All RMIFS shall be fitted with fuse cartridges having striker pins.

13.3.2 Fuses
The correct use of HV and LV fuses is critical to the reliable and safe supply of electricity and shall be in accordance with Ausgrid’s Approved Material List.

13.3.3 Ring main isolator circuit breaker (RMICB)
RMICBs shall comply with the latest Ausgrid specification for the purchase of 11kV RMICBs. The RMICB tee-off circuit breaker shall have a nominal minimum rated current of 200Amps.
14.0 TESTING

Refer to NS230, Testing of Distribution Substations for all testing requirements

15.0 INSPECTION

Ausgrid will inspect the work being carried by the Service Provider, the Service Provider’s employees and sub-contractors.

The level of inspection carried out on any particular project will depend upon the:

- grade of accreditation of the Service Provider for contestable work,
- complexity and criticality of the particular project, and
- reports of the project’s Liaison Officer.

Inspections may take two broad forms; review of progress inspections and milestone inspections.

**Review of progress inspections**: are general inspections normally carried out by the project’s Compliance Officer. Review of progress inspections are intended to keep the Compliance Officer up to date with the project’s progress, to maintain good working relationships, and to assist in the smooth running of the project.

**Milestone inspections**: are specifically arranged to inspect a particular aspect of the project. The project’s Compliance Officer will nominate the milestones for each particular project in accordance with relevant Ausgrid requirements.

Once the substation testing is complete, a final inspection shall be carried out by the Service Provider and a report produced to ensure:

- the substation is complete to the relevant drawings and is ready for service
- all operational and asset numbers and labels are correctly in place
- all danger signs and warning signs are correctly in place
- all work has been performed in a tradesperson-like manner and is fit for purpose.

Following the successful completion of the above inspection, all personnel involved in the construction shall be advised that the construction phase of the project is complete and that access is no longer available without the relevant safety procedures being adopted. The Equipping Permit shall then be signed-off and left on-site in its holder.

16.0 COMMISSIONING

The commissioning of the kiosk type substation must be carried out by Ausgrid. The Service Provider shall attend the commissioning to rectify any defects detected during commissioning and to witness the phasing tests.

17.0 ACCEPTANCE

Following a satisfactory final inspection, the construction of the kiosk type substation shall be accepted at a time prior to the commissioning of the substation. The date of acceptance of the substation shall initiate the start of the warranty period. Refer also to Clause 6.11.
Acceptance has the same meaning as Practical Completion in Customer Connection Contract documents.

Acceptance shall occur on the date on which Ausgrid’s Liaison Officer determines that all of the following requirements have been satisfied.

- the works have been completed in accordance with the Certified Design,
- the works are free from Major Defects,
- all fees and charges payable in respect to the works have been paid to Ausgrid,
- all required certificates and all required agreements for leases, easements and rights-of-way have been provided,
- satisfactory test reports and inspection reports have been made available to Ausgrid,
- all danger signs and warning signs are correctly in place,
- all equipment reports have been made available to Ausgrid.

18.0 REPORTING

The Service Provider shall provide Ausgrid with reports on the project as indicated below. Refer also to Clause 6.9.

For a single substation with no complications or delays during construction, a single report is required. This report is to be submitted immediately following the successful commissioning of the substation. For projects involving multiple substations or complications during the procurement or construction phases, the Liaison Officer may require intermediate reports.

“As Constructed” Changes. For contestable work, the design should be reviewed and any “as constructed” changes noted. All “as constructed” changes to the design, including the project identification, project location, substation model and operational details should be re-submitted together with a statement confirming the accuracy. (Note that any proposed changes from the project details provided in the Design Information document must be approved by the Liaison Officer before being implemented by the Service Provider.)

For non-contestable work, “as constructed” changes must be reported as specified in NS104.

Asset Details – Substation Inventory List. Full details of the significant components of the substation must be reported. Significant components include the HV and LV switchgear units, the LV surge arresters, the transformer, the earthing system and any options fitted.

Test Reports. The formal test reports of the insulation resistance, voltage withstand, earthing impedance and substation inspection, must be provided.

The Service Provider shall provide the Liaison Officer with the following information:

- Transformer nameplate details
- High voltage switchgear nameplate details
- Low voltage switchgear nameplate details
- Low voltage surge arrester details
- High and low voltage fuse type and size
- MDI type, size and constant “K”
- CT type and size (for MDI circuit)
- Transformer tapping ratio setting
- A copy of the formal test results, and all field recordings
- A description of the access/site restrictions for the kiosk.
The results of the tests required by NS230, Test of Distribution Substations, shall be reported to the Liaison Officer.

The Service Provider shall complete a previously approved itemised checklist for the substation construction and provide it to the Liaison Officer.

All information shall be produced and provided to the Liaison Officer in both hard and soft copy. The soft copy must be in a format compatible with AutoCad (.dwg or .dxf) or Adobe Acrobat (.pdf).

19.0 RECORDKEEPING

The table below identifies the types of records relating to the process, their storage location and retention period.

<table>
<thead>
<tr>
<th>Type of Record</th>
<th>Storage Location</th>
<th>Retention Period*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approved copy of the network standard</td>
<td>BMS Network sub process Standard – Company</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Draft Copies of the network standard during amendment/creation</td>
<td>HPRM Work Folder for Network Standards (HPRM ref. 2014/21250/241)</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Working documents (emails, memos, impact assessment reports, etc.)</td>
<td>HPRM Work Folder for Network Standards (HPRM ref. 2014/21250/241)</td>
<td>Unlimited</td>
</tr>
</tbody>
</table>

* The following retention periods are subject to change eg if the records are required for legal matters or legislative changes. Before disposal, retention periods should be checked and authorised by the Records Manager.

20.0 AUTHORITIES AND RESPONSIBILITIES

For this network standard the authorities and responsibilities of Ausgrid employees and managers in relation to content, management and document control of this network standard can be obtained from the Company Procedure (Network) – Production / Review of Engineering Technical Documents within BMS. The responsibilities of persons for the design or construction work detailed in this network standard are identified throughout this standard in the context of the requirements to which they apply.

21.0 DOCUMENT CONTROL

<table>
<thead>
<tr>
<th>Content Coordinator</th>
<th>Manager-Transmission and Distribution Substations Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution Coordinator</td>
<td>Senior Engineer-Guidelines, Policies and Standards</td>
</tr>
</tbody>
</table>
### Table A1 List of drawings for L type kiosks

<table>
<thead>
<tr>
<th>Drawing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>242582</td>
<td>L type 1000kVA kiosk general arrangement (2 sheets)</td>
</tr>
<tr>
<td>242583</td>
<td>L type 800kVA kiosk general arrangement (2 sheets)</td>
</tr>
<tr>
<td>242584</td>
<td>L type 600kVA kiosk general arrangement (2 sheets)</td>
</tr>
<tr>
<td>242585</td>
<td>L type 400kVA kiosk general arrangement (2 sheets)</td>
</tr>
<tr>
<td>242586</td>
<td>L type kiosk reinforced concrete base – with oil containment</td>
</tr>
<tr>
<td>228905</td>
<td>L kiosk concrete base galvanised infill panel</td>
</tr>
<tr>
<td>242587</td>
<td>3 x 400A LV board general arrangement</td>
</tr>
<tr>
<td>242588</td>
<td>4 x 400A LV board general arrangement</td>
</tr>
<tr>
<td>242589</td>
<td>5 x 400A LV board general arrangement</td>
</tr>
<tr>
<td>242590</td>
<td>2 x 400A, 1 x 800A, LV board general arrangement</td>
</tr>
<tr>
<td>242591</td>
<td>1 x 400A, 1 x 1600A, LV board general arrangement</td>
</tr>
<tr>
<td>242592</td>
<td>1 x 400A, 2 x 800A, LV board general arrangement</td>
</tr>
<tr>
<td>242593</td>
<td>2 x 400A, 1 x 1600A LV board general arrangement</td>
</tr>
</tbody>
</table>

### Table A2 List of drawings for K type kiosks

<table>
<thead>
<tr>
<th>Drawing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>242594</td>
<td>K type kiosk general arrangement</td>
</tr>
<tr>
<td>151190</td>
<td>K type kiosk layout option plan</td>
</tr>
<tr>
<td>242595</td>
<td>2500A Interpact disconnector with normally open 400A distributor wired to the load side terminals</td>
</tr>
<tr>
<td>242596</td>
<td>K type kiosk transformer protection panel wiring diagram (4 sheets)</td>
</tr>
<tr>
<td>52474</td>
<td>Loom method of panel wiring</td>
</tr>
</tbody>
</table>
### Table A3 List of drawings for HVC kiosks

<table>
<thead>
<tr>
<th>Drawing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>115248</td>
<td>Distribution substation link identification label details</td>
</tr>
<tr>
<td>237230</td>
<td>RMICB single transformer substations AC &amp; protection schematics (2 sheets)</td>
</tr>
<tr>
<td>237229</td>
<td>High Voltage Customer Substation wall mounted protection panel</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High Voltage Customer (HVC) control Kiosk (Schneider T2 enclosure)</th>
</tr>
</thead>
<tbody>
<tr>
<td>242597</td>
</tr>
<tr>
<td>242598</td>
</tr>
<tr>
<td>242599</td>
</tr>
<tr>
<td>242607</td>
</tr>
</tbody>
</table>
Annexure B – Stockcode Numbers

B1 Purchase arrangements
Kiosk substation items are available for purchase from Ausgrid. Requests should be directed aspsales@ausgrid.com.au and should include the appropriate stockcode number.

B2 L, K and HVC type kiosks
Table B1 Stockcodes for L,K and HVC type kiosks

<table>
<thead>
<tr>
<th>Stockcode</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L type kiosk stockcodes (T2)</strong></td>
<td></td>
</tr>
<tr>
<td>178155</td>
<td>1000kVA Tx with RMI and 5 x 400A LV board</td>
</tr>
<tr>
<td>179591</td>
<td>1000kVA Tx with RMI and 1 x 800A, 3 x 400A LV board</td>
</tr>
<tr>
<td>176621</td>
<td>1000kVA Tx with RMI and 2 x 800A, 1 x 400A LV board</td>
</tr>
<tr>
<td>178281</td>
<td>1000kVA Tx with RMI and 1 x 1600A, 1 x 400A LV board</td>
</tr>
<tr>
<td>178282</td>
<td>1000kVA Tx with RMI and 1 x 1600A, 2 x 400A LV board</td>
</tr>
<tr>
<td>176863</td>
<td>800kVA Tx with RMI and 4 x 400A LV board</td>
</tr>
<tr>
<td>179115</td>
<td>800kVA Tx with RMI and 5 x 400A LV board</td>
</tr>
<tr>
<td>176864</td>
<td>800kVA Tx with RMI and 400/800/400 LV board</td>
</tr>
<tr>
<td>176865</td>
<td>800kVA Tx with RMI and 2 x 800A, 1 x 400A LV board</td>
</tr>
<tr>
<td>179622</td>
<td>800kVA Tx with RMI and 1 x 800A, 3 x 400A LV board</td>
</tr>
<tr>
<td>178538</td>
<td>800kVA Tx with RMI and 1 x 1200A, 2 x 400A LV board</td>
</tr>
<tr>
<td>176866</td>
<td>800kVA Tx with RMI and 1 x 1200A, 1 x 400A LV board</td>
</tr>
<tr>
<td>176847</td>
<td>600kVA Tx with RMI and 3 x 400A LV board</td>
</tr>
<tr>
<td>176848</td>
<td>600kVA Tx with RMI and 4 x 400A LV board</td>
</tr>
<tr>
<td>176849</td>
<td>600kVA Tx with RMI and 1 x 800A, 2 x 400A LV board</td>
</tr>
<tr>
<td>176850</td>
<td>600kVA Tx with RMI and 1 x 1200A, 1 x 400A LV board</td>
</tr>
<tr>
<td>176837</td>
<td>400kVA Tx with RMI and 3 x 400A LV board</td>
</tr>
<tr>
<td>176839</td>
<td>400kVA Tx with RMI and 4 x 400A LV board</td>
</tr>
<tr>
<td>176838</td>
<td>400kVA Tx with RMI and 1 x 800A, 2 x 400A LV board</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stockcode</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>K type kiosk stockcodes (Schneider T3)</strong></td>
<td></td>
</tr>
<tr>
<td>178853</td>
<td>1500kVA Tx with RMICB and Interpact disconnector &amp; 1 x 400A LV board</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stockcode</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Voltage Customer (HVC) control Kiosk (Schneider T2 enclosure)</strong></td>
<td></td>
</tr>
<tr>
<td>179713</td>
<td>RMICB Kiosk for Control of HVCs with 200Amp rated Tee-off circuit breaker</td>
</tr>
</tbody>
</table>
### B3 Miscellaneous Items

#### Table B2 Stockcodes for Miscellaneous Items used with kiosks

<table>
<thead>
<tr>
<th>Stock code</th>
<th>Item</th>
<th>Schneider T2 400-800kVA L kiosk</th>
<th>Schneider T2 1000kVA L kiosk</th>
<th>Schneider T1 kiosk</th>
<th>Schneider T3 kiosk</th>
<th>Wilson T2 400-800kVA L kiosk</th>
<th>Schneider T2 HVC L kiosk</th>
</tr>
</thead>
<tbody>
<tr>
<td>175092</td>
<td>Z1 Padlock (substation)</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>179552</td>
<td>X5 Padlock (construction)</td>
<td>As required</td>
<td>As required</td>
<td>As required</td>
<td>As required</td>
<td>As required</td>
<td>As required</td>
</tr>
<tr>
<td>H46498</td>
<td>Z5 Padlock (operator)</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>182854</td>
<td>Z6 Padlock (operator small)</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Table B3 Fuse and fuse cartridge stockcodes

<table>
<thead>
<tr>
<th>Stockcode</th>
<th>Description</th>
<th>Tx kVA Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>85704</td>
<td>315A LV J Type Fuse Cartridge (SAIF Board)</td>
<td></td>
</tr>
<tr>
<td>85738</td>
<td>400A LV J Type Fuse Cartridge (SAIF Board)</td>
<td></td>
</tr>
<tr>
<td>85753</td>
<td>630A LV J Type Fuse Cartridge (SAIF Board)</td>
<td></td>
</tr>
<tr>
<td>177871</td>
<td>800A LV J Type Fuse Cartridge (SAIF Board)</td>
<td></td>
</tr>
<tr>
<td>85639</td>
<td>1000A LV T Type Fuse Cartridge (SAIF Board)</td>
<td></td>
</tr>
<tr>
<td>85654</td>
<td>1200A LV T Type Fuse Cartridge (SAIF Board)</td>
<td></td>
</tr>
<tr>
<td>85647</td>
<td>1600A LV T Type Fuse Cartridge (SAIF Board)</td>
<td></td>
</tr>
<tr>
<td>181951</td>
<td>100A DIN HV Fuse (RM6/SAFELINK)</td>
<td>1000 &amp; 800 kVA</td>
</tr>
<tr>
<td>89631</td>
<td>80A DIN HV Fuse (RM6/SAFELINK)</td>
<td>600kVA</td>
</tr>
<tr>
<td>88005</td>
<td>40A DIN HV Fuse (RM6/SAFELINK)</td>
<td>400 &amp; 315kVA</td>
</tr>
</tbody>
</table>
Annexure C – Danger Signs for Attachment to Kiosk Housings

C1 L and K type kiosks

Danger signs for these kiosks are fitted originally by the manufacturer.

If the original signs have been removed, or are damaged or ineffective, replacement signs complying with the following specifications must be attached:

- One sign is to be located at the high voltage end and one sign at the low voltage end, both visible from normal access points.
- The signs shall be either on:
  (i) stick-on Scotchlite (or equivalent) reflective sheeting, or
  (ii) aluminium sheeting.
- The signs shall comply with AS 1319 Safety signs for the occupational environment for colours and lettering dimensions.
- The dimensions of the signs shall be 350 mm wide x 175 mm high.
- The wording of the signs shall be as indicated below.
- The signs shall be in accordance with Ausgrid drawing 153366.
- Complying signs are available on Ausgrid stockcode 177281 for the stick-on sign, and stockcode 177282 for the sign on aluminium sheeting.
- Aluminium sheeting signs shall be attached with suitable sized rivets. A small amount of non-acid cure silicon sealant must be applied to the rivet holes before the sign is riveted in place.

Caution 1. If it is necessary to replace or retrofit a metal danger sign after the kiosk substation is commissioned; the work must be carried out in accordance with the requirements of Ausgrid’s Electrical Safety Rules.

Caution 2. Danger signs must not be attached in any position where drilling for the attachments, or fixing of the attachments, could possibly endanger the person attaching the sign, or any other persons, or cause damage to the equipment in the kiosk substation.

Figure C1 Danger sign for J, L and K type kiosks
Annexure D – Sample Compliance Checklist

Network Standard Checklist Form

NS17 Design and Construction Standards for Kiosk Type Substations

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Refer Clause</th>
<th>Completed/Actioned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>This Network Standard specifies the electrical design and construction requirements for kiosk substations for installation on Ausgrid’s network. Requirements are included for standard ratings up to 1500kVA, to provide three-phase four-wire nominal 415 / 240 volt supply.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>General Information and Kiosk Types</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>All materials used are free of Asbestos or asbestos related products.</td>
<td>5</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>2</td>
<td>All work undertaken in accordance with Ausgrid’s Electrical Safety Rules.</td>
<td>6.1</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>3</td>
<td>Equipping and Access permits are issued during construction.</td>
<td>6.3 and 6.4</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>4</td>
<td>All materials used to be either supplied by Ausgrid or approved by Ausgrid as meeting the relevant specifications</td>
<td>6.8</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>5</td>
<td>Reports provided to Ausgrid in accordance with NS 100 Field recording of network assets and NS164 Specification for Electrical Network Project Design Plans.</td>
<td>6.9</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>6</td>
<td>Environmental constraints met.</td>
<td>6.12</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>7</td>
<td>Danger signs fitted to kiosk housing as required.</td>
<td>6.14</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>8</td>
<td>Substation access, locking and security complies with Ausgrid’s approved</td>
<td>6.15</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Refer Clause</td>
<td>Completed/Actioned</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>9</td>
<td>Kiosk design is in accordance with requirements.</td>
<td>7</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>10</td>
<td>LV Board used complies with requirements</td>
<td>8</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td></td>
<td><strong>Siting, Construction, Protection and Areas of Special Care</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Kiosk siting and foundations meet requirements of Section 9 and NS141.</td>
<td>9</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>12</td>
<td>Oil containment requirements for kiosk bases is in accordance with requirements and all cable ducts sealed.</td>
<td>9.3</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>13</td>
<td>Earthing system arrangement is in accordance with the requirements of Cl. 10.2 and NS116 Design Standards for Distribution Equipment Earthing</td>
<td>10.2</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>14</td>
<td>For multiple kiosk installations as a premise a site specific earthing system design was prepared.</td>
<td>10.2</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>15</td>
<td>All cable connections to the kiosk made with bolts washers and nuts as specified in the standard drawings and the connections made in accordance with the requirements of this clause.</td>
<td>10.2</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>16</td>
<td>Protection Requirements met in accordance with Section 11.</td>
<td>11</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>17</td>
<td>Integrity of coatings to the outer shell (housing) of kiosks is maintained to limit effect of corrosion.</td>
<td>12.3</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>18</td>
<td>Cable terminations have been made in accordance with NS127, NS129 and NS17.</td>
<td></td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>19</td>
<td>Specific requirements relating to cable installation (and application of phasing crosses) meets the requirements of this clause.</td>
<td>12.5</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>20</td>
<td>The maximum number and size of consumers mains is in accordance with table 2 in this clause.</td>
<td>12.5.1</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>21</td>
<td>The phasing of the cable connections within the substation have been checked and installed in accordance with requirements.</td>
<td>12.6</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>22</td>
<td>Stainless steel bolts lubricated with anti-seize grease.</td>
<td>12.8</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td></td>
<td><strong>Procurement, Testing, Inspection and Commissioning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>All testing requirements in accordance with NS230 Testing of Distribution Substations</td>
<td>14</td>
<td>Yes/No/NA</td>
</tr>
<tr>
<td>24</td>
<td>Commissioning of kiosk substation by Ausgrid staff.</td>
<td>16</td>
<td>Yes/No/NA</td>
</tr>
</tbody>
</table>

Notes:

The signatures panel of this document has been removed for privacy considerations. The remainder of the document is unchanged.