

# Network Standard

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NW000-S0081

NS195 HIGH VOLTAGE CUSTOMER CONNECTIONS (HVCs)



## ISSUE

For issue to all Ausgrid and Accredited Service Providers' staff involved with the connection of High Voltage Installations to the Distribution System, 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](http://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Where this standard is issued as a controlled document replacing an earlier edition, remove and destroy the superseded document.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 2017 (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 to Ausgrid. 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.

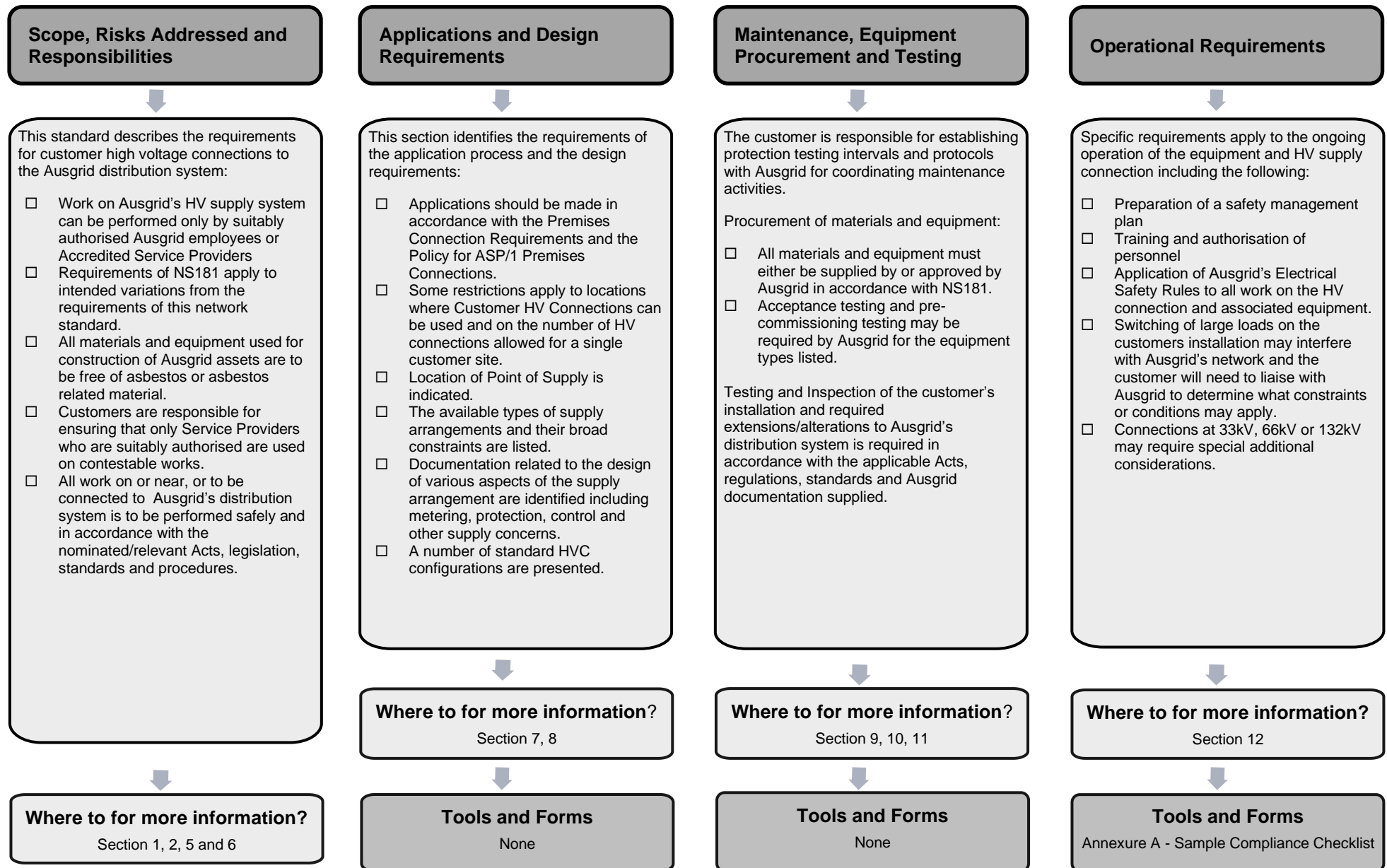
## KEYPOINTS

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



# Network Standard NS195 High Voltage Customer Connections (HVCs)

## Contents

<b>1.0</b>	PURPOSE .....	6
<b>2.0</b>	SCOPE .....	6
<b>3.0</b>	REFERENCES .....	6
3.1	Ausgrid documents .....	6
3.2	Other standards and documents.....	7
3.3	Acts and regulations.....	7
<b>4.0</b>	DEFINITIONS .....	8
<b>5.0</b>	ASBESTOS.....	9
<b>6.0</b>	RESPONSIBILITIES.....	9
6.1	Customers.....	9
6.2	General.....	9
<b>7.0</b>	APPLICATION FOR CONNECTION AND SUPPLY .....	10
<b>8.0</b>	DESIGN REQUIREMENTS .....	10
8.1	General.....	10
8.2	Customer’s electrical installation.....	10
8.2.1	General.....	10
8.2.2	Connection Point.....	10
8.2.3	HV metering .....	12
8.2.4	Protection .....	12
8.2.5	Supply voltage and transformers .....	12
8.2.6	Power factor .....	12
8.2.7	Consumer’s mains.....	12
8.2.8	Multiple HV supplies.....	12
8.2.9	Auxiliary low voltage supply .....	13
8.3	Ausgrid’s distribution, sub-transmission and transmission systems .....	13
8.3.1	Distribution system design and construction.....	13
8.3.2	Ausgrid HVC.....	13
8.3.3	Standard HVC configurations.....	14
8.3.4	Protection .....	14
8.3.5	Earth Fault Indicators (EFIs) .....	15
8.3.6	Equipment identification numbers .....	15
<b>9.0</b>	MAINTENANCE REQUIREMENTS AND COORDINATION PROTOCOLS.....	15
<b>10.0</b>	EQUIPMENT PROCUREMENT .....	15
10.1	Approved materials .....	15
10.2	Pole mounted recloser/intellirupter .....	16
10.3	Circuit breakers .....	16
10.4	Ring Main Isolator Circuit Breaker (RMICB) .....	16
<b>11.0</b>	TESTING AND INSPECTION.....	16
11.1	Customer’s installation .....	16
11.2	Ausgrid’s distribution system .....	16

**12.0** OPERATIONAL REQUIREMENTS ..... 16

    12.1 Installation safety management plan ..... 16

        12.1.1 Operating procedures..... 16

        12.1.2 Maintenance procedures..... 17

    12.2 Training/authorisation of personnel..... 17

    12.3 Switching to enable work on respective networks ..... 17

    12.4 Switching of large loads ..... 17

**13.0** 33KV, 66KV AND 132 KV CONNECTIONS ..... 17

**14.0** RECORDKEEPING ..... 18

**15.0** AUTHORITIES AND RESPONSIBILITIES ..... 18

**16.0** DOCUMENT CONTROL..... 18

ANNEXURE A – LIST OF DRAWINGS..... 19

ANNEXURE B – SAMPLE COMPLIANCE CHECKLIST ..... 20

## 1.0 PURPOSE

This document has been prepared to meet the needs of Ausgrid, Accredited Service Providers and Customers. The requirements specified in this Network Standard are supplementary to the Australian Wiring Rules AS 3000, Australian Standard AS2067-Substations and high voltage installations exceeding 1kV a.c., Service and Installation Rules of NSW and other related Ausgrid's Electricity Supply Standards and Network Standards as outlined in this document which specify minimum requirements for High Voltage Customer Connections (HVCs).

Work on Ausgrid's HV supply system can only be performed by suitably authorised employees of Ausgrid or, for contestable work, by Accredited Service Providers accredited to carry out contestable work in NSW as managed by Department of Planning & Environment. Every employee of an Accredited Service Provider required to work on or near live mains must first be an Authorised Person as detailed in Ausgrid's publication ES 4 Service Provider Authorisation.

The requirements of this standard must always be adhered to. Any departures from this Standard or the Service and Installation Rules must be submitted to Ausgrid for approval prior to their implementation in accordance with the requirements of NS181 Approval of Materials and Equipment and Network Standard Variations.

## 2.0 SCOPE

This standard applies to high voltage customer connections throughout Ausgrid's supply area.

## 3.0 REFERENCES

A list of other documents (standards, codes, acts, annexure, policies and other procedures etc) related to the document being prepared or updated. Internal documents that are referenced are those that are above or at peer level of the document in the document hierarchy.

### 3.1 Ausgrid documents

- Bushfire Risk Management Plan
- Company Form (Governance) - Network Document Endorsement and Approval
- Company Procedure (Governance) - Production / Review of Network Standards
- Company Procedure (Governance) - Network Document Endorsement and Approval
- Customer Installation Safety Plan
- Electrical Safety Rules
- Electricity Network Safety Management System Manual
- ES 1 Premises Connection Requirements
- ES 3 Metering Installations
- NEG-OH21 Vegetation Safety Clearances
- NS104 Network Project Design Plans
- NS113 Site Selection and Civil Design Standards for Chamber Type Substations
- NS114 Electrical Design and Construction Standards for Chamber Type Substations
- NS116 Design Standards for Distribution Earthing
- NS117 Design and Construction Standards for Kiosk Type Substations
- NS126 Specification for Design and Construction of High Voltage Overhead Mains
- NS128 Specification for Pole Installation and Removal
- NS130 Specification for Laying of Underground Cables up to 22kV
- NS135 Specification for Design and Construction of Overhead Sub-transmission Lines
- NS141 Site Selection and Site Preparation Standards for Kiosk Type Substations
- NS143 Easements
- NS148 Overhead Line Support, Street Light Column, Pit and Pillar Numbering
- NS149 Drawing Content for Chamber Type Substations, Control Points, Cable Risers and Ductlines
- NS156 Working Near or Around Underground Cables

- NS158 Labelling of Mains and Apparatus
- NS161 Specification for Testing of Underground Cables
- NS167 Positioning of Poles and Lighting Columns
- NS168 Specification for the Design and Construction of Underground Sub-transmission Lines
- NS174 Environmental Procedures
- NS177 11kV Joints (including Transition Joints) and Terminations – Polymeric Insulated Cables
- NS181 Approval of Materials and Network Standard Variations
- NS212 Integrated Support Requirements for Ausgrid Network Assets
- Policy for ASP/1 Premises Connections
- Public Electrical Safety Awareness Plan
- Tree Safety Management Plan

### **3.2 Other standards and documents**

- AS 2067 Substation and high voltage installations exceeding 1 kV a.c.
- AS 2467 Maintenance of Electrical Switchgear
- AS/NZS 3000 Wiring Rules
- EA 18 Guide to the Training of Personnel Working on or near Electricity Works
- ENA Doc 001-2008 National Electricity Network Safety Code
- ISSC 3 Guideline for Managing Vegetation Near Power Lines
- ISSC 14 Guide to Electrical Worker's Safety Equipment
- Service and Installation Rules of NSW

### **3.3 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 2017

## 4.0 DEFINITIONS

<b>Accredited Service Provider (ASP)</b>	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).
<b>Authorised Person</b>	Person employed by a Service Provider who has been granted permission in writing by Ausgrid after demonstrating to the authorising officer that they have the necessary safety training, qualifications and competence to perform Authorised Work.
<b>Authorised Work</b>	Specified works on or near Ausgrid's transmission and/or distribution system.
<b>Business Management System (BMS)</b>	An Ausgrid internal integrated policy and procedure framework that contains the approved version of documents.
<b>Contestable Work</b>	Works (including design), funded by the Customer, required to enable a new or altered connection and where the Customer may choose the Service Provider to carry out the works.
<b>Customer</b>	A Customer is an individual or an entity who has applied for connection services such as a new or altered connection to the network.
<b>Customer's Installation</b>	Consumer's Installation as per Service and Installation Rules including metering equipment and the Consumer's Mains.
<b>Consumer's Mains</b>	Consumer's Mains are the conductors between the <b>Connection Point</b> and the main switchboard and form part of a Customer's Installation.
<b>Distribution System</b>	Distribution system means the electricity power lines and associated equipment and electricity structures and accommodation that are used to convey and control the conveyance of electricity to the premises of wholesale and retail customers. This includes Distribution mains and service mains.
<b>Document control</b>	Ausgrid employees who work with printed copies of document must check the BMS regularly to monitor version control. Documents are considered "UNCONTROLLED IF PRINTED", as indicated in the footer.
<b>High Voltage Connection</b>	A connection to Ausgrid's high voltage Distribution, sub-transmission or transmission System.
<b>HV</b>	High Voltage – being any voltage above 240/415V (nominal) available as a supply voltage from Ausgrid.
<b>HVC</b>	A substation containing a High Voltage Customer supply control switch
<b>Network Standard</b>	A document, including Network Planning Standards, that describes the Company'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.
<b>Point of Supply</b>	The point specified by Ausgrid at which Ausgrid's Distribution System, after extension or alteration, is connected to the Customer's Installation.
<b>Review date</b>	The review date displayed in the header of the document is the future date for review of a document. The default period is three years from the date of approval. However 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.



<b>Service Provider</b>	Includes Accredited Service Providers carrying out contestable works, and Ausgrid staff and its contractors carrying out non-contestable works. Requirements for Accredited Service Providers are included in ES 4 Service Provider Authorisation and Ausgrid's Policy for ASP/1 Premises Connections
<b>Service Rules</b>	The Service and Installation Rules of NSW.

## 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 comply 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 RESPONSIBILITIES

### 6.1 Customers

It is the responsibility of Customers to ensure that only Service Providers who are suitably accredited are engaged on Contestable Works, and to ensure that only Authorised Persons are employed on Authorised Work. The Customer is responsible for the construction, operation and maintenance of the high voltage Customer's Installation in accordance with the Australian Wiring Rules AS/NZS 3000, the Service and Installation Rules of NSW and any specific requirements of the Ausgrid's nominated **Model Standing Offer or Negotiated Connection Offer**.

### 6.2 General

It is essential that all work on or near, or to be connected to, Ausgrid's Distribution System, is performed in a safe manner and in accordance with Ausgrid's:

- Bushfire Risk Management Plan
- Customer Installation Safety Plan
- Electrical Safety Rules
- Electricity Network Safety Management System Manual
- Network and Supply Standards
- Public Electrical Safety Awareness Plan
- Tree Safety Management Plan

as well as the Service Rules, any relevant Acts and Regulations, and NSW **SafeWork** requirements applicable at the time. Other relevant safety guidelines are also available from the Energy Networks Association of Australia (ENA) such as:

- EA 18 – Guide to the Training of Personnel Working on or near Electricity Works
- ENA Doc 001 – 2008 National Electricity Network Safety Code
- ISSC 14 – Guide to Electrical Worker's Safety Equipment,

## 7.0 APPLICATION FOR CONNECTION AND SUPPLY

A Customer who wishes to obtain a High Voltage Connection should make an application in accordance with Ausgrid's Premises Connection Requirements and Policy for ASP/1 Premises Connections. Any new developments should comply with Ausgrid's Policy for ASP/1 Premises Connections.

**Note:** High Voltage Connections are not permitted in certain situations (eg High Voltage Connections are not usually permitted in Sydney CBD area). Normally only one High Voltage connection is permitted per customer.

## 8.0 DESIGN REQUIREMENTS

### 8.1 General

Works that are necessary to take supply at High Voltage consist of works relating to the Customer's Installation, and the connection to Ausgrid's Distribution System.

The metering installation, consisting of instrument transformers and meters, is part of the Customer's Installation and must not be located within Ausgrid's side of the Connection Point. The metering installation must be located within the Customer's Installation and must comply with the Service Rules and the Standard Form Customer Connection Contract.

### 8.2 Customer's electrical installation

#### 8.2.1 General

The Customer's Installation shall be designed, constructed, operated and maintained to comply with the relevant sections of:

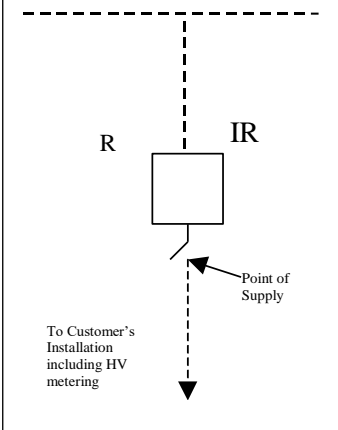
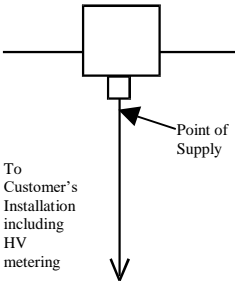
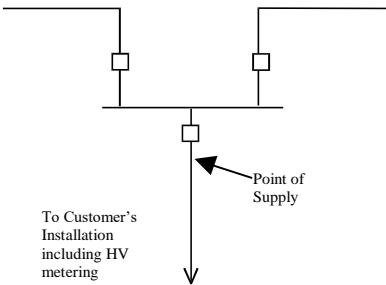
- AS/NZS 3000 Australian Wiring Rules
- Service and Installation Rules of NSW,
- any other relevant Australian Standards
- Ausgrid's Customer Installation Safety Plan, and
- any specific requirements identified by Ausgrid in a connection offer.

#### 8.2.2 Connection Point

Where an Ausgrid HVC is provided (as described in clause 8.3.2), the Connection Point shall be deemed to be the load side of the HV control switch in Ausgrid's HVC.

Where no Ausgrid HVC is provided, the Connection Point shall be deemed to be at a location determined by Ausgrid, normally being the first available termination point on the Customer's Installation. The Customer's Installation shall commence at the Connection Point. As outlined in the table below, the precise location of the Connection Point will depend on the design of the Customer's Installation and Ausgrid's HVC where provided.

Table 1 – Supply Arrangements

Ausgrid HVC Installations	Supply Arrangement	Point of Supply	Typical Application
	<p><b>Recloser/Interruption</b> Overhead supply. Protection via recloser or Interruption Isolation via isolation links or IR integrated isolator. Recloser operated in non-reclosing mode.</p> <p><b>Interruption Installation Drawing 244230 &amp; 244231</b></p>	<p>Cable termination on load side terminals of isolator link/switch.</p>	<p>Pole substation(s) in OH area. Maximum allowable load = 400 kVA or 400Amps where the OH feeder is a dedicated non shared asset.</p>
	<p><b>RMICB</b> UG supply. Protection via ring-main isolator circuit breaker (RMICB). Isolation via integral isolator. Supply via single feeder cable forming an 'N' connection will generally only be allowed by Ausgrid where the HV supply is temporary (non-permanent) or the HV feeder is a dedicated non shared asset.</p>	<p>Cable termination on load side terminals of RMU CB isolator</p>	<p>Kiosk or chamber substation</p>
	<p><b>Fully Switched</b> UG supply. Protection via HV circuit breaker switchboard. Isolation via integral isolators.</p> <p>Supply forming an 'N-1' connection will generally only be allowed by Ausgrid where the HV feeders are a dedicated non-shared asset.</p>	<p>Cable termination on load side terminals of CB isolator supplying load.</p>	<p>Chamber substation</p>

### 8.2.3 HV metering

HV metering equipment shall be provided in accordance with the Regulations and Ausgrid's Electrical Standard ES 3 - Metering Installations.

The Customer's HV metering equipment (VTs and CTs) shall be part of the Customer's Installation and shall be supplied and maintained by the customer. Metering equipment shall not be located within any part of Ausgrid's HVC.

### 8.2.4 Protection

A protection system shall be provided that isolates the Customer's Installation, in the event of a fault, without affecting the Ausgrid Distribution System.

All fuses, relays, current transformers, voltage transformers, circuit breakers and other protection equipment shall have characteristics compatible with the existing protection system associated with Ausgrid's Distribution System and shall grade with it.

The HV protection systems for the supplies to the Customer's Installation shall be designed and installed in accordance with the principles of the relevant sections of Ausgrid's Network Standard NS114, NS117 or NS122 as appropriate.

Ausgrid shall determine all relay settings and HV fuse ratings for Ausgrid's HVC and for the supplies to the Customer's Installation.

### 8.2.5 Supply voltage and transformers

Ausgrid's nominal HV supply voltage is 11kV, operating normally in the range 10.3kV – 11.8kV. However Ausgrid's high voltage Distribution, Sub-transmission and Transmission Systems actually operate at several voltages, depending on the geographic area. Accordingly, high voltage customers must obtain from Ausgrid, the supply voltage applicable to their location, particularly before proceeding with any project expenditure or commitments.

Ausgrid utilises 11kV distribution transformers with tappings of 1.25%. However the customer shall provide transformers with tappings of no more than 2.5%.

The standard vector group for Ausgrid distribution transformers is Dyn11 for pole-type transformers in the Hunter region and Dyn1 in the Sydney region. Kiosk type transformers are Dyn1.

Ausgrid will give advice, regarding other supply voltages (33kV, 66kV and 132kV) on a case by case basis.

### 8.2.6 Power factor

The power factor of the Customer's Installation must comply with the Service and Installation Rules of NSW.

### 8.2.7 Consumer's mains

The type of Consumer's Mains and associated cable accessories shall be compatible with, and suitable for connection to, Ausgrid's HVC equipment, including protection CTs, etc.

### 8.2.8 Multiple HV supplies

The supply arrangements for Customers requiring multiple HV supplies shall be negotiated on a case by case basis.

Where dual supplies are required for issues relating to the reliability of supply, consideration should be given to locating each Ausgrid HVC in separate accommodation. As a minimum, the accommodation should be constructed such that the likelihood of one HVC impacting adversely on the other in the event of a failure etc. is minimised. The potential impact of upstream reliability issues should also be taken into consideration.

### 8.2.9 Auxiliary low voltage supply

A nominal 240Vac 20A single phase circuit shall be provided from the customer's main low voltage switchboard. This is required to provide supply for protection battery charging, lighting and power within the HVC Substation. The sub-circuit originating from the customer's main switchboard must be dedicated for Ausgrid's exclusive use only and shall not have any Residual Current Detection (RCD) or ELCB device. This is to avoid spurious tripping.

The circuit shall terminate in the HVC Substation Service Board as shown on Ausgrid drawing 169394. The circuit mains shall be double insulated and consist of active and neutral conductors only, no earthing conductor is to be included in the circuit mains. The neutral is to be terminated on the neutral insulated busbar in a kiosk situation or insulated neutral link for chamber substations. Refer Ausgrid drawing 242607 HVC Chamber and Kiosk Substation Earthing Schematic. The earthing conductors will originate locally from the HVC Substation earthing bar. This is to ensure that the submains are not damaged by return earth fault currents in the instance of an 11kV earth fault.

## 8.3 Ausgrid's distribution, sub-transmission and transmission systems

### 8.3.1 Distribution system design and construction

Ausgrid will determine the extent of any alterations and/or extensions to the Ausgrid Distribution System necessary to connect the Customer's Installation.

The Customer shall be responsible for the design and construction of any new extensions or alterations to Ausgrid's 11kV, 33kV, 66kV or 132kV Distribution/Sub-transmission Systems that are necessary to connect the Customer's Installation. Ausgrid will provide the Customer with the necessary information on which to base the design of the required extensions or alterations. A suitably accredited Service Provider must carry out the design. Also refer to Section 12.2.

Electrical design and construction works relating to new extensions, alterations or augmentations to Ausgrid's Distribution System shall be carried out in accordance with the relevant sections of Ausgrid's Network Standards, which include but are not limited to those listed in the References List (refer Clause 3.1).

### 8.3.2 Ausgrid HVC

In addition to the protection and control of supplies to the Customer's Installation as required by the Service and Installation Rules of NSW, AS/NZS 3000 and Ausgrid's standards, the Customer's Installation shall be connected to the Ausgrid Distribution System such that there is always a means of control and isolation between the Customer's Installation and Ausgrid's System. This means of control and isolation shall be part of the Ausgrid Distribution, Sub-transmission or Transmission System.

The means of control and isolation shall generally be an Ausgrid HV supply control switch. The HVC shall comply with Ausgrid's standards and shall incorporate suitable equipment for the protection, isolation and earthing of supplies to the Customer's Installation.

For Customers Installations with direct (dedicated) 11kV or sub-transmission voltage supplies from Ausgrid Zone or Sub-transmission Substations, Ausgrid may consider allowing the means of control and isolation to be an Ausgrid circuit breaker at the Zone or Sub-transmission Substation.

With the exception of a LV supply for lighting and battery charging, etc, Ausgrid's HVC shall be independent of the Customer's Installation. The HVC shall be separate from the Customer's main switchboard and metering equipment (CTs and VTs) and located in separate accommodation to the Customer's HV switchroom.

Ausgrid will require the HVC to be located in dedicated accommodation in accordance with the appropriate Network Standard for the type of HVC chosen. This accommodation may be a HVC Chamber (as outlined in Ausgrid Network Standard NS113) or other enclosure as specified by Ausgrid. The HVC accommodation shall be located on the customer's property to meet Ausgrid's

requirements, and the site shall be covered by a suitable easement or lease in favour of Ausgrid. The HVC and any associated easements or leases shall be provided, by the Customer, at no cost to Ausgrid.

Only one supply to the Customer's Installation shall be taken directly from any Ausgrid HVC.

Expulsion drop-out fuses and fuse switch units shall not be used as the HV supply control switch, for Customer's Installations that are supplied from HV feeders that have any part consisting of overhead mains, (and therefore incorporate Sensitive Earth Fault protection schemes). In such circumstances the HVC shall incorporate a recloser/interrupter that includes suitable isolation facilities. The recloser/interrupter should be operated in the non-reclosing mode.

### 8.3.3 Standard HVC configurations

There are several basic configurations for HVCs including the following:

#### 8.3.3.1 Recloser or Interrupters

For this type of HVC a pole-mounted recloser or interrupter is connected in series with the HV feeder to the Customer's Installation. It is only suitable for overhead supplies. The recloser shall be operated in the non-reclosing mode.

#### 8.3.3.2 Ring Main Isolator Circuit Breaker (RMICB) Type HVC

For this type of HVC the RMICB is connected with the isolators in series with the HV feeder and the circuit breaker as a branch connection to the Customer's Installation.

Protection detail for this type of HVC is outlined in the "Protection" clause of this standard.

#### 8.3.3.3 Fully Switched Type HVC

This type of HVC is equipped with dedicated circuit breakers for each HV feeder and each supply to the Customer's Installation. The feeder circuit breakers are connected in series with the HV feeder.

### 8.3.4 Protection

#### 8.3.4.1 General

Protection requirements shall generally be in accordance with those outlined in Ausgrid's Network Standard NS114 Electrical Design Standards for Chamber Type Substations or NS117 Design and Construction Standards for Kiosk Type Substations as appropriate for the type of HVC to be constructed, including information relating to protection panels, protection relays, protection current transformers, protection batteries and battery chargers, and associated multicore cables.

The Ausgrid Liaison Officer shall include, in the Design Information, requirements for the HVC, including as a minimum requirement:

- for RMIFS HVCs: the high voltage fuse types and ratings to be used
- for RMICB, single CB, OH Recloser, and Fully Switched HVCs: the protection schemes to be installed for the HVC including type of protection relays in each scheme, current transformer class and ratio, and saturation transformer rate and any special protection requirements.

#### 8.3.4.2 OH reclosers, interrupters and circuit breaker type HVCs

HVCs will be equipped with feeder overcurrent and earth fault protection for the supply to the Customer's Installation. The protection shall, on operation, initiate a trip to the recloser, interrupter or high voltage circuit breaker.

#### 8.3.4.3 Ring Main Isolator Circuit Breaker (RMICB) Type HVCs

The HVCs will be equipped with feeder overcurrent and earth fault protection for the supply to the Customer's Installation. The protection shall, on operation, initiate a trip to the high voltage circuit breaker.

#### **8.3.4.4 Fully switched type substations**

The protection to be installed shall comply with Ausgrid's standard schematics.

The HVC shall be equipped with underground feeder protection as specified for the HV connection.

The feeder protection relays shall, on operating initiate a trip to the feeder circuit breaker.

#### **8.3.5 Earth Fault Indicators (EFIs)**

Where appropriate, suitable EFIs and associated CTs shall be installed at the HVC on the supplies to the Customer's Installation and on the load-side feeder of the RM unit.

#### **8.3.6 Equipment identification numbers**

All switches, substations and other equipment shall be uniquely identified using an acceptable form of an identifier such as a number or switch ID. Identification numbers shall be obtained from Ausgrid and included in all design documentation, as appropriate.

All equipment shall have identifiers clearly and permanently displayed in accordance with Ausgrid's Network Standards NS148 – Overhead Line Support, Street Light Column, Pit and Pillar Numbering, and NS158 – Labelling of Mains and Apparatus.

## **9.0 MAINTENANCE REQUIREMENTS AND COORDINATION PROTOCOLS**

The Customer must establish testing intervals for protection systems associated with the Customer's Installation, and agreed protocols for the coordination maintenance activities with Ausgrid. A copy of the proposed maintenance plan shall be forwarded to Ausgrid prior to commissioning the Customer's Installation.

## **10.0 EQUIPMENT PROCUREMENT**

### **10.1 Approved materials**

Only materials approved by Ausgrid shall be used in the construction of additions or alterations to Ausgrid's Distribution System. These materials shall comply with the requirements of Ausgrid's specifications.

Where materials are not sourced from Ausgrid, they must be approved by Ausgrid in accordance with NS181 and be type and/or routine tested at the manufacturer's works in accordance with Ausgrid's 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-commission testing by Ausgrid or a third party nominated by Ausgrid may be required for individual types of equipment as listed below. (Refer also to the section of this standard on testing.):

- HV switchgear
- Protection relays
- High voltage fuses
- High voltage cables
- High voltage cable termination kits
- Protection and metering current transformers and auxiliary transformers.

Unless otherwise specified, all bolts, nuts and washers, shall be galvanised in accordance with the relevant Australian Standard.

## 10.2 Pole mounted recloser/interruption

Pole mounted reclosers / interrupters shall comply with the latest Ausgrid specification.

## 10.3 Circuit breakers

HV circuit breakers shall be in accordance with Ausgrid's current specification.

## 10.4 Ring Main Isolator Circuit Breaker (RMICB)

RMICBs shall be purchased in accordance with the latest Ausgrid specification for the purchase of RMICBs.

In general, unless otherwise approved by Network Division the line isolators shall be supplied without motorised energy storage devices for remote control of the isolators.

A prefabricated kiosk (Ausgrid Stockcode 179713), containing an RMICB and provision for all necessary protection equipment is available. Refer to Ausgrid Drawing No. 242597 Sheet 1. This kiosk is to be installed in accordance with the requirements of NS117 and NS141 as appropriate.

# 11.0 TESTING AND INSPECTION

## 11.1 Customer's installation

All testing of the Customer's Installation, as required by AS/NZS 3000 shall be carried out before commissioning. All new or altered HV installations shall be inspected to the satisfaction of Ausgrid before connection of supply.

## 11.2 Ausgrid's distribution system

All extensions or alterations to Ausgrid's Distribution System necessary to connect the Customer's Installation shall be tested, inspected and audited in accordance with the requirements of the relevant sections of the nominated Customer Connection Contract, Ausgrid's Policy for ASP/1 Premises Connections, NS112, NS114, NS117 and NS161 as appropriate.

# 12.0 OPERATIONAL REQUIREMENTS

## 12.1 Installation safety management plan

The customer shall prepare an integrated Installation Safety Management Plan in accordance with the Ausgrid's Customer Installation Safety Plan and Standard Form Customer Connection Contract. This shall be lodged with Ausgrid prior to the commissioning of the Customer's Installation. The plan should be based on appropriate risk analysis techniques (and include non-compliant equipment, upgrade and refurbishment programs, site hazards, etc).

### 12.1.1 Operating procedures

The Customer's Installation Safety Management Plan shall include Operating Procedures, and shall ensure that the Customer's Installation is at all times operated in accordance with those Procedures. The Operating Procedures shall comply with the procedures detailed in Australian Standard AS 2467, and the Service and Installation Rules of NSW.

The Operating Procedures shall incorporate similar principals to Ausgrid's Electrical Safety Rules covering all aspects of operating the Customer's HV Installation.

An up-to-date HV line diagram of the Customer's Installation shall be prominently displayed in an appropriate location within the Customer's premises (eg the Customer's HV switchroom).



### 12.1.2 Maintenance procedures

The Customer's Installation Safety Management Plan shall include Maintenance Procedures to ensure that any malfunction will not create a hazard or cause interference to the Ausgrid supply. All maintenance shall be carried out in accordance with the appropriate Industry Guidelines and Australian Standards.

## 12.2 Training/authorisation of personnel

The Customer shall ensure that:

- all persons involved in HV isolation and access procedures are trained and assessed as competent to perform the roles for which they will be responsible;
- all switching coordinators, switching operators and recipients are properly authorised and for a specific period;
- a register of all authorised persons shall be maintained with details of any restrictions; and
- audits are carried out to guarantee compliance.

## 12.3 Switching to enable work on respective networks

All switching of one network (Ausgrid's or Customer's) to enable work on another network (Customer's or Ausgrid's) shall be carried out in accordance with Ausgrid's Electrical Safety Rules.

It should be noted that when portable earths are to be employed on the customer's equipment, Ausgrid will only accept the use of earthing equipment that complies with the requirements of ISSC 14 – Guide to Electrical Worker's Safety Equipment, as it applies to portable earthing and short circuiting equipment.

## 12.4 Switching of large loads

Before switching of any large loads, or any other action, on the Customer's Installation that is likely to interfere with normal supply on the Distribution System, the customer shall liaise with Ausgrid's Control Room before proceeding.

## 13.0 33KV, 66KV AND 132 KV CONNECTIONS

High voltage connections at 33kV, 66kV and 132kV may require special additional considerations. Ausgrid's Engineering or nominated representative should be consulted prior to commencing design.

## 14.0 RECORDKEEPING

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

**Table 2 – Recordkeeping**

Type of Record	Storage Location	Retention Period*
Approved copy of the network standard	BMS Network sub process Standard – Company	Unlimited
Draft Copies of the network standard during amendment/creation	HPRM Work Folder for Network Standards (HPRM ref. 2014/21250/251)	Unlimited
Working documents (emails, memos, impact assessment reports, etc.)	HPRM Work Folder for Network Standards (HPRM ref. 2014/21250/251)	Unlimited

\* 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.

## 15.0 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 Network Standards. 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.

## 16.0 DOCUMENT CONTROL

**Document Owner** : Head of Asset Engineering Policy & Standards

**Distribution Coordinator** : Manager – Asset Engineering Standards

## Annexure A – List of Drawings

**IMPORTANT:** Users must ensure that the drawings they are using are the current versions with all amendments.

**Table A1**

Number	Title
169394	High Voltage Customer Substations Service Board – General Arrangement and Wiring Diagram
242597	Schneider HVC kiosk – General Arrangement
242607	Standard Construction HVC Kiosk and Chamber Substations Earthing Schematic
244230	11KV S&C Intellirupter Pulsecloser with Phase to Phase VT Mounted on a Composite Pole – General Arrangement
244231	11KV S&C Intellirupter Pulsecloser with Phase to Phase VT Mounted on a Composite Pole – Pole Drilling Details

## **Annexure B – Sample Compliance Checklist**

As this Network Standard covers only Contestable HVC projects an internal Ausgrid compliance checklist is not applicable and has not been incorporated in this document.