Network Standard

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NW000-S0100 **NS204 COMMUNICATION PITS – SPECIFICATION AND INSTALLATION**

ISSUE

For issue to all Ausgrid and Accredited Service Providers' staff involved with the design, installation and / or alteration of underground cables, pits and conduits, 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Where this standard is issued as a controlled document replacing an earlier edition, remove and destroy the superseded document.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 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

Scope and Risks Addressed

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

- ☐ Planning, design and construction for Ausgrid telecommunications pit installation, alteration, relocation and recovery works
- ☐ Maintenance specific to Ausgrid telecommunications pits
- ☐ Telecommunications pit materials specification
- ☐ Documentation requirements and compliance checklists associated to Ausgrid telecommunication pits

Where to for more information?

Section 2

Planning, Design and Installation

This section defines:

- ☐ Risk factors which influence planning and design for telecommunications pits
- ☐ Pit security requirements
- ☐ Approved class ratings and structural characteristics for Ausgrid pre-fabricated and cast in-situ telecommunication pits
- ☐ Designing for additional load bearing capability and non-standard pits and lids
- ☐ Approved conduit penetrations and limitations on pit contents
- ☐ Labelling pits
- ☐ Requirements for buried telecommunications pits
- ☐ Specifications for telecommunications manholes
- ☐ Pit drainage
- ☐ Retrofitting pits over existing infrastructure
- ☐ Logistics and storage of telecommunications pits and parts
- ☐ Replacing, altering and enhancing telecommunications pits
- ☐ Plans, data submission and quality assurance requirements

Where to for more information?

Section 5

Tools and Forms

Annexures A and B

Maintenance, Recovery, Relocation & Reinstatement

This section defines:

- ☐ Tasks specific to the maintenance of Ausgrid telecommunications pits
- ☐ Requirements for recovering telecommunications pits & reinstating the area
- ☐ Requirements for relocating telecommunications pits

Where to for more information?

Section 6, 7

Tools and Forms

Annexures A and B

Stores & Materials

This section defines:

- ☐ The approved materials for Ausgrid telecommunications pits
- ☐ Ausgrid stores details

Where to for more information?

Section 8

Tools and Forms

Annexure A

Network Standard
NS204
Communication Pits – Specification and Installation

Contents

1.0 PURPOSE

The purpose of this document is to provide the specifications and guidelines for the procurement, installation and alteration of Ausgrid telecommunications pits. This standard is written to facilitate uniformity in relation to telecommunications pits across all of Ausgrid.

2.0 SCOPE

This document details the approved telecommunications pit types applicable to the range of conditions most commonly experienced across the Ausgrid network area. It details the approved installation and alteration methods for each pit type, as well as the associated labelling, security, storage and documentation requirements.

This standard is applicable to all Ausgrid telecommunications pits.

This standard does not cover pits which are not primarily intended for telecommunications purposes, nor does it cover pits for telecommunications carriers or other authorities. This standard does not cover telecommunications cable haul, coil storage or splicing works in telecommunications pits, nor does it cover conduit installation. For these standards, the Proponent shall refer to the following Ausgrid standards:

- NS234 Telecommunications Underground Physical Plant Installation;
- NS235 Telecommunications Underground to Overhead Transition; and
- NS266 Telecommunications Cables in Ausgrid Premises.

This standard specifies requirements for Ausgrid telecommunications infrastructure to travel through electrical pits and voids; however it does not specify parameters for the electrical pit structures.

For the electrical infrastructure design standards with regard to electrical pits, the general excavation and reinstatement requirements as well as the associated documentation, safety and environmental aspects of underground asset installation refer to NS130 and NS168. The requirements from these network standards shall be applied to telecommunications pit installation and alteration works.

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

- Bushfire Risk Management Plan;
- Company Form (Governance) - Network Document Endorsement and Approval;
- Company Procedure (Governance) - Network Document Endorsement and Approval;
- Division Workplace Instruction (Network) - Production / Review of Network Standards;
- Electrical Safety Rules;
- Electricity Network Safety Management System Manual;
- MRPA005 Establishment / Re-Establishment of Access Tracks;
- MRT100 Telecommunications Planned and Unplanned Outages, Faults, Damages and Emergency Response;
- NEG-EP04 Process for Acquisition of Easements in Capital Projects;
- NEG-EP06 NRP0002 Procedure for Negotiating Mines Access;
- NEG-EP07 Network Access and Security – Locks and Keys;
- NEG-SE10 Traffic Management;
- NEG-UG03 Guideline to management of work in close proximity to underground power cables;
- NS100 Field Recording of Network Assets;
- NS104 Specification for Electrical Network Project Design Plans;
- NS130 Laying of Underground Cables up to and including 11kV;
- NS143 Easements, Leases and Rights of Way;
- NS148 Overhead Line Support, Street Light Column, Pit and Pillar Labelling;
- NS156 Working Near or Around Underground Cables;
- NS158 Labelling of Mains and Apparatus;
- NS159 Installation of Cables and Conduits using Trenchless Techniques;
- NS165 Safety Requirements for Non-Electrical Work In and Around Live Substations;
- NS168 Design and Construction of 33kV, 66kV and 132kv Underground Cables;
- NS171 Fire Stopping in Substations;
- NS172 Design Requirements for Cable Pits, Vaults, and Bays;
- NS174 Environmental Procedures;
- NS174C Environmental Handbook for Construction and Maintenance;
- NS181 Approval of Materials and Equipment and Network Standard Variations;
- NS186 Major Substations Civil Works Design Standard;
- NS203 Telecommunications Network: Master Policy Document;
- NS205 Telecommunications Route Markers;
- NS211 Working With Asbestos;
- NS212 Integrated Support Requirements for Ausgrid Network Assets;
- NS234 Telecommunications Underground Physical Plant Installation;
- NS235 Telecommunications Underground to Overhead Transition;
- NS243 Telecommunications Roles, Responsibilities, Training Requirements, Auditing and Quality Assurance Acceptance; and
- NSA 1343 Supplement to NS181 Approval of Materials and Equipment and Network Standard Variations.

3.3 Other standards and documents

- AS1170 Structural Design Actions;
- AS1657 Fixed Platforms, Walkways, Stairways and Ladders – Design, Construction and Installation;
- AS1742 Manual of Uniform Traffic Control Devices;
- AS2700 Colour Standards for General Purpose;
- AS/NZS2865 Safe Working in a Confined Space;
- AS3600 Concrete Structures;
- AS3610 Framework for Concrete;
- AS3996-2006 Access Covers and Grates;
- AS4145.1 Locksets and Hardware for Doors and Windows;
- AS4198-1994 Precast concrete access chambers for sewerage applications;
- AS/NZS4586 Slip Resistance Classification of New Pedestrian Surface Materials;
- AS/NZS60529-2004 / IEC60529 Ed2.1-2001 Degrees of Protection Provided by Enclosures (IP code)
- AUS-SPEC 1152 Road Openings and Restoration (Utilities);
- AUS-SPEC #2 306U Road Openings and Restoration – NSW Specification;
- EA NSW-ISSC 7-2001 Guide to the Prevention of Unauthorised Access to Electricity Works;
- EA NSW-ISSC- 20-2001 Guidelines for the Management of Electricity Easements;
- EA NSW-2004-ISSC 28 Guideline for Enclosed Spaces - NSW Energy Networks March 2004;
- ENA Doc 001-2019 National Electricity Network Safety Code;
- ENA Doc 015 National guidelines for prevention of unauthorised access to electricity infrastructure;
- ENA NENS 03-2006 National guidelines for safe approach distances to electrical and mechanical apparatus;
- EN41003 Particular Safety Requirements for Equipment to be Connected to Telecommunication Networks and / or a Cable Distribution System;
- MOU - Ausgrid, RTA (now RMS) and Department of Transport;
- RMS - Guide - Traffic Control at Worksites;
- Road Occupancy Licence – Conditions of Approval - Sydney East, Sydney North, Sydney South - Homebush, Sydney South – Oatley;
- Shared Trench Utility Agreement;
- WHS – Confined Spaces – Code of Practice;
- WHS - Hazardous Manual Tasks: Code of Practice;
- WHS - How to Manage Work Health and Safety Risks: Code of Practice;
- WHS - Managing the Work Environment and Facilities;
- WHS - Work Health and Safety Consultation, Coordination and Cooperation;
- WHS - Excavation: Code of Practice;
- WHS - Manual Handling Resource and;
- WHS - Work Near Underground Assets: Guide.

3.4 Acts and regulations

- Electricity Supply (General) Regulation 2014 (NSW);
- Electricity Supply (Safety and Network Management) Regulation 2014;
- Environmental Planning and Assessment Act (1979);
- National Environmental Protection Council Act 1994;
- Roads Act - Seek Consent Under Section 138 of the Roads Act and;
- Work Health and Safety Act 2011 and Regulation 2017.

4.0 DEFINITIONS

Refer to NS001 Glossary of Terms

5.0 PLANNING, DESIGN AND INSTALLATION

5.1 General

The Communications Engineering Planning Manager is responsible for planning the optical fibre network and producing documentation including but not limited to Telecommunications Brief instructions and plans to communicate build requirements. All design and construction activity for telecommunications works must be compliant with direction given by the Communications Engineering Planning Manager and Ausgrid standards including, but not limited to, this standard.

New and pre-existing Ausgrid telecommunications pits must be made compliant with this standard prior to asset acceptance, prior to the insertion of new conduit to a pit, prior to the haul of new cable through the pit and / or prior to commissioning new services through the pit. Refer to NS243 Telecommunications Roles, Responsibilities, Training Requirements, Auditing and Quality Assurance Acceptance regarding asset acceptance.

The designer is responsible for consulting the Communications Engineering Planning Manager where clarification of this standard or variation from the standard is necessary, prior to the design progressing through to construction issue. The constructor is responsible for consulting the designer where clarification or variation from this standard and / or the design is necessary at any time throughout the construction stage.

The Proponent is responsible for compliance with:

- Ausgrid's Be Safe system (applicable to Ausgrid personnel);
- Ausgrid's Safety in Design procedures (NS212);
- Ausgrid Electrical Safety Rules;
- WHS Act 2011 and associated Regulation and:
- NS174 and all relevant laws, rules, regulations and guides for environmental impact assessment.

The Proponent is responsible for assessing and recommending mitigation of risks associated with asbestos in the work place in accordance with Ausgrid's NS211 Working With Asbestos Products and all relevant laws, rules, regulations and guides.

The Proponent shall comply with the guidelines relevant to the protection of trees found in AUS-SPEC 1152.

It is the Proponents responsibility to perform haul ability calculations and to plan the fibre cable hauls, hence pit and splicing locations and clearly note on the plans where splices are permitted to be installed in accordance with this standard and NS234 Telecommunications Underground Physical Plant Installation. It is the Proponents responsibility to provide a design which is constructible. Proponents may consult the Communications Engineering Planning Manager for support where required.

Design documentation must be sent to Ausgrid for review prior to construction release. The design shall not be released for construction until Ausgrid is satisfied that its needs for the telecommunications infrastructure installation or alteration are met.

It is the Proponent's' responsibility to restore all damage to Ausgrid pre-existing infrastructure that is caused by, or results from, their installation works at no cost to Ausgrid.

NS234 clauses 5.1 - 5.6 are applicable to this standard with regards to locating existing services, excavation and reinstatement, community consultation, geographic and environmental considerations, and access and easements. Refer to NS234 Telecommunications Underground Physical Plant Installation.

5.2 Telecommunications pits

Ausgrid telecommunications pits are used for hauling, splicing and coil storage purposes for Ausgrid protection fibre network, DTS cable, and occasionally also 3rd party cable. Ausgrid telecommunications pits within depots and Ausgrid sites with several building structures may also house cables, splices and coils for campus telecommunication network or building interconnection networks.

Refer to drawings 212393 and 212386 for standard communications construction drawings including but not limited to pits with conduit entries. Also refer to NS234 Telecommunications Underground Physical Plant Installation regarding telecommunications route design requirements, in particular with regard to haul ability calculations which will define the tolerable route distances between pits accounting for bends, inclines and other influencing factors.

Ausgrid underground optical fibre cables outside of buildings are hauled through continuous conduit and pit infrastructure as per the requirements of NS234. Ausgrid underground optical fibre cables must not be direct buried.

5.3 Planning and design

The Proponent shall refer to NS234 Telecommunications Underground Physical Plant Installation for cost effective holistic route planning and design which together with this standard, will also facilitate cost effective telecommunications pit planning and design.

The requirement for optical path diversity is determined and documented by the Communications Engineering Planning Manager. Optical path diversity is mandatory in many cases for Ausgrid's legal compliance to the NER's for electrical supply distribution. The Proponent is responsible for planning, designing and constructing routes in compliance with Ausgrid's direction for diversity and NS203. The Communications Engineering Planning Manager shall provide guidance to the Proponent if the Proponent finds that the requirements of NS203 for route diversity are ambiguous, or if further clarification is necessary. Refer to NS203 Telecommunications Network: Master Policy Document on Ausgrid's Balin and internet sites.

It is imperative that constructors follow the design with regards to the correct conduit/s being brought into each communications pit. In some situations, several protection fibre conduits may be designed within the one HV feeder trench; however these conduits may be separated by a HV feeder cable or conduit for diversity reasons. For these designs, each protection fibre conduit would stray out to its own independent telecommunications pit for hauling, splicing and coil storage.

It is the Proponent's responsibility to assess haul-ability of each individual conduit route in all instances and to design and construct pits en-route in compliance with this standard, as well as NS130 Specification for Laying of Underground Cables up to and including 11kV, NS168 Specification for the Design and Construction of 33kV, 66kV and 132kV Underground Cables, NS234 Telecommunications – Underground Physical Plant Installation, NS203 Telecommunications Network: Master Policy Document, and all other applicable Ausgrid underground plant installation standards.

5.4 Risk mitigation

Within the scope for which the Proponent has responsibility, the Proponent's shall design and / or construct Ausgrid telecommunication pits minimising risk to people and plant, considering the entire project and asset lifecycle stages.

Communications pits are to be installed, preferable in footpath alignments or on easement land in an area which does not pose a risk to the communications pit, its contents or the safe access, opening and closing of the pit lids.

Potential risks include, but are not limited to:

- Vehicles or farm machinery traversing the land where the pit is to be located, or driving immediately adjacent to the pit;
- Livestock traversing the land where the pit is to be located;

- Future excavation in the area;
- Future road widening necessitating the pit and contents to be relocated;
- Surrounding soil erosion;
- Landscaping or other civil works changing the ground surface height or levels;
- Proximity to other underground utility services;
- Access restrictions i.e.: in rail corridors or mines;
- Ausgrid telecommunications infrastructure crossing over other underground utility service routes and / or easements;
- Proximity to, or positioning under fence lines;
- Proximity to drains;
- Flooding or tidal affects at the proposed pit location;
- Hazardous chemicals or gasses entering and pooling in the pit, and
- Proximity to pedestrian or vehicular access points including, but not limited to; gates, driveways, doorways, pedestrian crossings, livestock crossings, bridges, causeways, parking lots, bus stops, street stalls, drains, outdoor cafés, concierge drop-off points.

Proponents must not install pits where access to the pit is likely to generate a safety hazard.

Proponents must avoid installing pits where access to the pit will impede: plant operation, vehicular traffic flow, the movement of public and staff at or near the work site. Exception to this rule is only allowable if written approval to proceed has been obtained from the Communications Engineering Planning Manager.

Telecommunications pits must not be installed in rail corridors. The Proponent shall avoid installing Ausgrid telecommunications pits on land where access is restricted by the owner, by the land authority, or by other conditions.

Telecommunications pits installed in areas affected by tides or high ground water level must be designed and constructed to permanently hold position withstanding buoyancy uplift forces.

Telecommunications pit installations within substation yards must be placed so as to avoid the likelihood of pit access restrictions including but not limited to: in roadways, near gate and doorway access, in storage areas (i.e.: where equipment or bins are typically delivered), areas with the potential to fall under access permit conditions as well as any other potential site specific restrictions. Telecommunications pits shall not be placed to affect the safety, operability or accessibility of any other plant within the substation.

Substations and depots may share the conduit and pit architecture for the hauling of both optical fibre and copper telecommunications cabling between buildings, panels or equipment so long as the sharing of conduit space does not risk damage to any of the assets or risk the safety of personnel.

The Proponent must be aware that conductive marker wire with the potential for carrying current may be installed between telecommunications pits and enter the pit cavities outside of Ausgrid substations. It is the Proponents responsibility to assess and minimise electrical earthing and potential induction risks where cables entering the pit are conductive or have the potential to become conductive, and to comply with Ausgrid's ESR's (Electrical Safety Rules) where the risk cannot be eliminated. Refer also to NS205 Fibre Optic Cabling Installation – Cable Markers, Placement and Numbering as well as NS234 Telecommunications – Underground Physical Plant Installation.

The installation of one or more conduits to a pit must not compromise the structural integrity of the pit.

Telecommunications pits must not be located over existing utility services including, but not limited to Ausgrid power cables.

The Proponent shall design to avoid the risk of excessive lifecycle cost to Ausgrid by factors including, but not limited to; the choice of materials, the impact on Ausgrid's business from access to the proposed pit location, ongoing maintenance requirements and potential associated costs, and the cost of altering, replacing or recovering and disposing of the pit in future.

5.5 Bollards

The risk of damage to pits from vehicular traffic in easement, parking lot or road reserve areas can be mitigated by the installation of protective bollards situated so as the bollards do not restrict pit lid opening and closing using safe manual handling practices. Bollards shall be permanently positioned, spaced and sized so as to be easily visible to and therefore deter traffic from driving onto any part of the pit from any reasonably expected angle.

Bollards shall be coated with high visibility paint and then affixed with reflective tape at a height that is easily visible to approaching traffic. Bollards shall be designed and constructed with foundations and structural strength to endure impact from the vehicular size and speed reasonably expected in the area.

Bollards shall not be placed in main carriageway corridors or areas that would restrict normal traffic flow. Pits in carriageways shall be designed and constructed in accordance with clause 5.13 of this standard.

All bollards around Ausgrid telecommunications pits that have suffered impact, and bollards requiring replacement, shall be reported to the Communications Engineering Planning Manager. Bollards that have been found to have experienced impact shall be replaced with new bollards of the same or greater structural strength at the earliest possible convenience.

Telecommunications pits that have been damaged by vehicular traffic, slashing, or machinery must be replaced with a pit compliant with this standard. Consideration should be given to the installation of protective bollards i.e. an assessment of the mechanism of damage should be undertaken before installation.

The Proponent is responsible for consulting the land authority regarding bollard installation works, noting that Ausgrid has a right to protect its telecommunications assets from damage in the interests of safety as well as for maintaining reliable telecommunications signal transmission.

Note: Some of Ausgrid's telecommunications signal transmissions are essential to maintaining electrical grid stability.

The Proponent shall design Bollards to withstand the potential expected environmental conditions for the area, including, but not limited to, fire in areas with high fire potential.

5.6 Alignment and location

The Proponent shall refer to NS234 Telecommunications – Underground Physical Plant Installation regarding route design influencing factors and requirements including, but not limited to, haul-ability assessment, in order to design for optimal cost effective pit location points which are compliant with Ausgrid standards.

Ausgrid telecommunications pits are to be positioned:

- so that the largest wall dimension of the pit is parallel to the line of the asset route;
- so that the largest wall dimension of the pit is parallel to a reference line such as a footpath, property boundary, line of kerb, cable run, or easement;
- within the local government specified electricity utility allocation or approved easement;
- minimum 5m back from any street corner;

- so as the top surface of the pit is made flush with the surrounding pavement or finished ground surface level on all sides including after reinstatement and soil settlement, noting that this may result in sloping horizontal positioning;
- for pits intended to house splices, the pit is installed within 10 to 15 metres from a location where a splicing vehicle may be safely and legally parked and whereby the parked vehicle and splicing works will not adversely impact upon vehicular and pedestrian traffic;
- for pits intended to be haul points, the pit is installed in an area where the hauling of cable in or out of the conduit (or conduits) shall not be obstructed by structures including, but not limited to: parked cars, trees, bus stops, street café's, buildings, fences, bridges, retaining walls, barriers, street signs, street furniture or other above ground assets and;
- according to fibre cable haul-ability calculations performed by the Proponent taking into account factors including, but not limited to, route distance, bends, slope, drum lengths and the radius of bends, and other influencing factors and route design requirements as per NS234.

For each protection fibre conduit approaching a major substation, a communications pit must be installed either: a)

- Inside the locked substation security fence line, or;
- Within 50m outside of the locked substation security fence line.

Refer to clause 5.30 of this standard regarding substation site internal pits.

Telecommunications pits are not required at or near distribution substations in which the optical fibre cable will pass through without termination.

The Proponent shall consult Ausgrid's Communications Engineering Planning Manager for pit placement advice where clarification of standards, or advice for particular circumstances is required.

Telecommunications pits and manholes must not be placed over Ausgrid power cables or other utility infrastructure unless there are no other viable pit location options and written approval to do so has been received from the Senior Engineer responsible for Telecommunications Area Planning. Where a standard size 8 pit or prefabricated manhole will not fit in the chosen location, a cast in-situ pit or manhole must be built. The prefabricated pit or manhole shell must not be cut to suit in any way.

Refer to clause 5.4 of this standard regarding risk mitigation relative to pit location.

5.7 Excavation and reinstatement

NS234 clauses 5.1 - 5.5 are applicable to this standard with regards to locating existing services, excavation and reinstatement, community consultation, geographic and environmental considerations, and access and easements. Refer to NS234 Telecommunications Underground Physical Plant Installation.

In removing surface and sub-surface materials, maximum care shall be exercised to safeguard existing underground services and other structures within and around the work site against damage. Refer to NS156 Working Near or Around Underground Cables.

Guidelines for the stockpiling or disposal of excavated material in AUS-SPEC 1152 Clause 3.2 - Excavation are applicable to this standard and shall be adhered to. Refer to NS130 Specification for Laying Underground Cables up to and including 11kV regarding requirements for temporary reinstatement.

Excavation for the pit or manhole should be approximately 150mm greater than the outer dimensions around the pit or manhole side walls, and 100mm below the base. Bedding material is to be installed with a minimum depth of 100mm in substances other than rock or 50mm in rock. Refer to Figure 1 below. Any large, sharp objects or other protrusions that may damage the pit or

manhole must be removed prior to placement of the pit or manhole. The bedding material also acts as a drainage medium.

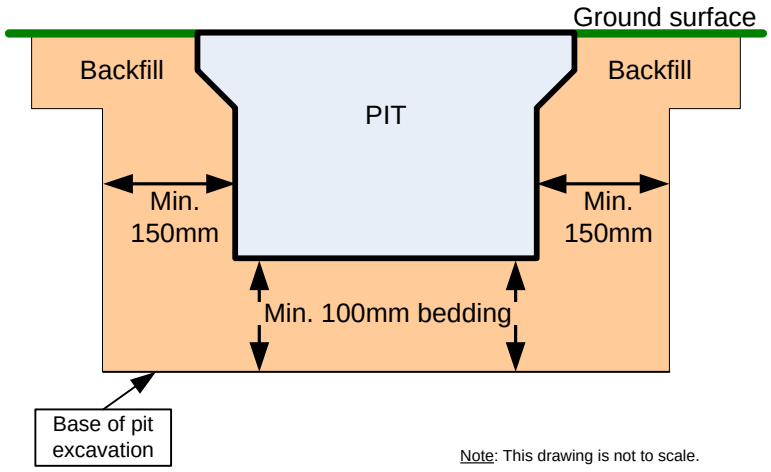

Figure 1 Pit excavation and backfill

5.8 Traffic control notifications

It is the Proponents responsibility to assess and factor into the design the traffic control requirements for the installation or alteration of each telecommunications pit. The Proponent shall then notify all relevant authorities in accordance with the requirements of AUS-SPEC 1152, Clause 1.10 - Provision for Traffic. Ausgrid's personnel, contractors and ASP's shall also comply with NEG-SE10 Traffic Management.

Ausgrid prefer the Proponent to design and construct pits in locations which minimise the initial and ongoing necessity for traffic control to access telecommunications pits.

5.9 Security

Ausgrid's optical telecommunications network has high security and availability requirements which are growing over time in line with increasing volumes of business essential service transmission through the optical network. For this reason, all telecommunications pits found to be fitted with lids that are not lockable, must have the lids replaced with locked lids in compliance with Ausgrid standards including, but not limited to this standard, prior to the installation of new protection fibre cable through the pit, and / or prior to commissioning new control and / or protection services through the pit. Refer to clause 5.11 regarding telecommunications through pre-existing pits.

For Ausgrid telecommunications applications, the Proponent is responsible for sourcing pit lids for which the manufacturer has gained SCEC endorsement.

Installing a new secure lid locking mechanism recessed into a pre-existing pit shell will result in reduced structural integrity of the existing concrete pit in most instances, therefore necessitating the replacement of the entire pit. Refer to clause 5.33 below regarding replacement, alteration and enhancement of telecommunications pits.

All pits and manholes intended to house Ausgrid protection fibre cable, that are installed outside of Ausgrid locked security fence lines must be fitted with a substation type padlock at the time the pit is installed. Pits installed within locked substation security fence lines do not require substation type padlocks to be fitted, however the pits and lids shall be of the same type as those installed beyond the fence. These provisions then allow for the fitting of locks to the pits in future if security is breached, if damage or vandalism occurs, or if part or all of the land is sold.

For security reasons, Ausgrid telecommunications pit lids and surrounds shall not have any form of Ausgrid identification stamped on the outside. Designated underground asset information provider plans shall identify the asset as Ausgrid's upon request.

Pits housing protection fibre cables through which active tele-protection services travel, and which are damaged by forced entry, vandalised or otherwise made unsecure, must be supervised by site security at all times until the pit can be either replaced or rectified to be made secure again. Pit rectification works must be compliant with this standard. If the damage compromises safety to people or property, then all measures must be taken to guard the area off and make safe as soon as is possible.

Pits that are not housing protection fibre cables, and which are damaged by forced entry, vandalised or otherwise made unsecure, do not require site security supervision, however the pit must be guarded off, the area made safe, and the damage must be rectified no more than 2 weeks from initial report. The restoration must result in a pit compliant with this standard.

The local Ausgrid site authority shall advise if site supervision is necessary for security reasons at campus pit damages.

Ausgrid Z1 padlocks shall be used to secure pits.

Note: If protection fibre cables are found to have been cut or damaged within the pit, then all optical fibre cable ends are to be sealed so as to prevent laser damage to retinas. The area is to be made safe, and the damage reported to Ausgrid in accordance with MRT100 Telecommunications Planned and Unplanned Outages, Faults, Damages and Emergency Response.

Ausgrid pits with existing or proposed protection fibre cable, which also house existing or proposed external authority cable and conduit entries, must be locked with an Ausgrid padlock in compliance with this standard such that only authorised Ausgrid personnel shall enter. At the time the padlock is fitted, the Proponent shall notify Ausgrid's Communications Engineering Manager, who is responsible for notifying the external authority of the new access arrangement.

Ausgrid telecommunications pits shall not be accepted by Ausgrid if the lids are held closed by screw-down bolts or other mechanisms falling outside the security requirements of this standard. Ausgrid reserves the right to refuse payment for cables and conduits installed or services commissioned through unsecure and non-compliant pits.

5.10 Standard pit specifications

New protection fibre infrastructure, as well as dedicated campus fibre network infrastructure, shall utilise pre-fabricated size 8 concrete telecommunications pits in all instances unless specific site conditions force a solution for which an alternate section of this standard applies.

Ausgrid telecommunications pits which are intended to only house DTS fibre cables may use J5 concrete pits.

Concrete pit structures shall be reinforced with reo and shall meet or exceed the load rating of the intended pit lid/s.

The figure below is based on loadings detailed in AS3996 (Access Covers and Grates) and AS4198 (Precast Concrete Access Chambers for Sewerage Applications) standards.

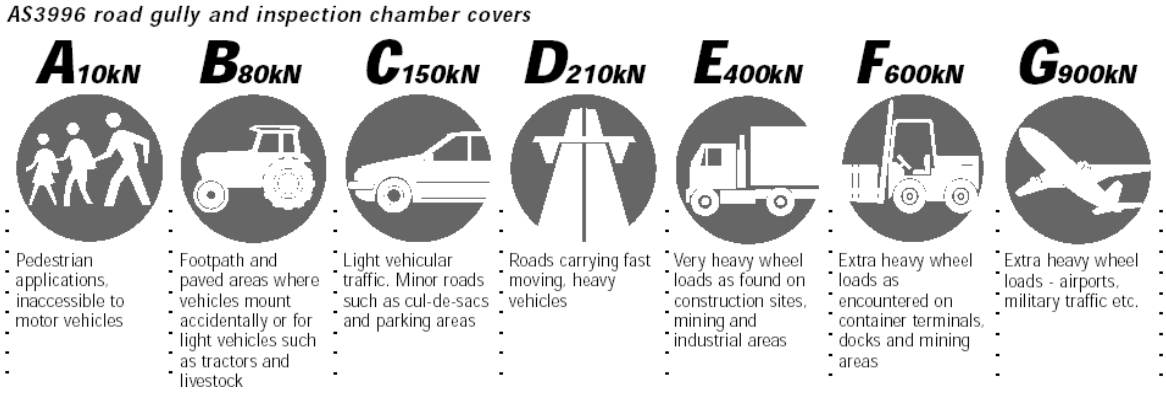

Figure 2 Pit ratings

Ausgrid telecommunications pit structures shall be minimum Class C rated, unless clause 5.13 below applies.

5.10.1 Standard pit lid specifications

Minimum Class C rated pit lids as per AS3996 are to be installed for Ausgrid telecommunications pits regardless of where the pit is placed, it's size or its intended contents. Higher rating lids are required for pit installations in roads and carriage ways – refer to clause 5.13 of this standard.

Each size 8 telecommunications pit shall have two separate lids. Each lid shall have two key holes centrally positioned so as to balance the lid when lifting by the use of either one or two standard Telstra pit key tools and with correct manual handling technique.

The security padlock detailed in clause 5.9 above shall be accommodated in a recess in one of the pit lids within one of the lid sections. The recess and lock shall be protected by a suitable hinged cover plate provided with a means of keeping it in a closed position until accessed, however this must not be by removable parts such as screws as the screws have the potential to be lost and/or seize preventing access to the lock. An acceptable method would be for the lock cover plate to be spring loaded.

The pit key holes and lock recess must have mechanical barrier under the key holes and lock mechanism to prevent the ingress of foreign matter including, but not limited to, syringes, cigarette butts and soil.

The bracket for the removable locking bar shall be recessed into the concrete pit wall. The brackets shall hold the locking bar in place or have a barrier preventing the bar from accidentally dislodging and falling into the pit through the action of pit lid lifting and reinstatement.

Pit lid locking mechanisms shall not comprise twisting or moving parts other than the lock and hinged cover plate.

Pit lids shall fit neatly into the pit lid frame, and lock in place such that once padlocked, the lids cannot be lifted from any side, corner or at the point where two lids join, by the insertion and leverage of a screw driver or any other common tool.

New J5 pits may only be used to house DTS cables. Size 5 pits only require one lid with two key holes in the lid centrally positioned so as to balance the lid when lifting by the use of either one or two standard Telstra pit key tools and with correct manual handling technique. The new size 5 pits do not require a locking mechanism to be fitted to the lid unless advised otherwise by either the Communications Engineering Planning Manager or Ausgrid Design. Size 5 pit lids may be either concrete lids reinforced with reo, or metal lids. Concrete J5 pits must have a mechanism such as a gasket under the lid to prevent the ingress of foreign matter to the pit cavity.

5.11 Telecommunications through pre-existing pits

New protection fibre conduits and cables must not travel through the following new or pre-existing pit types:

- any type of size 5 pit;
- size 8 plastic pits and;
- size 8 polycrete pits.

The above direction applies regardless of whether or not the pit is locked.

The Proponent is responsible for consulting Ausgrid's Communications Engineering Planning Manager in all instances whereby the Proponent is considering taking a new protection fibre conduit to a pre-existing pit that has existing protection fibre conduit entries. The Communications Engineering Planning Manager shall determine whether or not diversity will be compromised by bringing the routes together at the pit.

DTS cables may travel through new or pre-existing size 5 pits, so long as the pits are compliant with this standard.

Refer to clause 5.19 regarding limitations on conduit penetrations to pits and also clause 5.21 regarding limitations on pit contents.

Pre-existing unlocked pits with lids that are capable of accommodating the locks specified in this standard shall have locks installed prior to the installation of new protection fibre cable through the pit, and / or prior to commissioning new control and / or protection services through the pit. This rule applies regardless of the pits existing contents.

Refer to clause 5.33 below regarding alterations to pre-existing pits for which the lids are not capable of locking in compliance with this standard.

5.12 Telecommunications through electrical pits

For instances where route design compliant with NS234 determines that new protection fibre conduit and cable must travel through electrical pits, the optical fibre cable shall be mechanically protected for the entire path through the pit. Mechanical protection shall be designed to protect the optical fibre cable from risks including, but not limited to, fire and chemical damage, as well as from kinking and crushing caused by works on other assets within the pit.

Ausgrid's preferred option to achieve mechanical protection is for the PVC telecommunications conduit to be made continuous through the electrical pit, with the conduit surrounded by no less than 50mm concrete on all sides from each point immediately where the conduit enters the electrical pit, through the entire pit cavity. The concrete surrounding the conduit shall be no less than 20MPa strength. The concrete encased conduit shall be installed on the base of the electrical pit preferably along one side.

Existing optical fibre cables through electrical pits which are not mechanically protected do not need to be retrofitted with mechanical protection or fire protection unless risk assessment in accordance with NS171 Fire Stopping in Substations proves that coverage of the optical fibre cable is necessary.

If concrete encasement of the conduit is not feasible, then the Proponent may design for metallic conduit made continuous through the pit so long as the metallic conduit does not introduce new safety risks. The metallic conduit through the electrical pit must be of the same internal diameter as the telecommunications conduit outside of the pit. The join between metal and PVC conduit shall be glue sealed at each join such that no internal burrs or ridges are left. The metal conduit shall be saddled to the wall of the electrical pit or supported on tray or brackets through the pit.

Metallic conduit and the associated support hardware must not be installed in areas where it could be used as a platform to stand on, or used as a step.

The concrete and / or metallic mechanical protection for telecommunications conduit through electrical pits shall be installed such that it does not restrict access or ingress for people or plant, or restrict cable flow through the pit for future installations.

It is the Proponent's responsibility to obtain approval for all designs for which this section applies prior to progressing designs through to construction issue. Approval must be obtained in writing from Ausgrid's Communications Engineering Planning Manager.

The Proponent must not design or construct Ausgrid protection fibre infrastructure with splices or fibre cable coils in electrical pits.

5.13 Road carriageway pits

It is the Proponent's responsibility to obtain written permission for designing and constructing road carriageway telecommunications pits from Ausgrid's Communications Engineering Planning Manager in all instances prior to progressing the design through to construction issue. Telecommunications pits must not be installed in road carriageways unless one or more of the following conditions prevent pit installation outside of the carriageway corridor:

- the road reserve is too congested with other utility underground services, or
- the road reserve is more than 3m perpendicular distance from the Ausgrid underground conduit route, or
- other existing above ground infrastructure or assets in the road reserve prevent pit installation, or
- the road reserve is insufficient in width to accommodate an Ausgrid telecommunications pit, or
- placement of the pit in the road reserve would generate a safety risk, or
- the road reserve terrain prevents, or creates unacceptable risks, for pit installation i.e.: potential for erosion, steep ground slope, retaining walls, rock, or
- access restrictions in the road reserve would occasionally or permanently prevent pit access.

Pits planned to house protection fibre splices shall not be installed in road carriageway pits under any circumstances, for availability reasons.

If the Proponent finds it is unavoidable to install a hauling pit for Ausgrid telecommunications cables in the carriageway of a major road or freeway, then all of the following requirements must be adhered:

- The pit shall be a buried pre-cast size 8 locked pit. If it is not possible to install a buried pre-fabricated pit, then a buried cast in-situ pit with locked lids may be installed, so long as the cast in-situ pit complies with clause 5.24 of this standard, and

- The buried pit must have a flat uni-marker device glued to the top of each size 8 pit lid as per NS205 Fibre Optic Cabling Installation – Cable Markers, Placement and Numbering.

- The pit shall have an additional concrete collar fitted on top of the size 8 or cast in-situ pit with minimum 'Class D' rated unlocked lids on the collar made flush with the surrounding finished surface level. The collar must be bolted and glued to the size 8 pit's concrete without reducing the structural integrity of the size 8 pit. The concrete collar must not restrict the locked size 8 pit lid open or close operation, or present a manual handling issue. Any reasonably practicable additional requirements by the land or roadway asset owner shall be adhered.

Specific lid types requested by external authorities may include, but are not limited to, gatic lids, steel pit lids with recessed sections for paving or tile inserts, or concrete lids which can be painted or stamped. Refer to clause 5.23.1 below.

Road carriageway telecommunications pits requiring alteration must have the works result in a pit that is compliant with this standard regardless of the state of the pre-existing telecommunications pit.

Pits installed in road ways, driveways or high trafficable areas with 4 or more conduit entries in the end of the pit and must have minimum 200mm concrete haunching outside of the pit, applied around conduits to prevent pit collapse as shown in figure 3 below.

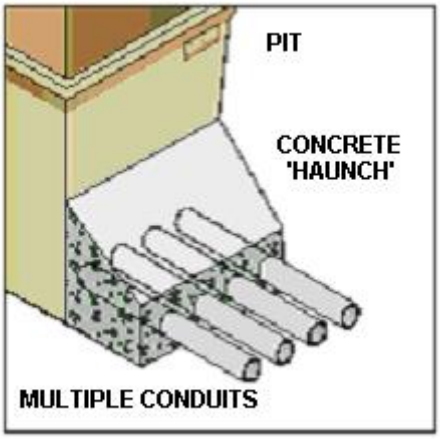

Figure 3 Concrete haunching for conduits entering a pit

Telecommunications pits must not be placed in transformer runways or carriageways where traffic is likely to exceed 8000kg, unless placement of the pit in the carriageway is unavoidable and the pit structure and lids have been specifically designed to withstand the applicable load.

Refer to NS130 Specification for Laying Underground Cables up to and including 11kV regarding design loads for temporary road covers during pit construction works, where it is unavoidable to install a telecommunications pit in a road carriageway.

5.14 UGOH transition

At protection fibre UGOH transitions, a size 8 concrete pit must be installed near the base and no more than 40m from the base of the pole for the housing of optical fibre cable coils and splices.

Refer to drawing 212386 for Ausgrid's standard construction telecommunications UGOH drawing and also NS235 Telecommunications Underground to Overhead (UGOH) Transition.

5.15 Ausgrid DTS fibre pits

Optical fibre cores are being installed for DTS (Distributed Temperature Sensing) either within the sheath of new HV feeder cables, or in a separate sheath installed adjacent to HV feeder cables and conduits. The DTS must stray out to pits for jointing, hauling and coil purposes. DTS coils are used for calibration and to measure ambient temperature. DTS infrastructure does not require the same level of security and reliability as that of protection fibre cable, hence pits which are only intended to house DTS conduits and cables do not require locks.

It is generally more economical for HV feeder design to optimise the telecommunications installation component of the feeder project by straying the DTS fibre cabling away from the feeder at the same points as the protection fibre cabling, and sharing pit space with the protection fibre cable in the locked size 8 pits. Where extra pits are required for DTS alone, these pits may be either J5 or size 8 type and installed to the same standard as for protection fibre cabling.

It is preferred that DTS pits are not buried. If DTS pits are to be buried for unavoidable reasons, then the requirements of NS205 Fibre Optic Cabling Installation – Cable Markers, Placement and Numbering Markers and clause 5.22 of this standard for buried pits must be applied.

Note: The protection fibre cables and conduits MUST NOT enter unlocked size 5 DTS pits. Protection fibre cables and conduits may enter pre-existing size 8 pits so long as the pit complies with this standard and is secured with a padlock.

Refer to drawing 212393 for standard comm's pit construction drawings and also NS234 Telecommunications Underground Physical Plant Installation.

Where necessary, risers may be fitted to size 5 pits to increase the pit depth and available internal pit space up to a maximum of 1200mm internal depth to capture DTS assets.

5.16 Ausgrid copper pilot pits

Copper pilot cables are no longer being installed for Ausgrid's telecommunications network. When a copper pilot cable is decommissioned, isolated, cut and capped, any existing pits en route must also be recovered, the hole filled and the land reinstated to match the surrounds.

If copper pilots must retain connectivity and are to be rearranged to bypass a substation that is being decommissioned, the Communications Engineering Planning Manager shall document the required network alterations including detail for pits if required.

5.17 Campus telecommunications pits

New depots and Ausgrid sites with multiple buildings shall be designed with dedicated telecommunications pit and conduit infrastructure linking buildings in accordance with Ausgrid's written direction. The pits for campus fibre distribution shall be size 8 concrete pits fitted with lockable type lids as per the standard for installing substation site internal pits stated in clause 5.30 below.

Depots and Ausgrid Offices with campus distribution networks whereby any or all of the following conditions apply, require Ausgrid padlocks to be fitted to all telecommunications pits at the site in accordance with clause 5.9 of this standard prior to the haul of telecommunications cable through the pit:

- there is no security fencing at the site, or
- the site is not completely surrounded by security fence, or
- gate structures do not require Abloy padlock key or swipe card for access, or
- gate structures are generally kept open during the day or at other times when staff are on site, or
- the site and / or neighbouring sites have a history of unauthorised access and / or vandalism, or
- gate structures are rarely closed.

Dedicated campus fibre conduits may be installed in shared trench with other underground infrastructure in the depot including, but not limited to power, water, sewer or drains, so long as the following conditions are all adhered:

- co-location in the trench does not introduce risk to people or plant, and
- the other infrastructure does not enter the telecommunications pits, and
- telecommunications infrastructure does not enter pits which are primarily installed for other infrastructure.

The Proponent shall refer to Ausgrids Communications Engineering Planning Manager where Ausgrid's documented telecommunication requirements for the site are in need of clarification or additional information.

Existing Ausgrid depots and sites with campus telecommunications cabling shall apply the requirements of this standard for pit security whenever a pit is replaced which contains Ausgrid telecommunications copper or optical fibre infrastructure.

New campus telecommunications pits shall not be installed in road carriageways, driveways, car parks, doorways, pedestrian crossings, equipment storage areas, or areas of potential risk as listed in clause 5.4 of this standard.

5.18 Damage and hazard reports

This section applies to Ausgrid telecommunications pits only. Attending sites for reported damage to telecommunications cable, pits or equipment must be in compliance with MRT100

Telecommunications Planned and Unplanned Outages, Faults, Damages and Emergency Response.

Ausgrid telecommunications pits found with any of the following conditions must be reported to Ausgrid's Communications Engineering Planning Manager in accordance with MRT100:

- damaged telecommunications pits including, but not limited to; fractured pit shell, deformed pit lids, cave-in of pit walls, damaged lid support frame or broken concrete surround, or
- vandalism to telecommunications pits, or
- security risks for telecommunications pits including, but not limited to; missing or damaged locking bar, inoperable locking mechanism, missing padlock, side walls caved in exposing the pit interior, lid either missing or deformed and exposing the pit interior, or
- telecommunications pit related safety and other hazards including, but not limited to; trip hazards caused by erosion or subsidence, locking recess cover unable to stay closed, deformed lids. Other risks may include but are not limited to; pit installations in unformed roads close to heavy machinery traffic or operation of slashers, pit installations in corrosive soils, pit installations in areas prone to erosion, and the risks listed in clause 5.4 of this standard, or
- replacement requirements for standards compliance, or
- any other risks or hazards related to Ausgrid's telecommunications pits.

Refer clauses 5.4 Risk Mitigation and clause 5.9 Security within this standard.

Figure 4 Pit damage – concrete shell broken and lid deformed

5.19 Conduit penetrations

Telecommunications conduit entries to pits, must comply with the following requirements as applicable to the pit type:

- conduit entries into a prefabricated pit or manhole must utilize the manufacturers pre-formed moulded drill points or infill cut-out plate in order to retain the designed structural rating of the pit shell. In either case, once the conduit is inserted into the opening for pit entry, the opening must be completely sealed with mastic around the conduit to prevent the ingress of foreign matter to the pit.
- Conduit entries must enter the end wall of size 8 and size 5 pits (smallest dimension wall). Pit side wall (the longer dimension wall) moulded drill points must not be used.
- all conduits entering Ausgrid telecommunications pits must be free of sharp edges and burs, and fitted with bell mouths.
- minimum 50mm separation between the pit floor and the lowest point of the conduit.
- minimum 50mm separation between the pit side wall and conduit entries.
- minimum 50mm separation between each conduit (before bell mouths are fitted).
- conduit entries to the pit shall be from a perpendicular angle to the wall it enters.
- after the conduits are installed, the infill plate must be sealed around all edges and the conduit entry holes must be sealed around the conduit
- Concrete haunching extending minimum 200mm from the pit wall must be installed behind all pit infill plates after the plate and conduit entry holes are sealed.
- Concrete haunching extending minimum 200mm from the outer pit wall must be installed for all pits for which clause 5.11 applies, after conduit entry holes are sealed.
- Conduit entries into pre-formed or cast in-situ manholes as well as cast in-situ pits, shall be designed and constructed allowing for cable flow with sufficient internal space to exceed the manufacturer's minimum bend radius for haul, splice and coil storage conditions.

Figure 5 Incorrect conduit entries to a pit

No more than **6 conduits** may penetrate an end wall of a size 8 telecommunications pit. No more than **4 conduits** may penetrate an end wall of a J5 telecommunications pit. Refer to NS234 Telecommunications Underground Physical Plant Installation for approved conduit sizes.

Most conduit paths travel straight through the pit end-to-end, whereas some paths may double back on themselves creating more conduit entries at one end of the pit. The maximum number of conduit entries above applies regardless of whether or not the conduit run doubles back.

If the number of conduits approaching a pit end wall exceeds the above specified limits, then either the extra conduits are to be taken to another pit or alternatively, a manhole may be installed to accommodate the conduit requirements. Refer to clause 5.25 below regarding manholes.

The Proponent shall consult Ausgrid's Communications Engineering Planning Manager to ask if one or more link pipes are required between telecommunications pits that are installed within 10 metres of each other for instances where the specified limits for conduit penetrations and pit contents stated in this standard force the design and construction of an additional pit nearby.

5.20 Labelling

Telecommunications conduits entering Ausgrid pits shall be labelled in accordance with NS234 Telecommunications Underground Physical Plant Installation.

Refer to drawing 212393 for standard telecommunications construction drawings.

Ausgrid telecommunications pits shall **not** be stamped or labelled on the top surface of either the pit structure or its lids to indicate the pit's owner. Asset identification of Ausgrid telecommunications pits is by Designated underground asset information provider plans correlating with field location.

All Ausgrid telecommunications existing and new pits shall have a unique identifying number allocated and recorded in Ausgrid's GIS and SAP systems as per the section for pits in NS148 Overhead Line Support, Street Light Column, Pit and Pillar Numbering. The unique identifying number shall be securely affixed with glue to the pit inner wall in a location that is easily viewable when the pit lids are lifted. Signage shall not impede any operation, installation or removal of the pit lids or pit contents. Equipment including but not limited to splices must not be placed over the top of pit identification plates. Pit identifying plates must not be affixed to pit lids.

5.21 Limitations on pit contents

The Proponent shall comply with the following pit contents limitations when designing and constructing telecommunications pit installations, as well as the conduit limitations stated in clause 5.19 above.

The following table specifies the maximum coil and splice combinations that may be housed in a standard size 8 telecommunications pit:

Table 1 Ratio of coils and splices allowable in a pit

Options	Coil only	Splice
A	3	0
B	2	1
C	1	2
D	0	3

The above table shows the ratio of acceptable optical fibre cable coils versus splices which may be housed in a single size 8 telecommunications pit, and is applicable to the optical fibre cable types most commonly used by Ausgrid. "Coil only" is for either DTS coils or protection fibre 40m-100m cable length coils with no associated splice. Protection fibre cable splices must have between 20m and 50m cable length coiled in the pit for each individual cable entering the splice enclosure.

If splices and / or fibre cable coils are necessary in addition to the limits of table 1 above, then the Proponent must design for the most cost effective option from the following list of solutions;

1) Staggering the fibre cable coil storage in pits along the route to avoid exceeding limits in any one pit, or
2) Splicing the fibre cable in another pit along the route where the above limits will not be exceeded, or
3) Installing a separate pit and diverting one or more routes to the new pit for coil and / or splice storage, or
4) Replacing the pit with a manhole in compliance with clause 5.25 of this standard.

Note: Any cables travelling through a size 8 protection telecommunications pit in addition to the above maximum allowances may do so as long as no coils or splices for the cable are stored in the pit.

It is the Proponent's responsibility to plan pit, conduit and optical fibre cable coils and splices for each route in accordance with this standard as well as NS234 Telecommunications Underground Physical Plant Installation and other standards as applicable.

No more than 4 DTS coil or splice installations are permissible in a J5 pit.

5.22 Buried pits

Ausgrid protection fibre cables, coils and splices must not be housed in buried pits unless there is no feasible alternative, and the Proponent has obtained written approval to bury a pit from the Communications Engineering Planning Manager. Ausgrid prefer that pits which do not contain protection fibre and are only intended to contain cable and conduits for DTS or other telecommunications, are not buried.

Where buried pit installation is both unavoidable and approved to proceed by the Communications Engineering Planning Manager, the following conditions shall apply:

- a flat uni-marker device must be glued directly to the top of each pit lid as per NS205 Fibre Optic Cabling Installation – Cable Markers, Placement and Numbering Markers, and
- there must be no less than 100mm soil coverage over the uni-marker device, and
- a plastic sheet comprising no conductive parts shall cover the entire pit lid surface to prevent the ingress of foreign matter to the lid key holes, lid frame, lock void and padlock, and
- non-conductive warning marker tape shall be placed on top of the plastic sheet for identification of the buried asset by potholing.

Pits buried with less than 100mm soil covering the lids shall apply all of the requirements detailed in this section; however the uni marker devices must be replaced with omni marker devices buried at 300mm depth at either end of the pit as per NS205 Fibre Optic Cabling Installation – Cable Markers, Placement and Numbering Markers.

In all cases, buried pits must have location coordinates recorded and sent for upload to Ausgrid's GIS mapping system in accordance with NS 100 Field Recording of Network Assets.

5.23 Non-standard pits

Polycrete and plastic pits must not be installed for Ausgrid's telecommunications infrastructure installations or alterations.

Existing polycrete pits (installed prior to the release of this standard) in good condition with no concrete surround, which contain existing Ausgrid optical fibre cable and are located in unpaved areas, must be reported to the Communications Engineering Planning Manager.

Existing polycrete pits (installed prior to the release of this standard) with any damage* to the pit or lids, which contain Ausgrid optical fibre cable, must be reported to the Communications Engineering Planning Manager and comply with the damage reporting and rectification requirements of this standard and MRT100 Telecommunications Planned and Unplanned Outages, Faults, Damages and Emergency Response.

*** Note:** Damage to telecommunications pit structure and / or lid is defined as cracked, deformed, broken, crushed, or missing components.

Existing polycrete pits in good condition must have a min. 150w x 200d (mm) concrete surround installed prior to the haul of new telecommunications cable into the pit and prior to commissioning any new control and protection services through the pit. New concrete surrounds must be stamped with a slip resistant surface in compliance with AS4586.

Cracked, damaged, unsecure, unsafe or deformed existing polycrete pits and lids must be completely replaced with new pits that are compliant with this standard prior to the haul of Ausgrid telecommunications cable and / or prior to performing any splicing works in the pit.

New conduits may not be brought into existing polycrete pits.

Existing plastic pits (installed prior to the release of this standard) must be replaced with new pits that are compliant with this standard prior to; construction of any new conduit entries, new telecommunications cable haul into the pit, splice activity in the pit, or new services being commissioned through the pit.

5.23.1 Non-standard pit lids

If the Proponent has request from the road reserve, verge, carriageway, footpath or easement authority for specific pit lids, then the standard Ausgrid locked pit shall be installed beneath an affixed concrete collar in accordance with clause 5.13 of this standard for road carriageway pits. The collar shall be made to suit the lids required by the authority.

Permission for designing non-standard pit lids in accordance with clause 5.13 of this standard does not need to be obtained from Ausgrid if the pit is installed in road reserve land and it is either 1) a standard size 5 pit housing DTS cable only, or 2) a standard locked size 8 pit. All other instances must be pre-approved in writing by the Communications Engineering Planning Manager prior to progressing the design through to construction issue.

Specific non-standard pit lid types may be requested by land authorities for reasons including, but not limited to; aesthetics, slip resistance or heritage. Lids requested may include, but are not limited to, gatic lids, steel pit lids with recessed sections for paving or tile inserts, or concrete lids which can be painted or stamped. It is the Proponent's responsibility to consult the land authority and comply with all reasonable requests for specific pit lid types so long as the finished security, accessibility and load rating of Ausgrid pits is compliant with this standard.

5.24 Cast in-situ pits

Pre-fabricated pits are to be used in all instances for Ausgrid telecommunications infrastructure installation and alteration, unless specific circumstances deem otherwise necessary including but not limited to the following:

- the pre-fabricated pit will not fit in or near the chosen location or easement allocation due to the close proximity of other underground facilities
- the chosen location is the junction of several optical fibre cables at 90˚ orientation of each pit entry and a prefabricated manhole does not fit the allowable space
- the allowable pit conduit, coil and splice combinations detailed in clauses 5.19 and 5.21 of this standard are exceeded and the options of either placement of a second pre-fabricated pit, or replacement of the pit with a pre-fabricated manhole are both not feasible
- locations where casting a pit on site is more practicable, safe and cost effective by comparison to the transport and installation of a full prefabricated pit at the site.

Cast in-situ pits are generally more expensive to install and alter by comparison to pre-fabricated pits. It is the Proponent's responsibility to design and construct the most cost effective telecommunications infrastructure installations and alterations including, but not limited to pits. The Proponent must clearly document the reasons to opt for cast in-situ pits rather than pre-fabricated pits, in project documentation.

Cast in-situ pits shall be concrete in composition, rated to the same class as per the requirements for pre-fabricated pits in this standard, made secure and fitted with locked metallic pit lids as per the size 8 pit lids specified in this standard for either road reserve, or road carriageway application.

Cured concrete shall meet a minimum concrete compressive strength at 28-days standard curing time of min. 25 MPa in road reserve, or 40MPa in road carriageways as per AS3600. Concrete slump shall not exceed 80mm where calcium chloride or mixture additives containing significant amounts of calcium chloride exist. Test results certifying that the pit and related equipment meets or exceeds the minimum specified standards for all cast in-situ products, shall be submitted to Ausgrid by the Proponent, for storage with the 'as built' documentation for the life of the asset.

It is the Proponent's responsibility to perform design for all cast in-situ telecommunications pits in all instances. Cast in-situ pit designs must be approved to proceed by Ausgrid's Communications Engineering Planning Manager prior to construction release. On completion, the drawings, survey information and location co-ordinates for the pit are to be forwarded to Ausgrid for storage and upload to SAP and Geographical Information Systems.

Cast in-situ pit designs must account for the depth of conduits approaching the pit, and the internal space required to install and house the proposed telecommunications cable and equipment, as well as for safe access and egress of the pit cavity. The minimum internal dimensions for cast in-situ pits are:

a) 500H x 500W x 500L (mm) for cast in-situ pits intended for DTS only, or

b) 1000H x 500W x 800L (mm) for cast in-situ pits intended to house protection fibre.

Cast in-situ pits intended to house campus fibre distribution cable and equipment shall meet or exceed the requirements specified for protection fibre pits.

5.25 Manholes

Ausgrid telecommunications manholes shall be pre-fabricated unless clause 5.24 above applies.

Telecommunications manholes may be designed and constructed where the following conditions apply:

- the maximum conduit entries and / or cable coils and / or splices for a standard pit stated in clauses 5.19 and 5.21 of this standard are exceeded
- where a hauling pit is necessary at a 90˚ bend point thus necessitating pit conduit entries oriented at 90˚ of each other

Telecommunications manholes with depth exceeding 1200mm require a permanently affixed rung ladder. For ladder specifications refer to NS172 Design Requirements for Cable Jointing Pits and Vaults, AS1657-1992 and drawings 49813 and 157908. Telecommunications manholes >2m deep must not proceed unless written approval to do so has been received from the Communications Engineering Planning Manager.

Telecommunications manholes ≤1m deep do not require rung ladders to be permanently affixed.

Telecommunications manholes must have internal dimensions no less than 1000H x 900W x 900L (mm).

Manholes with protection fibre conduit entries must be fitted with locked lids as per the requirements for size 8 pit lids stated in this standard, however a manhole may have more than 2 lids. Manholes only containing DTS conduits may be fitted with standard unlocked lids.

Existing concrete pits (preformed or cast in-situ) which are exceeding 1200mm internal depth and are not fitted with a ladder, must be replaced with a manhole affixed with a permanent rung ladder to the side wall for the provision of safe access and egress, in compliance with this standard. The replacement must be completed before any persons enter the pit cavity.

The concrete manhole structure shall meet or exceed the load rating of the intended pit lids.

Conduit entries to manholes must be no less than 600mm deep from the finished ground surface. Each manhole conduit entry wall shall be sufficiently wide and deep so as to accommodate the number of proposed conduits, spaced in accordance with clause 5.19 of this standard, and planned so as to allow sufficient internal space for the haul of cable, coil and splice storage, and safe access and egress to the pit.

5.26 Pits in corrosive soils and tidal areas

In areas with Acid Sulphate Soils (ASS) or in tidal areas, all pits including DTS pits shall be wholly reinforced pre-fabricated pits or cast in-situ pits comprising minimum 50MPa concrete utilising sulphate resisting (SR) cement.

It is the Proponents responsibility to attain soil condition information as part of the design and to annotate any special pit requirements on plans and associated documentation prior to construction release.

It is the constructor's responsibility to install pits in accordance with the design and to request redesign where variation is required prior to construction commencing.

All signage in pits that are located in corrosive soils and tidal areas shall be corrosion resistant. A warning sign shall be permanently affixed near the top of the inner pit cavity indicating the fact that the pit is in a tidal area, or in corrosive soil, and this information shall also be noted on 'as built' plans. The sign shall also indicate the corrosive hazard i.e.: "ASS" for Acid Sulphate Soil.

5.27 Drainage

Pits and manholes are to be drained via drainage holes within the base through to the blue metal/sand bedding material underneath. All new pre-fabricated and cast in-situ pits and manholes are to be fitted with the following drainage holes:

- Pits up to and inclusive of 1m² floor surface area shall be drained via 1 x min 20mm diameter hole in the floor of the pit, located centrally
- Pits and manholes between 1m² and 1.5m² shall be drained via 3 x min 20mm holes positioned in the floor of the pit, located centrally (width); 2 of the holes are to be approximately 100mm from the end walls of the pit with the third placed centrally longitudinally

Pre-fabricated pits and manholes are to be manufactured with drainage holes in compliance with this standard and all other relevant national and international standards, guidelines and rules.

5.28 Pit extensions or risers

Pit extensions or risers are not permissible on a size 8 protection fibre pit. Clauses 5.13 and 5.23 of this standard specify collars necessary to achieve a higher pit load rating while maintaining pit security, and also for special lid requirements, however these instances do not increase pit cavity internal height.

Refer to clause 5.24 and 5.25 for specifications on telecommunications installations that require pits and manholes with different internal dimensions to the standard size 8 and J5 pits.

The extending or deepening of a DTS pit may be required so as to allow a pit to capture assets installed at >600mm depth or in situations where additional fill will raise the finished ground surface level around an existing size 5 pit, and it is therefore necessary to raise the pit lid height to meet the new elevation.

Risers may only be installed to concrete size 5 pits that comply with this standard. Pre-existing plastic or polycrete size 5 pits must not have risers fitted. Polycrete and plastic size 5 pits requiring alteration to meet a raised ground surface level must be replaced with concrete pits in compliance with this standard.

Extensions or risers to DTS size 5 pits must be screwed and glue sealed to prevent the ingress of foreign matter i.e.: such that the top section cannot be lifted off and separated from the base.

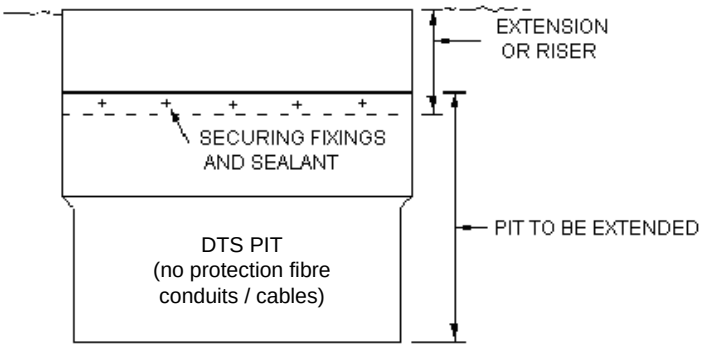

Figure 6 Pit extensions or risers

5.29 Shared trenching arrangements

Ausgrid is signatory to a shared trenching agreement with Telstra, Optus, and AGL which is an initiative aimed at reducing the overall cost of infrastructure developments to the community. Where trench sharing is proposed, the arrangements and installations must be in accordance with the “Underground Services in a Shared Trench” 1998 agreement for Ausgrid, Telstra, Optus and AGL.

Refer to NS234 Telecommunications Underground Physical Plant Installation regarding telecommunications route specifications with regards to shared trench arrangements.

Shared trenching design must exclude Ausgrid telecommunications conduits and cables from all other utility pits. Ausgrid telecommunications cables and conduits must not enter or travel through other utility pits and voids unless Ausgrid’s Communications Engineering Planning Manager has given written approval to proceed. Ausgrid telecommunications cables and conduits must only travel through Ausgrid telecommunications pits installed as per this standard.

Refer to NS205 Fibre Optic Cabling Installation – Cable Markers, Placement and Numbering regarding route marking requirements for shared trench installations.

5.30 Substation site internal

Telecommunications pits installed within locked substation site security fence lines are to be size 8 or size 5 pits installed to the same standard as for street fibre network, with the exception of padlock installation. Padlocks are not required to be fitted to telecommunications pits installed within the locked substation security fence perimeter unless there is a history of security breach and / or vandalism at the substation.

In all instances, telecommunications pits installed within locked substation site security fence lines are to be fitted with lids capable of being padlocked at any time.

Refer to clause 5.13 of this standard regarding the requirements for road carriageway pits including, but not limited to transformer roadways.

5.31 Retrofit over conduit

To retrofit a telecommunications pit over existing conduit/s, the Proponent must design for a concrete pit that has a solid removable base plate that is specifically designed for retrofit application without compromising the structural integrity of the pit. The pit base plate must be attached to the walls using sealant and all new installation practices stated within this standard are to be adhered.

The Proponent shall perform notifications for working in close proximity to Ausgrid optical fibre cables as per NS156 Working Near or Around Underground Cables in all instances where the conduit contains Ausgrid optical fibre cable. Due care must be taken to protect the conduits' contents during retrofit works, and if damages to the conduit contents occur, then the requirements of MRT100 Telecommunications Planned and Unplanned Outages, Damage and Emergency Response are to apply.

The Proponent may refer to Ausgrid's Communications Engineering Planning Manager for guidance on pit retrofit circumstances where required.

Pit retrofit over existing conduits must result in a pit that is compliant with this standard.

5.32 Logistics and storage

Pre-formed concrete pits and manholes require careful transportation, mechanical lift and pallet storage. It is the Proponent's responsibility to assess the sites suitability for delivery of materials and equipment and to consult the Communications Engineering Planning Manager for situations where the terrain prevents either:

1) delivery to site of standard pre-fabricated pits and manholes, or

2) delivery to site of materials for the construction of cast in-situ pits (refer clause 5.24 of this standard).

Pallet storage is required for concrete pit lids as well as gatic lids.

Consult the manufacturer for logistic and storage requirements with regards to special order telecommunications pits and pit lids, materials and associated equipment.

5.33 Replacements, alterations and enhancements

All telecommunications pit and manhole replacements must result in a pit that complies with this standard regardless of the existing pit or manhole construction type.

Pit parts requiring replacement (including, but not limited to pit lids) must have new parts fitted in compliance with this standard.

The replacement of un-locked pit lids whereby the pit contains Ausgrid protection fibre assets, must result in pit lids locked in place with substation type padlocks. The change of lids may necessitate the replacement of the lid support frame to achieve secure locking functionality. In many cases, the removal and replacement of the upper pit lid frame will reduce the structural integrity of the pit shell; hence full replacement of the pit would be required.

In all instances, pit or manhole alterations and replacements must have a resulting load classification compliant with this standard. Replacements and alterations shall not introduce new safety or environmental hazards or compromise the security, longevity and operability of the pit or manhole. It is the responsibility of the Proponent to engage design engineers for pit structural assessment where required and to design the alteration or replacement in compliance with this standard.

The Proponent is responsible for obtaining approval for pit alterations from the Communications Engineering Planning Manager prior to construction commencing.

Due care must be taken to protect the pit or manhole contents during replacement or alteration works, and if damages to the contents occur, then the requirements of MRT100 Telecommunications Planned and Unplanned Outages, Damage and Emergency Response are to apply.

The Proponent must test all structural modifications to Ausgrid telecommunications pits and manholes to prove that the structural integrity after completion of works is equal to, or exceeds, the minimum Class ratings stated in this standard. Test results must be certified and submitted to Ausgrid for records storage along with details of the modifications that were made.

At the completion of structural modifications, the Proponent shall also test the pit lids for operability and security. Tests shall include, but are not limited to:

- testing that lids are able to be removed and placed back in position using correct manual handling technique, such that the lid support frame is the correct size, no concrete spill or other foreign material obstructs lid operation, and the frame has not been deformed in the process of modification;
- testing that new concrete collars cannot be lifted off the top of the pit base;
- testing that the padlock is able to be fitted correctly in the lid recess, and the recess cover closes into position flush with the lid surface, and
- testing that the locking lids cannot be lifted from any side, corner or at the point where the two lids join, by the insertion and leverage of a screw driver or any other common tool.

Pit tests that fail structural integrity and / or security tests shall not be accepted by Ausgrid.

Ausgrid telecommunications pits which have experienced vandalism, are unlocked, or have been made unsecure, and which contain active Ausgrid telecommunications cable, shall have all works performed for the pit to be securely locked in compliance with this standard at the earliest possible convenience and in accordance with MRT100 Telecommunications Planned and Unplanned Outages, Damage and Emergency Response. The Proponent shall inform Ausgrid's Communications Engineering Planning Manager of the vandalism so that the Manager can assess potential risks to other telecommunications plant in the area.

Telecommunications pits found to be in unsafe or high risk areas, whereby the safety hazard and / or risks cannot be sufficiently reduced or eliminated, shall not have works performed to replace, alter or enhance the pit. In these cases, the Proponent must consult the Communications Engineering Planning Manager regarding options for relocating the pit to a safer area with less risk, or other risk mitigation alternatives. Refer to section 7 below regarding telecommunications pit recovery, relocation and reinstatement.

5.34 Changing landscapes

Existing pits or manholes which are exposed or buried due to a change in surrounding ground surface levels from erosion, excavation, landscaping, civil construction or other reasons, must have one of the following performed prior to the haul of new telecommunications cabling through the pit, or prior to the commissioning of a new Ausgrid service through the pit:

- For eroded or built up ground surfaces - the soil surrounding the pit is to be built back up and / or removed to match the pit surface level, and measures taken to prevent future soil build-up or erosion, or
- replace the pit or manhole with one to match the new surrounding ground surface by use of either prefabricated or cast in-situ construction options.

Note: Erosion, earth works and landscaping works may also reduce the depth of cover over telecommunications conduits, necessitating conduit works at or near the pit location. Refer to NS234 Telecommunications Underground Physical Plant Installation. The Proponent may refer to the Communications Engineering Planning Manager for guidance on depth of cover issues.

The Proponent is responsible for consulting the land asset authority regarding alteration of landscape at Ausgrid telecommunication pit locations, in compliance with Ausgrid's community engagement policy.

Existing pits containing optical fibre cable must not be raised or lowered due to the potential for damage to the cable and conduit.

Existing pits which do not contain optical fibre cable may be raised or lowered prior to hauling new cable into the pit, so long as the existing pit is compliant with this standard, and so long as the pit and conduit is not damaged in any way during the process of raising or lowering. The pit must be replaced if it does not comply with this standard, or if it is in any way damaged.

Refer to clause 5.22 with regards to buried pits, where approval to bury the pit is granted by the Communications Engineering Planning Manager.

5.35 Plans and GIS recording

The Proponent is responsible for sending designs to Ausgrid for review and approval prior to construction release.

All as built plans and information relating to Ausgrid telecommunications pit installations, recoveries, replacements or alterations are to be sent to Ausgrid at the earliest possible convenience by Email directly to gis@ausgrid.com.au, with the location in the subject of the Email. As built plans must detail location coordinates for the pit.

Telecommunications infrastructure as built documentation must comply with NUS100 and NS104. As built documentation must be sent to Ausgrid at the earliest possible convenience and no more than one week from construction completion, whereby acceptance of the 'as built' infrastructure will be assessed by Ausgrid

Cast in-situ telecommunications pits must have drawings produced and certified for structural integrity as per NS172 Design Requirements for Cable Jointing Pits and Vaults, and submitted to Ausgrid's Communications Engineering Planning Manager for approval prior to construction commencing. Ausgrid's written approval to proceed with cast in-situ pit installation must be received by the Proponent before construction commencing.

It is the Proponent's responsibility to supply Ausgrid with all pit information detailed in Annexure C of this standard at both the design and 'as built' stages. 'As built' plans must mark-up any construction variations to that of the design.

It is the Proponents responsibility to request pit identification numbers for each pit as part of the design and / or maintenance process. Pit identification numbers can be allocated through liaison with the Ausgrid Project Manager, or Contestable Connections Project Officer. The Ausgrid person responsible for supplying the Proponent with pit identification numbers will require all information as listed in Annexure C of this standard for each individual pit, to enable SAP system allocation, and therefore pit identification number creation.

5.36 Quality assurance and acceptance

It is the responsibility of the Project Manager to engage Quality Assurance personnel to assess the telecommunications design and construction works for compliance with this standard as well as all applicable Ausgrid and industry standards including but not limited to NS243 Telecommunications Roles, Responsibilities, Training Requirements, Auditing and QA Acceptance prior to finalising the project. If submitted design and construction works are found to be non-compliant to Ausgrid and applicable industry standards, then all amendments to bring the work up to compliance will be at the Proponent's expense.

Ausgrid reserves the right to refuse payment for services performed which do not comply with Ausgrid and applicable industry standards including but not limited to this standard and whereby the design function commenced after the date the relevant standard was released.

Project Managers and Contestable Project Officers may refer to the Communications Engineering Manager for guidance where necessary.

6.0 MAINTENANCE

Each time pit lids are lifted, the frame must be cleared of debris and foliage before refitting the lids. Gatic lids are to be removed and the frame area cleared of debris and greased before refitting the lids. For locked pits, check that the locking mechanism covers are reinstated such that no trip

hazard is left and the hinged cover assembly is operational. Test that the locking mechanism is operational and the padlock is left correctly secured and locked. Lubricate the padlock to inhibit corrosion and water ingress.

Refer clause 5.9 regarding pit and / or lid replacement requirements with regards to security where pits containing Ausgrid protection fibre cables, are found to be unlocked.

All telecommunications pits found to be buried must be compliant with, or have works performed in accordance with, clause 5.22 and / or clause 5.34 of this standard.

All telecommunications pits which do not have a unique identifying number affixed inside the pit shall have the number identified or assigned and attached to the pit as per clause 5.20 of this standard.

For data integrity, all Ausgrid telecommunications pits and manholes found to have the following criteria must be reported to Ausgrid for GIS data corrections:

- Pits or manholes found in the field, which are not recorded in GIS;
- Pits or manholes incorrectly positioned in GIS (GIS location coordinates do not match the field location point);
- Pits or manholes in GIS which do not exist in the field (and are not buried);
- Pits or manholes in GIS which have incorrect or absent unique number identifiers attached;
- Pits or manholes in GIS with incorrect information (refer to clause 5.35 and Annexure C for the list of information required) and;
- Pits or manholes with cable and equipment contents and / or conduits incorrectly associated or absent in GIS

Refer to clause 5.35 and Annexure C of this standard regarding pit details required for upload to Ausgrid's GIS and SAP systems.

Telecommunications pits or manholes found to be caved in, or deemed a serious safety hazard must be fitted with barriers immediately as per standard Ausgrid procedures and complying with Work Cover practice as well as land owner requirements and all applicable local government and national standards, guidelines and procedures to make the site safe.

Security of the pits contents must be accounted for and restoration performed in compliance with this standard and MRT100 Telecommunications Planned and Unplanned Outages, Damage and Emergency Response. Funding for rectifications must cover temporary make safe works, as well as permanent reinstatement or replacement works.

For all Ausgrid telecommunications pits, the following conditions encountered under maintenance activity must be reported in every instance to the Communications Engineering Planning Manager at the earliest possible convenience:

- corroding pit or manhole parts;
- inoperable pit or manhole parts;
- damaged pit or manhole shell or parts;
- faulty pit or manhole construction or parts;
- structurally unsound pit or manhole parts (including but not limited to cracked or deformed walls and / or lids);
- pits or manholes containing or causing safety hazards (including but not limited to trip hazards, cave-in or subsidence around the pit or manhole);
- pits or manholes causing environmental hazards;
- buried pits (where the pit was not listed as being buried) and;
- pits or manholes containing hazardous substances (including but not limited to fluids, syringes, flammable or noxious gasses)

Refer to MRT100 - Telecommunications Planned and Unplanned Outages, Faults Damages and Emergency Response regarding procedures for reporting faults and damages to Ausgrid's

telecommunications network including but not limited to telecommunications pits, manholes and their contents.

7.0 RECOVERY, RELOCATION AND REINSTATEMENT

Ausgrid's Communications Engineering Planning Manager shall provide Project Managers with direction as to if or when telecommunications pits and manholes are to be recovered along a route. Decommissioning a telecommunications cable may not necessarily warrant the recovery of pits and manholes along the route. Planning initiatives may plan for future use of the cable and / or pit and conduit route, hence it may need to be retained in serviceable condition.

In some instances, telecommunications pits may need to be recovered or relocated, but the conduit route retained. In these instances, the Communications Engineering Planning Manager shall provide written direction regarding relocating or replacing the cable and equipment in the pit, so that the pit can be recovered, and split pipe may be applied to make the conduit continuous. Split pipe application in these cases must be applied so that there are no internal ridges or burred edges.

Refer to NS234 Telecommunications Underground Physical Plant Installation regarding route relocation.

The Proponent may refer to the Communications Engineering Planning Manager where advice is required.

Telecommunications pit replacements and pit recoveries must be conducted in accordance with this standard. The recovered pit must be disposed of in accordance with NS174C Environmental Handbook for Construction and Maintenance. Pit and manhole lids, padlocks, locking bars and other associated hardware which are recovered and still in operable condition are to be returned to Ausgrid stores for future use.

After pits are replaced or recovered, the site must be reinstated to match the surrounds as per NS130 Specification for Laying Underground Cables up to and including 11kV and according to all local government and land authority requirements.

Telecommunications pit relocations and alterations for contestable works projects must be performed in accordance with the technical direction of this standard.

8.0 STORES AND MATERIALS

The Proponent is responsible for supplying all tools as necessary to fulfil the requirements of this standard.

Unless prior written approval is received from Ausgrid, all materials used must be new and in accordance with Ausgrid's specifications. Materials may be purchased directly from Ausgrid by contacting the Manager – Customer Service - Logistics on telephone number (02) 9394 6001. All materials will be made available to be picked up from:

Somersby Warehouse
Lot 11 Kangoo Road Cnr Wella Way
Somersby NSW 2250

Refer to NS245 Telecommunications Approved List of Materials.

Where the Proponent wishes to use materials not supplied or already approved by Ausgrid, they must submit details in accordance with the requirements of NS181 Approval of Materials and Equipment and Network Standard Variations. Materials approved by Ausgrid under this process are listed in the regularly updated NSA 1343 Supplement to NS181.

9.0 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	Document repository Network sub process Standard – Company	Unlimited
Draft Copies of the network standard during amendment/creation	Work Folder for Network Standards (HPRM ref. 2014/21250/147)	Unlimited
Working documents (emails, memos, impact assessment reports, etc.)	Records management system Work Folder for Network Standards (HPRM ref. 2014/21250/147)	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.

10.0 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.

11.0 DOCUMENT CONTROL

Content Coordinator : Control & Protection Engineering Manager

Distribution Coordinator : Manager Asset Standards

Annexure A –Sample Design Compliance Checklist

DESIGN CHECK SHEET
NS204 COMMUNICATION PITS – SPECIFICATION AND INSTALLATION

Check sheet completed by: _____ **Signature:** _____ **Date:** _____

Submitted for approval by: _____ **To:** _____ **Date:** _____

Project reference:

_____

For asset compliance and acceptance, the design and construction check sheets must be completed and submitted for each project installing or amending infrastructure for which the NS204 standard applies. NS204 covers Ausgrid telecommunications pit installation, replacement, alteration and recovery. This check sheet does not negate the responsibility for the Proponent to review the full NS204 standard for compliance. Clause references will be updated when the review of NS204 is published.

Design check list	Clause Ref	✓/✗ or N/A
1. Design compliance with Ausgrid Electrical Safety Rules as well as WHS Act 2011 and associated Regulation	5.1	
2. Design compliance with NS174 and all relevant laws, rules, regulations and guides for environmental impact assessment	5.1	
3. Design assesses and recommends mitigation of risks associated with asbestos in the work place in accordance with Ausgrid's NS211 Working With Asbestos Products and all relevant laws, rules, regulations and guides	5.1	
4. Installation is designed to utilize approved easement corridors, or land which is approved through standard development agreement or land access agreement process	5.1, 5.4, 5.6	
5. The installation is designed to minimize aesthetic impact, in accordance with community consultation	5.1, 5.6, 5.33	
6. Design specifies reinstatement to minimize scar and prevent subsidence	5.1, 5.17, 6	
7. The designed placement and installation method is chosen to minimize the likelihood of erosion caused by the installation	5.4, 5.11, 5.17, 5.33	
8. Designed works do not create security risks for Ausgrid assets, or safety hazards	5.3, 5.7, 5.12, 5.15, 5.16, 5.21, 5.26, 5.28, 5.31, 6	

Check sheet continues over page …..

9. Haulability assessment is performed by design to pass based on standard 60F UGFO cable or other cable as specified by Ausgrid, to be hauled through the proposed conduit and therefore pit placement is planned accordingly	5.1, 5.2, 5.3, 5.4	
10. Conduits are designed to enter the end wall of the size 8 telecommunications pit (smaller dimension wall), not the side wall (larger dimension wall)	5.17	
11. Designs specify routes and pits in accordance with the diversity requirements documented by Ausgrid for the project	5.3, 5.10	
12. No third party cables are designed to enter Ausgrid pits	5.29	
13. Design avoids pit installation in road carriageways and driveways	5.4, 510.1, 5.13, 5.17	
14. Where design cannot avoid pit installation in road carriageways, approval is sought from Ausgrid prior to construction release, and the requirements of NS204 for the lockable pit to be topped with a collar and class D unlocked pit lids is applied	5.13	
15. Design allows for concrete haunching where applicable	5.13, 5.19	
16. Design allows for a size 8 pit to be installed at the base of UGOH transitions, or no more than 40m from the base of the pole	5.14	
17. Design minimizes the likelihood for pit access restrictions when planning pit placement	5.1, 5.3, 5.6, 5.13, 5.17, 5.23.1	
18. Design plans for pit rectification or replacement where the existing pit/s are not compliant to NS204	5.7, 5.17, 5.18, 5.23, 5.28, 5.33, 5.34, 7	
19. Designed pit shells and lids are minimum class C rated as per AS3996 and AS4198	5.10, 5.10.1	
20. Telecommunications manhole designs comply with NS204	5.25	
21. Design allows for no more than 6 conduits to enter an end wall of a size 8 pit	5.19	

Check sheet continues over page .....

22. Design considers traffic control requirements for pit installation and / or replacement	5.6, 5.8	
23. Pit identification numbers are requested of Ausgrid by design, for construction to apply to the designated pit in accordance with NS148	5.20	
24. Designs avoid protection fiber cable and conduit entering and travelling through electrical pits and voids	5.12	
25. Designs that cannot avoid protection fiber cable and conduit entering electrical pits and voids have mechanical protection for the cable through the entire void space	5.12	
26. Pits housing protection fiber cable are designed to be securely locked with Ausgrid substation type padlocks prior to cable installation and / or new services commissioning through the pit	5.9	
27. Pits are not designed to be buried	5.15, 5.22, 5.34	
28. Designs account for pit alignment and installation according to NS204	5.3, 5.4	
29. Designs specify Ausgrid approved materials	8	
30. Design specifies that for each protection fiber route, a pit is either installed within 50m of the substation it approaches, or inside the locked substation security fence line	5.4	
31. Designs for new protection optical circuit connections assess the existing pits through which the circuit will travel to ensure compliance with NS204. Where non-compliances are found, corrective works are designed as part of the project connecting the new optical circuit	5, 5.11, 5.12, 5.23, 5.34	
32. Pit recoveries compliant to NS204 are only designed for the pits specified by Ausgrid to be recovered	7	
33. Design documentation is sent to Ausgrid for review and approval prior to construction release	5.35	
34. Design documentation details all of the above compliances	Appx A	

Check sheet continues over page .....

All check list items marked '✖' above shall be referenced and submitted for approval in the below variation table along with supporting documentation, prior to design release.

Design variations to standard materials and/or Network Standards	Signature
Cross reference to check sheet and explanation of non-conformance	Name:_____ Title:_____ Signature:_____ Date:_____
Cross reference to check sheet and explanation of non-conformance	Name:_____ Title:_____ Signature:_____ Date:_____
Cross reference to check sheet and explanation of non-conformance	Name:_____ Title:_____ Signature:_____ Date:_____

Design variations to NS204 must be submitted to Ausgrid's Senior Engineer responsible for Telecommunications Area Planning for approval and signature prior to construction release.

Design check sheet verified and approved by:_____

Signature:_____Date:_____

Annexure B –Sample Construction Compliance Checklist

CONSTRUCTION CHECK SHEET

NS204 COMMUNICATION PITS – SPECIFICATION AND INSTALLATION

Check sheet completed by: _____ **Date:** _____
Submitted for approval to:_____ **Date:**_____
Project reference:

_____

For asset compliance and acceptance, the design and construction check sheets must be completed and submitted for each project installing or amending infrastructure for which the NS204 standard applies. NS204 covers Ausgrid telecommunications pit installation, replacement, alteration and recovery. This check sheet does not negate the responsibility for the Proponent to review the full NS204 standard for compliance. Clause references will be updated when the review of NS204 is published.

Construction check list	Clause Ref	✓/✗ or N/A
1. Construction compliance with WHS Act 2011 and associated Regulation as well as Ausgrid Electrical Safety Rules	5.1	
2. Construction compliance with NS174 and all relevant laws, rules, regulations and guides for environmental impact assessment	5.1	
3. Construction assesses and mitigates risks associated with asbestos in the work place in accordance with Ausgrid's NS211 Working With Asbestos Products and all relevant laws, rules, regulations and guides	5.1	
4. Installation utilizes approved easement corridors, or the local government specified electricity utility allocation as per the design	5.1, 5.4, 5.6	
5. The installation and reinstatement minimizes aesthetic impact, and is in accordance with community consultation	5, 5.6, 5.33	
6. The installation minimizes scar and is reinstated to prevent subsidence	5.1, 5.17, 6	
7. The placement and installation method chosen minimizes the likelihood of erosion caused by the installation	5.4, 5.11, 5.17, 5.33	
8. Security risks for Ausgrid assets and safety hazards are not caused by the pit installation at any stage of the installation process	5.3, 5.7, 5.12, 5.15, 5.16, 5.21, 5.26, 5.28, 5.31, 6	

Check sheet continues over page …..

9. Pits are located as per the design and the conduits nominated by Ausgrid are incorporated into the pit such that the required route diversity is provisioned	5.3, 5.10	
10. Conduits enter the end wall of the size 8 telecommunications pit (smaller dimension wall), not the side wall (larger dimension wall)	5.19	
11. Conduits entering the pit are min. 50mm apart, fitted with bell mouths and the conduit entry is sealed to prevent ingress of foreign matter	5.19	
12. Pits are not installed on top of other utility underground infrastructure	5.3	
13. Multiple conduits entering an end wall of a pit are identified and permanently marked on the pit wall to differentiate the routes	5.20	
14. The substation padlock recess in the pit lid is covered by a hinged plate made flush with the pit lid surface with mechanism to hold the plate in closed position without the need for removable items such as screws or bolts	5.10.1	
15. Each pit lid has two pit key holes oriented centrally and opposite each other to allow for a balanced two person correct manual handling lifting technique. Pit key holes have a permanent barrier to prevent the ingress of foreign matter to the cavity	5.10.1	
16. The pits procured have lids with minimal moving mechanical parts	5.10.1	
17. No third party cables and / or conduits enter the Ausgrid pits	5.29	
18. Pits are not installed in road carriageways and driveways	5.4, 5.10.1, 5.13, 5.17	
19. Where road carriageway pits are designed, construction has applied the requirements of NS204 for the lockable pit to be topped with a collar and class D unlocked pit lids	5.13	
20. Concrete haunching as per NS204 is installed	5.13, 5.19	
21. A size 8 pit is installed at the base of UGOH transitions, or no more than 40m from the base of the pole	5.14	
22. Pits are not installed in areas where there are access restrictions	5.1, 5.3, 5.5, 5.6, 5.13, 5.17, 5.23.1	

Check sheet continues over page …..

23. All pre-existing pits requiring rectification or replacement are made compliant to NS204	5.7, 5.17, 5.18, 5.23, 5.28, 5.33, 5.34, 7	
24. Pit contents are not damaged or put at risk throughout pit replacement works	5.33	
25. Protection fiber conduits and cables do not link to pits which do not comply with NS204	5.2, 5.10	
26. Ausgrid telecommunications pit shells and lids are minimum class C rated	5.10, 5.10.1	
27. Prefabricated or cast in-situ telecommunications manhole installations comply with NS204	5.25	
28. No more than 6 conduits enter an end wall of a size 8 pit	5.19	
29. Pit identification number plates are attached to each designated pit and the referenced number is checked against the design documentation and plans	5.20	
30. Installations of protection fiber cable and conduit through electrical pits and voids have mechanical protection covering the cable through the entire void space	5.12	
31. Pits housing protection fiber cable are securely locked with Ausgrid substation type padlocks as per NS204 prior to cable installation	5.9	
32. Pits surfaces are made flush with the surrounding finished ground surface, and are therefore not buried	5.15, 5.22, 5.34	
33. Pits are aligned and installed according to NS204	5.3, 5.6	
34. Only Ausgrid approved materials are procured and used	8	
35. Pits and manholes procured or cast in-situ have drainage holes in the base compliant to NS204	5.27	
36. For each protection fiber route, a pit is either installed within 50m of the substation it approaches, or inside the locked substation security fence line	5.6	
37. Where Ausgrid telecommunications conduits are installed in shared trench arrangement with other utility infrastructure, the installation complies to the shared trenching agreement	5.29	
38. Pit recoveries compliant to NS204 are only performed for the pits specified by Ausgrid for recovery	7	

Check sheet continues over page .....

39. Telecommunications infrastructure 'as built' documentation is in compliance with NUS100 and NS104. Documentation includes, but is not limited to, this checklist and the completed form of NS204 'Annexure B'. These details are sent to Ausgrid at the earliest possible convenience and no more than one week from construction completion, whereby acceptance of the 'as built' infrastructure will be assessed by Ausgrid	5.35, Annx A, Annx B	

All check list items marked '✱' above shall be referenced and submitted for approval in the below variation table along with supporting documentation, prior to construction commencement.

Construction variations to standard materials and/or Network Standards	Signature
Cross reference to check sheet and explanation of non-conformance	Name:_____ Title:_____ Signature:_____ Date:_____
Cross reference to check sheet and explanation of non-conformance	Name:_____ Title:_____ Signature:_____ Date:_____
Cross reference to check sheet and explanation of non-conformance	Name:_____ Title:_____ Signature:_____ Date:_____

Construct variations to NS204 must be submitted to Ausgrid's Senior Engineer responsible for Telecommunications Area Planning for approval and signature prior to construction commencement.

Construction check sheet verified and approved by:_____

Signature:_____ Date:_____

Annexure C – Pit Detail Form

The following telecommunications pit construction and materials information shall be submitted to Ausgrid for SAP and GIS system upload as a minimum:

Pit information required	Pit details
Type	Communication pit
Accessible or special access requirements	
In zone (for pits installed within substation yard security fence lines)	
Date installed	
Pit unique identifying number (as attached to the pit inner wall)	
Unsound (for pits showing signs of becoming or being structurally unsound)	
Water pump (for pits that typically contain water or are tidal)	
Site complexity	
Traffic control (for pits installed where traffic control is required to access the pit)	
Remote (for pits installed in remote areas)	
Rough (for pits installed in rough or difficult terrain)	
Pollution (for pits installed in areas of high industrial pollution)	
Particular environmental factors	
Salt Spray (for pits installed in areas of high salt spray)	
Flood prone (for pits installed in flood prone areas)	
Bushfire (for pits installed in bush fire prone areas)	
Lid type i.e.: padlocked, unlocked, plastic, concrete, gatic, galvanised steel, other	
Preformed size 8 pit, P5 pit, J5 pit, manhole, other	
Cast in-situ	
Cast in-situ pit internal dimensions and if it has a ladder, collar, or any other structural or composition specific information	
Buried or surface pit	
Total number of conduit entries at each end	
Total number of cables travelling through	
Map section and sub-sections	
Pit shell material type: concrete, polycrete, plastic, other	
Pit contents information (SC = splice) *Example: "40m coil FSS123456, SC FOU765432, 100m coil FGW987654".*	

Refer to the Communications Engineering Planning Manager for guidance regarding fibre cable designations and splice designations where none have been allocated, advised or designed.