

# Network Standard

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NW000-S0117

**NS259 REQUIREMENTS FOR PROTECTION SYSTEM SEGREGATION**



## ISSUE

For issue to all Ausgrid and Accredited Service Providers' staff involved with protection systems in zone and sub transmission 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](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Where this standard is issued as a controlled document replacing an earlier edition, remove and destroy the superseded document.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 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 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.

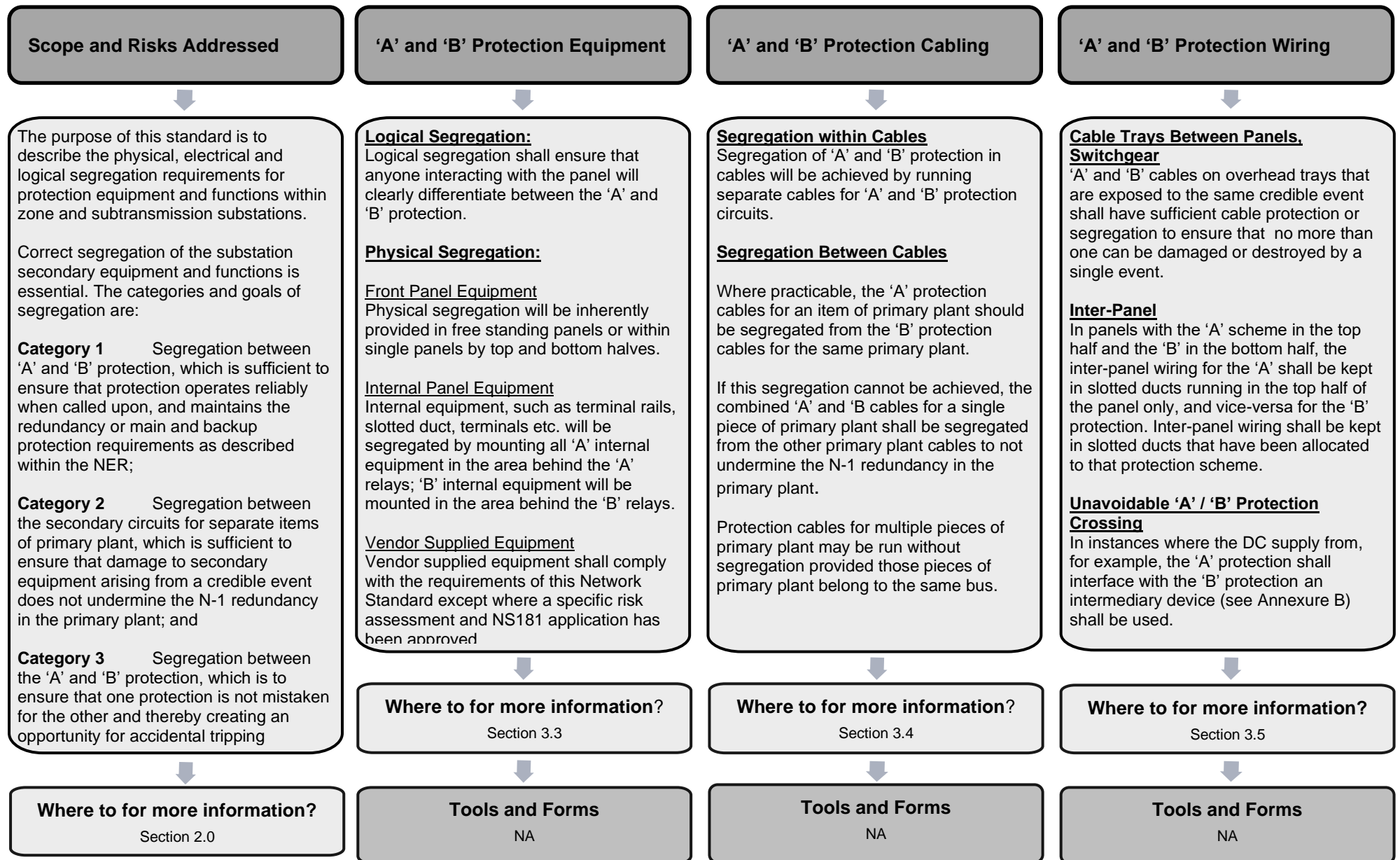
## KEYPOINTS

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 NS259 Requirements for protection system segregation

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## 1.0 PURPOSE

The purpose of this standard is to describe the physical, electrical and logical segregation requirements for protection equipment and functions within zone and subtransmission substations.

## 2.0 SCOPE

### 2.1 Inclusions

Segregation between 'A' Protection and 'B' Protection:

- Relays, links, terminals and other minor panel hardware
- Cabling between primary plant and panels
- Wiring between panels and inter-panel
- Communications paths per NS203
- AC/DC Boards, Batteries & Chargers

Segregation between Low Voltage Power and Protection/SCADA:

- Low Voltage Power Cables and Fibre Optic cables
- Low Voltage Power Cables and Copper protection cables  
Some exceptions are allowed. Refer to Clause 3.4.2.

Segregation between Primary Plant and Protection/SCADA:

- High Voltage Power Cables and Fibre Optic cables
- High Voltage Power Cables and Copper protection cables
- Location of HMI, Protection Panels, and Switchgear in the Control Room

Segregation between groups of secondary equipment:

- Secondary equipment for separate items of primary plant

### 2.2 Exclusions

- Cables which form part of communications systems between substations.
- Segregation of other services in the substation (fire, telecommunications etc).

## 3.0 ACTIONS

### 3.1 Categories of separation

Correct segregation of the substation secondary equipment and functions is essential. The categories and goals of segregation are:

- |            |   |
|------------|---|
| Category 1 | Segregation between 'A' and 'B' protection, which is sufficient to ensure that protection operates reliably when called upon, and maintains the redundancy or main and backup protection requirements as described within the NER; Failure to maintain segregation negates the duplication or the independence of the main and backup protection. |
| Category 2 | Segregation between the secondary circuits for separate items of primary plant, which is sufficient to ensure that damage to secondary equipment arising from a credible event does not undermine the N-1 redundancy in the primary plant; and  |
| Category 3 | Segregation between the 'A' and 'B' protection, which is to ensure that one protection is not mistaken for the other and thereby creating an opportunity for accidental tripping  |

Segregation is to be applied where required between the items listed in Section 2.0. The following sections detail the specifics of the required segregation. Each section will associate each type of segregation with one or more of the above categories.

All aspects of the substation and control room design, including civil, layout, mechanical etc. will complement the segregation requirements in this Network Standard.

### 3.2 Credible Events

Credible events that can occur within the substation include - but are not limited to - fire, induced voltage, maintenance and construction activities, and rodent damage. The potential hazards that are associated with a credible event can be either limited in their extent, such as a transformer fire, or otherwise can occur anywhere within the substation area.

The selection of the applicable credible events for a particular substation shall be based on a formal and documented risk management approach as part of the design phase of the asset.

### 3.3 'A' and 'B' Protection Equipment

#### 3.3.1 Panel Layout – Logical Segregation

##### Category of Segregation 3

'A' and 'B' protection equipment mounted on the panel shall be logically segregated. Logical segregation shall ensure that anyone interacting with the panel (e.g. reading measurements, flags, conducting testing etc), will clearly differentiate between the 'A' and 'B' protection such that by following the logical layout of the relays and equipment on the panel it will not be possible to inadvertently misidentify any 'A' protection equipment as belonging to the 'B' and vice-versa.

#### 3.3.2 Panel Layout – Physical Segregation

##### 3.3.2.1 Front Panel Equipment

##### Category 1 and 3 Segregation

Physical segregation will be inherently provided in cases where separate free standing panels for 'A' and 'B' protection are used.

Where a single free-standing panel houses both 'A' and 'B' protection, the protection equipment (relays, links, fuses, test points, etc and associated labels) for the 'A' to be mounted on the top half of the panel. The bottom half houses the 'B'.

Where protection equipment should be mounted on switchgear (see Section 3.7), and top/bottom or side/side physical segregation cannot be completely achieved, every effort should be made to

ensure all 'A' protection is grouped together and 'B' is grouped together with clear labelled delineation.

### **3.3.2.2 Internal Panel Equipment**

#### Category 1 and 3 Segregation

Internal equipment, such as terminal rails, slotted duct, terminals etc. will be segregated by mounting all 'A' internal equipment in the area behind the 'A' relays; 'B' internal equipment will be mounted in the area behind the 'B' relays. The 'A' protection terminal rails, slotted duct, terminal blocks etc shall be separate from those used for the 'B' protection.

Segregation of protection circuits (e.g. CT & VT connections, CB trips, etc) for a single 'A' or 'B' scheme will be achieved by using physically separated groups of terminal blocks.

Specific details of the layout of equipment in and on panels, such as spacing, and labelling requirements, are covered in NS178 standard designs and NS252.

Low voltage AC power wiring (excluding CT or VT wiring) within a panel shall be avoided where practical. Where AC power cannot be avoided within a panel, it shall be contained within a dedicated conduit. Slotted duct shall not be used.

Marshalling cabinets, whether mounted outdoors or indoors, will achieve segregation by using, at a minimum, separate terminal rails for termination of 'A' and 'B' protection circuits.

### **3.3.2.3 Vendor Supplied Equipment**

#### Category 1, 2 and 3 Segregation

Vendor supplied equipment shall comply with the requirements of this Network Standard except where a risk assessment and NS181 application has been completed.

Modifications to approved equipment shall maintain at least the level of segregation provided within the unmodified equipment.

### **3.3.3 Reference Drawings**

Ausgrid standard panel layouts as per NS178, will be used to ensure correct physical and logical segregation. Under no circumstances will protection equipment from the 'A' scheme be mounted in the space reserved for the 'B' scheme (whether it be a half-panel or full panel), and vice-versa.

Consistency in panel layouts, link labelling and control pushbuttons form part of Ausgrid's engineering control against misidentification on equipment and/or maloperation of equipment controls.

Should space be required for additional protection equipment not provided for on standard drawings, approval is required as per NS181 process.

## **3.4 'A' and 'B' Protection Cabling**

### **3.4.1 Segregation within Cables**

#### Category 1 Segregation

Segregation of 'A' and 'B' protection in cables will be achieved by running separate cables for 'A' and 'B' protection circuits. Cores in 'A' protection cables shall not be allocated for 'B' protection functions, and vice-versa. Under no circumstances will a single cable, whether fibre optic, copper, or other, use some cores for 'A' protection and some cores for 'B' protection, regardless of the circuit's function.

Any cable used for low voltage AC power shall not allocate or reserve other cores in the same cable for use by any DC circuits.

### **3.4.2 Segregation Between Cables**

#### Category 1 and 2 Segregation

Where practicable the 'A' protection cables for an item of primary plant shall be segregated from the 'B' protection cables for the same primary plant. Where this segregation cannot be achieved, the combined 'A' and 'B' cables for each primary plant shall be segregated from the protection cables of the other plant of the same type to not undermine the N-1 redundancy in the primary system. i.e Protection cables for multiple pieces of primary plant may be run without segregation provided those pieces of primary plant belong to the same bus. For example:

- It is preferred that for the 'A' protection cables for a single power transformer and its associated feeder and bus to be run segregated from the 'B' cables.
- It is acceptable for the 'A' and 'B' protection cables for a single power transformer and its associated feeder and bus to be run without segregation to each other. They must however remain segregated from the other primary equipment.

The cables segregated throughout the switchyard shall enter the control room at segregated locations.

'A' fibre optic cables shall be run in the same channel as the 'A' protection cables. 'B' fibre, which includes SCADA, shall be run with the 'B' cables. Segregation of fibre optic cables in the switchyard is covered in NS203.

Low voltage, low power cables may be laid in the same channel as the 'A' protection cables, providing:

- (a) All low voltage, low power cables are grouped together, and are clearly separated from the protection cables;
- (b) All low voltage, low power cables are protected by, at most, a 32A fuse or MCB. Higher power circuits must be segregated from the control cables.
- (c) Protection and low voltage power cables will remain clearly separated when new cables are pulled; and
- (d) No low voltage power cables are laid with the 'B' protection cables.

Under no circumstances shall any low voltage power cables be placed in direct contact with, or immediately above or below, the protection cables. Adequate vertical separation shall be provided where low voltage cables are located above or below the protection cables.

### 3.4.3 Trenches, Chases, Tunnels

To achieve acceptable segregation, physically separate trenches or chases shall be used where required. For cable tunnels, acceptable segregation can be achieved by using separate cable trays, preferably on opposite sides of the tunnel.

### 3.4.4 Conduits

The use of separate buried conduits is acceptable for the purposes of segregation.

### 3.4.5 Cable Pits

#### Category 1 and 2 Segregation

Segregation within pits can be achieved by the use of separate pits or with appropriate internal barriers within single segregated pits.

#### 3.4.5.1 Segregation with separate pits

Separate pits connecting segregated trenches/ducts or conduits can be used to maintain segregation. Care shall be taken to ensure that connections between pits do not compromise the segregation of the pits themselves.

#### 3.4.5.2 Single pits with internal segregation

All internal barriers used within the pits to achieve segregation shall have a minimum fire resistance level of -/60/60.

The physical separation shall be such that any activities within one section of the pit will not permanently impact the other section e.g. cable pulling, jointing and general access.

Examples of acceptable segregation within a single pit are given in Annexure C.

## 3.5 'A' and 'B' Protection Wiring

### 3.5.1 Cable Trays Between Panels, Switchgear

#### Category 1 Segregation

'A' and 'B' cables on overhead trays that are exposed to the same credible event shall have sufficient cable protection or segregation to ensure that no more than one can be damaged or destroyed by a single event. Basement cable trays overcome this issue and hence do not require the same level of cable protection or segregation. The selection of either overhead or basement type cable trays shall be based on a cost-benefit analysis and risk assessment, with a NS181 application completed for each substation

Fibre optic cables for protection signalling and SCADA shall be run on the same tray as their respective protection cables. Adequate protection for fibres shall be provided (e.g. ruggedised cables) in accordance with Ausgrid NS203.

Low voltage power cables may be run on the same cable tray as the 'A' protection provided the segregation requirements of Clause 3.4.2 are met.

Should the protection cable tray not allow for any separation between the fibres and the copper conductors due to the large quantity or size of copper conductors, larger trays shall be used, or separate trays for fibre provided. Under no circumstances shall copper conductors be placed in direct contact with fibres, regardless of the fibre optic cable's mechanical strength.

Cables shall remain segregated on their own tray until directly above or below their respective protection panel, to minimise the length that the cables are run at close proximity.

Every effort shall be made to position the 'A' and 'B' cable trays such that any single credible event (e.g. fire) does not jeopardise the cables on both trays. Where the trays are in close proximity (e.g. 'B' below the 'A') and exposed to a credible event, adequate spacing shall be provided between the trays to allow for future mitigation measures to be installed (e.g. fire blankets etc.) where required.

### 3.5.2 Inter-Panel

#### Category 1 and 3 Segregation

In panels with the 'A' scheme in the top half and the 'B' in the bottom half, the inter-panel wiring for the 'A' shall be kept in slotted ducts running in the top half of the panel only, and vice-versa for the 'B' protection. Inter-panel wiring shall be kept in slotted ducts that have been allocated to that protection scheme.

Separate wire looms, between each protection relay and their respective terminals inside the panel, shall be used.

In cases where compact switchgear designs limit segregation options, lack of complete segregation may be accepted pending a risk assessment and NS181 application (e.g. trailing leads that have all 'A' and 'B' wiring together, including trip coils). Where space exists for separate slotted ducts or wire looms to be used, this space shall be used to segregate the 'A' and 'B' wiring.

### 3.5.3 Unavoidable 'A' / 'B' Protection Crossing

#### Category 1 Segregation

The 'A' and 'B' protection schemes are independent per Ausgrid NS178 standard designs. In instances where the DC supply from, for example, the 'A' protection shall interface with the 'B' protection (e.g. Autoclosing; see Transformer DC schematics), an intermediary device (see Annexure B) shall be used. The DC supply from one protection shall be used to energise the coil; the DC supply from the other protection shall use the contact. 'A' and 'B' segregation is therefore maintained by virtue of the separation between the relay's coil and contacts.

Under no circumstances can other non-approved devices (e.g. multi-function electronic relays, auxiliary relays) be involved in unavoidable 'A' / 'B' protection crosses.

SCADA signals from the 'A' protection shall be wetted by the 'B' battery. In these cases, two 2A fuses capable of interrupting a DC short circuit will be used. Both 2A fuses shall be located in the 'B' protection panel of the associated piece of primary plant (see Figure 1). The circuit from one of the 2A fuses shall be used in the 'B' protection panel; the circuit from the other 2A fuse shall be used in the 'A' protection panel. There shall be no additional fuse in the 'A' panel for the SCADA signals; the fuse for the 'A' panel shall not be moved to the 'A' panel.

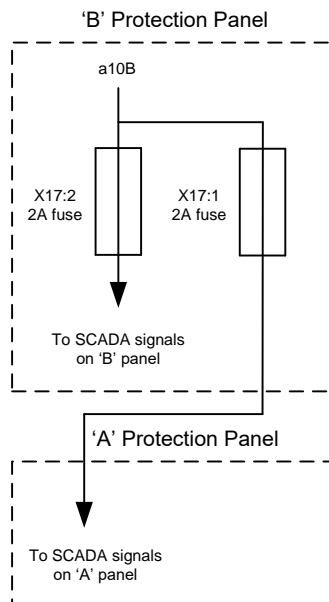


Figure 1 Diagram of 'A' and 'B' fusing requirements for SCADA signals

### 3.6 'A' and 'B' Batteries, Chargers, DC Boards

#### Category 1 Segregation

Separate 'A' and 'B' cabinets shall be used and segregation of substation batteries shall be such that failure of any part of the 'A' battery cannot result in damage to the 'B' and vice versa. For details regarding substation batteries refer to - NS191.

Physical separation of 'A' and 'B' batteries shall be as large as practically possible, but under no circumstances will be less than 900mm.

Under no circumstances will batteries share a common cabinet, regardless of separation within the cabinet.

The 'A' and 'B' battery chargers will be housed in their own free-standing cabinets. The battery charger cabinets will not be joined in any way and will be separated from the batteries.

Changeover switches provide a common point of failure for two otherwise independent circuits. 'A' and 'B' DC supplies shall not use any type of changeover switches.

'A' and 'B' DC boards should be installed on opposing sides of the control room where this is reasonably practicable.

'A' and 'B' AC boards should be installed on opposing sides on the control room where this is reasonably practicable.

### 3.7 'A' and 'B' Protection Communications Paths

#### Category 1 and 2 Segregation

Segregation of 'A' and 'B' protection communications paths (e.g. direct and multiplexed communications for line differential schemes) is required. Refer to NS203 for details.

Segregation of 'A' and 'B' protection communications equipment in the substations (e.g. LAN equipment for IEC-61850 sites) is required. Refer to NS255 .

### 3.8 Protection Equipment and Switchgear

#### Category 1 and 2 Segregation

'A' and 'B' protection for 132kV, 66kV and 33kV equipment at Subtransmission and Zone substations shall be mounted on separate control room panels and not on the switchgear with the exception of bay controller relays, which may be mounted on the switchgear. 'A' and 'B' protection for 11kV feeders at zone substations may be mounted on the switchgear were practical.

### 3.9 Primary Conductors

#### Category 2 Segregation

Protection cables shall be segregated from high voltage primary conductors 11kV and above. Refer to NS171.

### 3.10 Fire Stopping

#### Category 1 and 2 Segregation

Segregation shall be designed to allow for effective fire stopping upon completion of equipping. Fire stopping shall be provided in accordance with NS 171 and shall be designed to complement the segregation described in this Network Standard.

## 4.0 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.

## 5.0 RELATED DOCUMENTS

### 5.1 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](http://www.ausgrid.com.au).

### 5.2 Ausgrid documents

- Company Form (Governance) - Network Technical Document Endorsement and Approval
- Company Procedure (Governance) - Network Technical Document Endorsement and Approval
- Company Procedure (Network) – Network Standards Compliance
- Company Procedure (Network) - Production / Review of Engineering Technical Documents within BMS
- Electrical Safety Rules
- Electricity Network Safety Management System Manual
- NS 171 Firestopping in Substations
- NS 178 Secondary System Requirements for Major Substations
- NS181 Approval of Materials and Equipment and Network Standard Variations
- NS185 Major Substations Building Design Standard
- NS 186 Major Substations Civil Works Design Standard
- NS191 Batteries and Battery Chargers
- NS203 Planning and Design Standard for Electrical Network Telecommunications Assets
- NS212 Integrated Support Requirements for Ausgrid Network Assets
- NS252 Secondary Systems – Requirements for Wiring Within Panels
- NS251 Secondary Systems – Requirements for Cables Between Panels
- NS255 Secondary Systems – SCADA and LAN Design for Zone and sub transmission Substations
- NS250 Secondary Systems – Requirements for CT, VT and Tripping Circuits
- NS258.1 - Secondary Systems - Requirements for isolation links - Operational aspects

### 5.3 Other standards and documents

- ENA Doc 001-2008 National Electricity Network Safety Code

### 5.4 Acts and regulations

- AS/NZS3000 Wiring Rules (Specifically Clauses 3.9.8, 3.9.8.3, 3.9.8.4, 3.11.5)
- AS2067 Substations and High Voltage Installations Exceeding 1kV AC
- Electricity Supply (General) Regulation 2014 (NSW)
- Electricity Supply (Safety and Network Management) Regulation 2014
- Work Health and Safety Act 2011 and Regulation 2011

## 6.0 DEFINITIONS

<b>Ausgrid protection and control</b>	Ausgrid Protection and Control within the Secondary Systems Branch
<b>Bay</b>	Logical grouping of equipment associated with connection of an item of primary plant to a bus, or connection of two buses.
<b>Business Management System (BMS)</b>	An Ausgrid internal integrated policy and procedure framework that contains the approved version of documents.
<b>Channel</b>	Any chase, trench, tunnel or similar area dedicated to the safe passage of cables
<b>Chase</b>	A shallow channel used to run cables. The chase is not normally backfilled and will have a metal cover. Cables are readily accessible; chases are therefore only suitable inside the substation.
<b>Conduit</b>	A tube or pipe that accommodates cables. May be non-flexible (eg PVC) or flexible (eg corrugated).
<b>Document control</b>	Ausgrid employees who work with printed copies of document shall check the BMS regularly to monitor version control. Documents are considered "UNCONTROLLED IF PRINTED", as indicated in the footer.
<b>Loom</b>	A group of wires, bound together with cable ties, straps, or similar. The loom may be protected with flexible conduit.
<b>NER</b>	The National Electricity Rules. The NER governs the operation of the National Electricity Market. The NER has the force of law, and are made under the National Electricity Law. Transmission and Distribution protection schemes must comply with the NER.
<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>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. Potential needs for a review include changes in legislation, organisational changes, restructures, occurrence of an incident or changes in technology or work practice and/or identification of efficiency improvements.
<b>Slotted Duct</b>	Slotted duct is frequently used inside panels to arrange and segregate cabling. Slotted duct consists of square/rectangular cross-section tubing with a detachable front panel.
<b>Tray</b>	Part of a system used to support electrical and fibre cables, specifically in control rooms and basements.
<b>Trench</b>	An underground area dedicated to the safe passage of cables, into which conduit and cable trays are laid for separation of different circuit types.
<b>Tunnel</b>	An underground area dedicated to the safe passage of cables, with sufficient space for someone to work in, but not necessarily stand in.

## 7.0 RECORDKEEPING

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

**Table 1 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. 2014/21250/27)	Unlimited
Working documents (emails, memos, impact assessment reports, etc.)	HPRM Work Folder for Network Standards (HPRM ref. 2014/21250/27)	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.

## 8.0 DOCUMENT CONTROL

**Content Coordinator** : Manager Secondary Systems

**Distribution Coordinator** : Senior Engineer Guidelines Policies and Standards

## Annexure A –Sample Compliance Checklist

### Network Standard Checklist Form

### NS259 Requirements for protection system segregation

Project Identification:	
Prepared by: <Name & Position Title>	Date:

This checklist is for internal Ausgrid use only and does not apply to ASPs or contractors who have specific compliance requirements in relation to Contestable project works. The checklist is unique for each network standard and is available within BALIN and the BMS as a separate form that can be amended as required, completed and saved in HPRM with the other project documentation.

This section is used to identify compliance checks that when applied to the work associated with this Network Standard will satisfy an audit process to establish that the requirements of the standard have been followed. It is expected that applicable items would normally be checked as Comply (Yes) as non-compliance is generally not tolerated.

Where non-compliance is the result of specific site conditions or design decisions this needs to be identified in the notes section of the form for each non-compliance and approval sought from an appropriately authorised Ausgrid manager responsible for design approval.

Should additional information be available to document non-compliance decisions, these can be attached to the checklist form. The checklist and any attached explanatory notes should be saved in the project document repository.

Item	Description	Refer clause	Completed/ Actioned
<b>Scope</b>			
	Segregation between protection systems	2	
	Segregation between primary plant and protection systems	2	
	Segregation between low voltage power and protection systems	2	
	Segregation between groups of secondary equipment.	2	
<b>Topic Heading 1</b>			
1	Segregation between 'A' and 'B' protection, which is sufficient to ensure that protection operates reliably when called upon	3	Yes/No/NA
2	Segregation between the secondary circuits for separate items of primary plant, which is sufficient to ensure that damage to secondary equipment arising from a credible event does not undermine the N-1 redundancy in the primary plant	3	Yes/No/NA
3	Segregation between the 'A' and 'B' protection, which is to ensure that one protection is not mistaken for the other and thereby creating an opportunity for accidental tripping	3	Yes/No/NA

Notes: .....

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

## Annexure B – Approved Intermediary Devices

The relays below have been approved by Ausgrid for the purposes of unavoidable 'A' / 'B' protection crosses (see Section0). Circuit designs with unavoidable 'A' / 'B' protection crosses that do not use one of the below relays as an intermediary device shall be referred to Secondary Systems.

**Table B2 Approved Intermediary Devices**

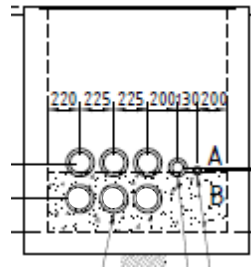
Relay Description	Make	Model	Dwg No
Multitrip Hand-Reset	RMS	2HS522K10 2HS522K11 2HS522K12	169211 sht1
		TR12-ED-22	223206 sht2
Multitrip Self-Reset	RMS	2HS512K10 2HS512K14	169212 sht1
		TR12-ED-12	223206 sht2
Trip Indicator	RMS	3A32K37 3A32K38 3A32K39 3A32K65 3A32K40 3A32K73 3A32K41	123399 sht1
Multitrip	Reyrolle	F8H	113553 Sht 1
		F8S	113858 Sht 1

## Annexure C – Example Pits to maintain segregation

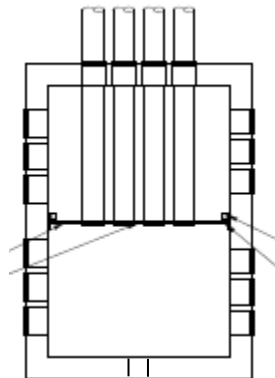
The example pit designs below meet the requirements of acceptable segregation within the pit while providing access from three directions. The height segregation allows for the concrete encased conduits of the B system to reach through under the A system cables.

This design with segregated conduits allows for A and B systems of primary plant to use the same duct line, trench and single pits as each other, while also maintaining the required segregation.

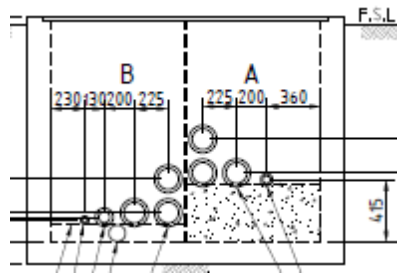
These examples have been taken from Munmorah STS, Drawings 238624 Sht1 & 238624 Sht1-6.



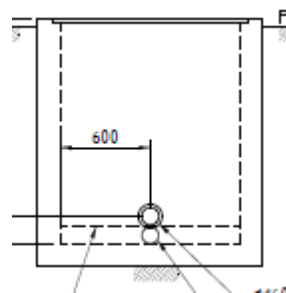
North View



Top View



East View



South View