

National
Broadband
Network

NBN Co

Residential Preparation and Installation Guide: SDUs and MDUs

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1 About This Document

1.1 Introduction

This document assists developers, builders, and new home owners in New Developments to both prepare homes correctly and arrange premises connection, in order to access the National Broadband Network.

These guidelines have been provided for new developments where the developer has an agreement with NBN Co to provide optical fibre broadband to the premises within the development.

It describes NBN Co's minimum requirements and specifications for wiring and related infrastructure, to and within new premises. Additional internal wiring is at the discretion of the homeowner.

To ensure a smooth connection of the National Broadband Network service to the premises, developers, building owners and builders must adhere to this guide.



Important Note for Owners and Developers

Developers must ensure that the building owner is aware of, and has a copy of, this document.

Building owners must ensure these guidelines are given to the builder and that the builder is aware of the requirement for them to be followed.

The **builder** and/or **building owner** is responsible for ensuring that the building is prepared correctly and the supporting infrastructure is installed correctly.

1.1.1 Responsibilities

NBN Co designs and constructs the network infrastructure up to each premise and provides wholesale data and voice services to Retail/Internet Service Providers (RSPs/ISPs).

NBN Co never provides internet or telephone services directly to occupants. Occupants of each premise must contact their service provider of choice to activate telephone and/or data services.

1.1.2 What do I do if I Cannot Follow these Requirements?

For sites that require configurations that fall outside of the guidelines described here, or other problems that may arise, contact NBN Co. See [Contact Information](#)

1.2 Scope

In scope	<ul style="list-style-type: none"> • Residential, Single Dwelling Units (SDUs) • Small-scale Multiple Dwelling Units (MDUs) to which SDU methods can be applied • New buildings constructed on vacant lots of land within a new housing estate • Connecting a building to the fibre telecommunications network • Duplex or Triplex dwellings
Out of scope	<ul style="list-style-type: none"> • Estate Pit and Pipe installation information, processes, methods and practices These are referenced in separate documents which can be found online at: http://www.nbnco.com.au/newdevelopments • Larger scale Multi Dwelling Units (MDU) to which SDU methods cannot be applied The guideline <i>Building Design Guide – New Developments</i> (NBN-TE-CTO-284) is available online at: http://www.nbnco.com.au/newdevelopments • NBN Co Customer (Retail Service Provider) connection equipment or information

1.3 Glossary

Term	Description
Customer	The final 'downstream' customer; the individual or organisation who acquires services from one of NBN Co's Retail Service Providers. Also called the end user .
FTTP	Fibre to the Premises Optical fibre cable extended to the premises, with Gigabit Passive Optical Network fibre-sharing.
FTTP solution provider	Any company or supplier providing fibre to the premises.
GPON	Gigabit Passive Optical Network
IPTV	Internet Protocol Television Delivery of video streams via the Internet instead of electromagnetic broadcast, for viewing at a customer premises.
MDU	Multiple Dwelling Unit A structure that contains more than one premise.
NBN	National Broadband Network
NBN Co	Company established by the Australian Government to design, build, and operate the wholesale-only National Broadband Network.
New Developments	New real estate developments. Formerly called <i>Greenfields</i> .
NTD	Network Termination Device (Also referred to as an NBN connection box .) NBN Co's network termination point at each premise, for residential fibre services (typically) featuring 4 data and 2 voice interfaces.
NTD Enclosure	Optional wall-mounted, purpose-built housing for an NTD and cabling. Consists of a base, and a removable cover. (Also referred to as an NBN connection box cover .)
PCD	Premises Connection Device (Also referred to as an NBN utility box .) A connection box for the fibre from the street, located on the outside of the building.
PS/B (Optional)	Power Supply with Battery Backup Provides power to a Network Termination Device.
PS/S (Default)	Standard Power Supply Provide power to a Network Termination Device.
RSP	Retail Service Provider
SDU	Single Dwelling Unit A structure that contains only one premise.
VRLA battery	Valve-Regulated Lead-Acid battery. A lead-acid rechargeable battery of the type used in NBN Co PS/Bs.
WSP	Wholesale Service Provider

1.4 Responsibilities

Who	What
Developer	<p>Ensures that their builder and/or land buyer is aware of the requirements set out in this document, and of the consequences of non-compliance.</p> <p>Note: The 'land buyer' can be a builder who plans to resell the land later as part of a house and land package, or an owner who engages a builder to construct the premises.</p> <p>Makes a copy of this document available to builders and building owners, as required.</p> <p>For additional subdivision within a development, similar to a super lot development makes application to NBNCo for fibre. Additional pit and pipe may be required to be provided by the subdivision developer</p>
Building Owner	<ul style="list-style-type: none"> • Gives this document to the builder to ensure the house is ready for the installation of fibre network equipment as per NBN Co requirements. • Discusses and reaches agreement with the builder about the desired services and the placement of the fibre equipment. • Ensures that the builder is aware of the following: <ul style="list-style-type: none"> • Space and pathway compliance requirements within NBN Co guidelines • The correct equipment to be used to prepare for connection to the NBN
Builder (and building subcontractors)	<ul style="list-style-type: none"> • Installs the internal customer wiring for telephone, data and other services (including power circuits) to the building owner's requirements. • Installs the facilities to connect the premises to the fibre network, including: <ul style="list-style-type: none"> • Service Drop Conduit through which to run fibre from the street to the external Premises Connection Device • Internal Conduit through which to run fibre from the PCD to the NBN Co equipment location • Power for GPO outlet to provide power to the NTD and space reserved for battery backup unit if EUP requests for one in future. <p>Note: A drawstring should protrude through the wall at the location of the NBN Enclosure, from the PCD position (both ends of the drawstring should be tied off)</p> • <i>(After the premises is at lock-up stage)</i> Books a pre-installation appointment with NBN Co.

NBN Co (or other FTTP solution provider)	<p>Installs the following components:</p> <ul style="list-style-type: none"> • A service drop cable from the street to the Premises Connection Device • The Premises Connection Device. This device is attached to an external wall and will have optical fibre cable connected to it • Premises cable (also known as a connecting fibre) from the PCD to the internal location where NBN Co Equipment will be installed • A Network Termination Device. NBN Co's network termination point (at the Network Boundary) for the fibre network. It connects internal wiring to the NBN • An NBN Enclosure. The housing for the Network Termination Device. • A Power Supply (with default standard power supply if no request for pre-installation of Battery Back-up unit has been lodged) unit. The unit that powers the NTD and provides battery back-up as required in accordance with government policy <p>For more information, refer to the <i>Power Supply and Battery Backup User Guide</i> available from NBN Co.</p>
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Table 1: Responsibility description of each Sector

1.5 Contact Information

For more information, use the following contact information:

Method	Address/number
Email	newdevelopments@nbnco.com.au
Website	http://www.nbnco.com.au/newdevelopments
Telephone	1800 OUR NBN (1800 687 626)

For builders to submit pre-installation of equipment booking:

1)	<p>Single Premises Request form:</p> <p>http://www.nbnco.com.au/content/dam/nbnco/documents/NBN599_NEWDV_Pre-InstallRequestForm_SingleLocation_WEB.pdf</p> <p>Multiple Premises Request Form:</p> <p>http://www.nbnco.com.au/content/dam/nbnco/documents/NBN599_NEWDV_Pre-InstallRequestForm_MultipleLocation_WEB.pdf</p>
2)	<p>Submit to http://www.nbnco.com.au/newdevelopments by saving the completed application file and then submitting it by email to newdevelopments@nbnco.com.au</p>

2 Before You Start

2.1 Read This First!

It is important to comply with the guidelines described in this document.

Failure to do so may result in delays in connecting the premises to the National Broadband Network or result in NBN Co's inability to make a fibre connection to the new premises

Builders, developers and building owners may face delays and additional costs (borne by the owner of the premises) until the building preparations are brought into compliance with these guidelines.

2.2 Safety

NBN Co takes safety and risk management very seriously. NBN Co is subject to the *Work Health and Safety Act 2011 (Cth)*.

However, NBN Co recognises that the developers it engages may be subject to different health and safety legislation in place across Australia. This includes relevant regulations, standards, and codes of practice.

Before you start, you **must** familiarise yourself with the following safety principles.





Safety Principles	
	NBN Co expects that developers' organisations have implemented, understand, and comply with, their own Health Safety and Environment (HSE) policies and procedures.
	Consistent with Commonwealth and State Occupational Health and Safety legislation, NBN Co expects that developers will consider the risks associated with property development that may impact on later stages of the asset lifecycle. This expectation includes the following: <ul style="list-style-type: none"> • Inspection/assurance • Use • Operation • Maintenance
	Specific aspects that developers must consider include (but are not limited to) the following: <ul style="list-style-type: none"> • Risks associated with the location of SDU or MDU fibre cabling and equipment • Risks associated with the method of construction and installation
	Sufficient ventilation must be provided wherever NBN Co equipment is intended to be enclosed. See Appendix C – Ventilation of NTD and PS/B for more information.

Table 2: Safety Principles

2.3 ACMA Wiring Rules

All cabling work performed on the customer side of the network boundary point is subject to Australian Communications and Media Authority (ACMA) wiring requirements.

- **Cabling work** includes the connection, installation or maintenance (repair) of customer cabling
- The ACMA rules also require the installer to be registered to install customer premises cabling

Note: The ACMA wiring rules do not apply to cabling up to and including the network boundary point.

2.4 Network Boundary Point

The **network boundary point** is defined as the service output ports on the NBN Co Network Termination Device (NTD); specifically, the data (UNI-D) and phone (UNI-V) service sockets on the device.

(At time of publication) As per AS/CA S009:2013 the NTD is labelled as a **Network Termination Device (NTD)**.

2.5 Installation Life-cycle

The following table describes the stages involved in the installation of fibre telecommunications equipment in a New Development. This document details the stages highlighted in green.

Stage	Activity	Responsible Party
Before building commences	Install estate pit and conduit	Estate Developer
	Install estate fibre	FTTP solution provider
	Connect estate fibre to the NBN	FTTP solution provider
	Install the Developer's Starter Pipe	Estate Developer
Before building commences	Confirm building design, accommodating fibre equipment and wiring	Builder
During base/slab stage	Install service drop conduit from Starter Pipe, and install draw-string	Builder
During framing stage	Install GPO outlet to identified NTD location	Builder
	Install internal conduit, and install draw-string	Builder
	Install pre-wired customer wiring	Builder/Owner
After lock-up stage	Submit Pre-install Request	Builder
After lock-up stage	Install NTD/NTD Enclosure	NBN Co
	(When mains power to the premises has been connected and turned on) Install PS/S into NTD Enclosure (or Install PS/B unit if EUP has lodged for one)	NBN Co
	Install PCD	NBN Co
	Install service drop cable fibre to PCD	NBN Co
	Connect service drop cable fibre from PCD to NTD	NBN Co
	Connect up power supply wiring to	NBN Co
	Connect pre-wired customer wiring to NTD	Owner/Service Provider
After order from RSP received	Activate communication services	Owner/Service Provider
As required during or after building construction	Install additional customer wiring (optional)	Owner
	Connect additional customer wiring to NTD (optional)	Owner

Table 3: Installation Life-cycle

3 Preparing for Fibre Installation

3.1 Fibre Installation Components

The following table summarises the components of a fibre installation.

Component	Description
Developer's Starter Pipe	Located at the property boundary, running back to the Service Drop Access Pit. Marks the start of the builder's scope of work.
Service drop conduit	Provides a pathway for fibre cabling to the building. Connects to the Developer's Starter Pipe.
Premises Connection Device (PCD)	A connection box for the fibre, located on the outside of the building.
Internal Conduit	Provides a pathway for fibre cabling to go to a point inside the building, where the NBN Co Equipment will be located.
General Purpose Outlet (GPO)	Electrical power point required to power the NBN Co Equipment.
NBN Co Equipment	<ul style="list-style-type: none"> • Network Termination Device (NTD) • NTD Enclosure • Default Standard Power Supply (PS/S) or Back-up Power Supply Unit (PS/B) <p>Note: The PS/B includes a battery back-up unit, and is sometimes referred to as a BBPSU.</p>
NBN Co Equipment Location	Space provided within and upon a premise for the installation of NBN Co Equipment.
Customer Cabling	End user-owned communications cabling (if used).

Table 4: Fibre Installation Components Description

3.2 Preparing New Buildings: Overview

3.2.1 Builder Activities

Preparing a building for the NBN Co fibre network requires the builder to perform the following tasks:

- Extend the Service Drop Conduit from the property boundary to the external PCD location, complete with internal draw string
- Provide sufficient space for the future fitting of the PCD with sufficient clearance from other utilities, such as electrical meter panels and gas meter assemblies
- Supply the pathway (a white P23 communications conduit with drawstring) from the external PCD location to the NBN Equipment location
- Co-locate the internal fibre exit location with the internal NTD Enclosure (and PS/B if required) as part of the home equipment installation
- Provide adequate space for the future fitting of NBN Co Equipment inside the premises, and if home wiring is installed, collocate with any Customer Cabling
- Provide for mains power requirements at the proposed NBN Co Equipment location



Important: Plan the positioning of the equipment and associated pathways as part of the overall building design.

When determining the location of the internal conduit and consequent location of the NBN Co Equipment, builders should consider the intended use of the premises in terms of accessibility, safety and aesthetics.

Example: Make sure that equipment is easily accessible to people with restricted mobility, but out of normal reach of children and pets.

3.2.2 NBN Co Activities

To connect the building to the fibre network, NBN Co will provide/install the following:

- The service drop cable to the PCD location within the service drop conduit prepared by the builder.
- The PCD on to the external wall in the space provided by the builder clear of other utilities.
- The internal fibre cable from PCD to the NTD Enclosure.
- An NTD and NTD Enclosure in the space and environment provided within the premises by the builder.
- **A Power Supply (refer to Section 3.6 for details on developer's choice details):**
 - **If owner chooses PS/S** - An NTD with PS/S supply along with NTD enclosure will be provided in the space and environment provided within the premises by the builder **If owner chooses PS/B** - An NTD along with NTD Enclosure supplied by a backup battery unit (PS/B) will be provided in the space and environment within the premises by the builder

Note: Standard Power Supply (PS/S) will not be required if using Battery back-up supply unit.

3.3 Service Drop Conduit Installation

(Also referred to as a **Lead In Conduit (LIC)**)

The service drop conduit must be installed from (and *connected to*) the Developer's Starter Pipe at the property boundary, and run to the nominated location where the PCD will be located externally on the premises.

Ideally, the developer has provided a marking tag in the street network pit servicing the lot, to help locate the Developer's Starter Pipe.

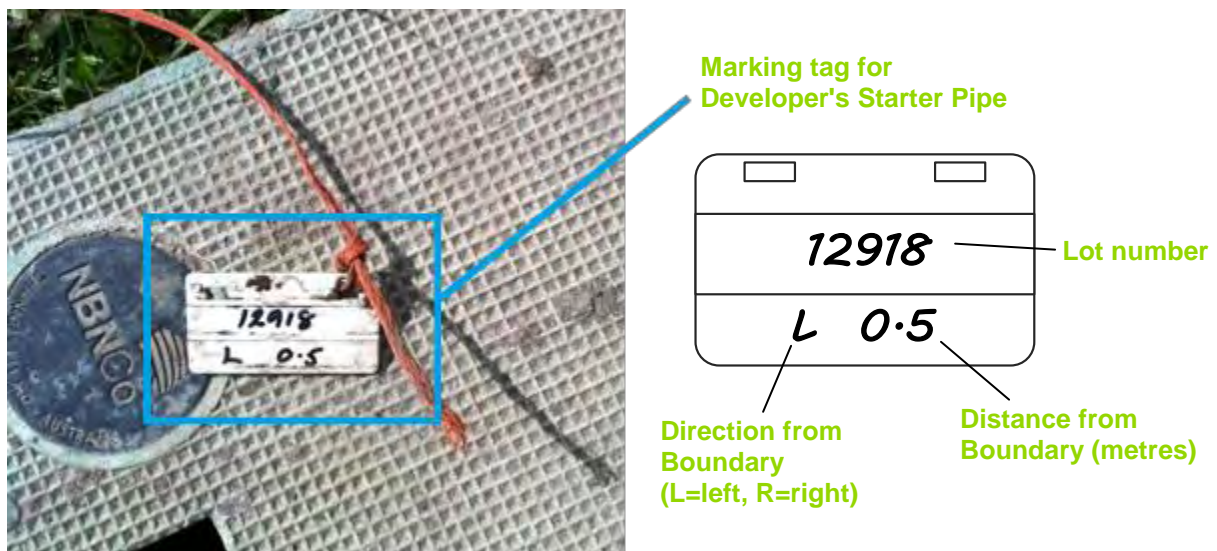


Figure 1 – Marking Tag example

Note: For Duplex or Triplex developments the service drop conduit (LIC) must be provided to have access straight from the property boundary directly to the PCD location for each dwelling. A service drop conduit cannot traverse a neighbour's property. Service Drop Conduit Requirements

The service drop conduit must conform to the following requirements:

Type	23mm ID; 26.6 to 26.8mm OD white PVC-U telecommunications conduit, compliant with AS1477.
Installation	<ul style="list-style-type: none"> • Minimum depth below finished ground level: 300 mm • Maximum depth below finished ground level: 500 mm • Covering: All excavation work performed as part of installing the LIC shall be back-filled with suitable fill, compacted and reinstated to match the surrounding area. • Increase minimum depth to 450mm for any service drop conduits planned to pass under a driveway
Bend angles	<ul style="list-style-type: none"> • Minimum radius: 300 mm (underground), 100 mm (above ground) • Maximum individual bend angle: 90 degrees • Maximum total (cumulative) bend angles: 270 degrees
Draw string	Installed from the street network pit, exiting the premises end.
Seals	Temporarily seal at premises end, during construction activity.
Connection	Connected to the Developers Starter Pipe from the pit on footway, as shown in <i>Service Drop Conduit Installation (in footings option)</i> .

Table 5: Service Drop conduit requirements



Important: Care should be taken to plan the best time to install the conduit, especially if using a shared trench for utilities to service premises.

The risk of damage to the conduit by later installation of other services should be reasonably avoided.

Service drop conduit is required for each dwelling in a duplex or triplex construction, between street property boundary and PCD location on each dwelling.

3.4 Internal Conduit Installation

3.4.1 Internal Conduit Requirements

The internal conduit must conform to the following requirements:

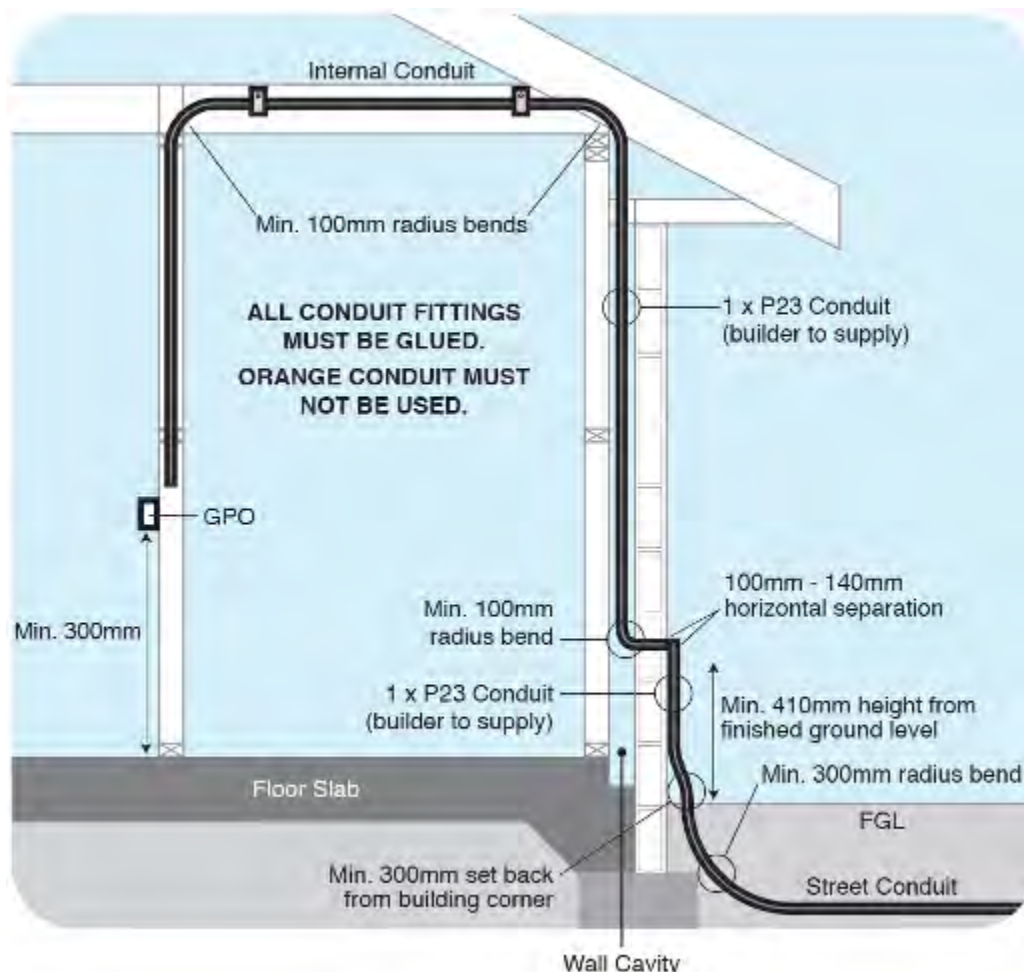
Type	23mm ID; 26.6 to 26.8mm OD white PVC-U telecommunications conduit, compliant with AS1477.
Installation	<ul style="list-style-type: none"> • 100-140mm separation aligned on the horizontal plane separated from the service drop conduit on the external wall, to the NBN Co Equipment location in the premises • location planned to be outside exclusion zones for hazardous services such as gas regulator and meter assemblies, see 3.5.1 PCD Installation Requirements • An internal conduit from PCD location to NBN Co equipment must remain part of the dwelling, internal conduits must never traverse a neighbour's property.

Bend angles	<ul style="list-style-type: none"> • Minimum radius: 100 mm • Maximum individual bend angle: 90 degrees • Maximum total (cumulative) bend angles: 270 degrees between accessible draw points <p>Important: Contact NBN Co for advice on special building types, where the number of bends required may exceed these guidelines.</p>
Draw string	<p>Installed along the length of the conduit.</p> <ul style="list-style-type: none"> • In cavity walls: At the end of the conduit, draw string may be presented as a blank plate marked 'NBN' for easy identification and location. • For masonry walls: Conduit may be chased into the masonry, and the end presented as a standard electrical blank plate. • For surface conduit: Present as a neat conduit end to line up with the edge of the mounting surface template provided by the builder.
Joins and Bends	All glued with conduit solvent cement and primer.

Table 6: Internal conduit requirements

3.4.2 Conduits and Structural Integrity

Where the internal conduit passes through timber framing, care must be taken to maintain the integrity of the building structure.



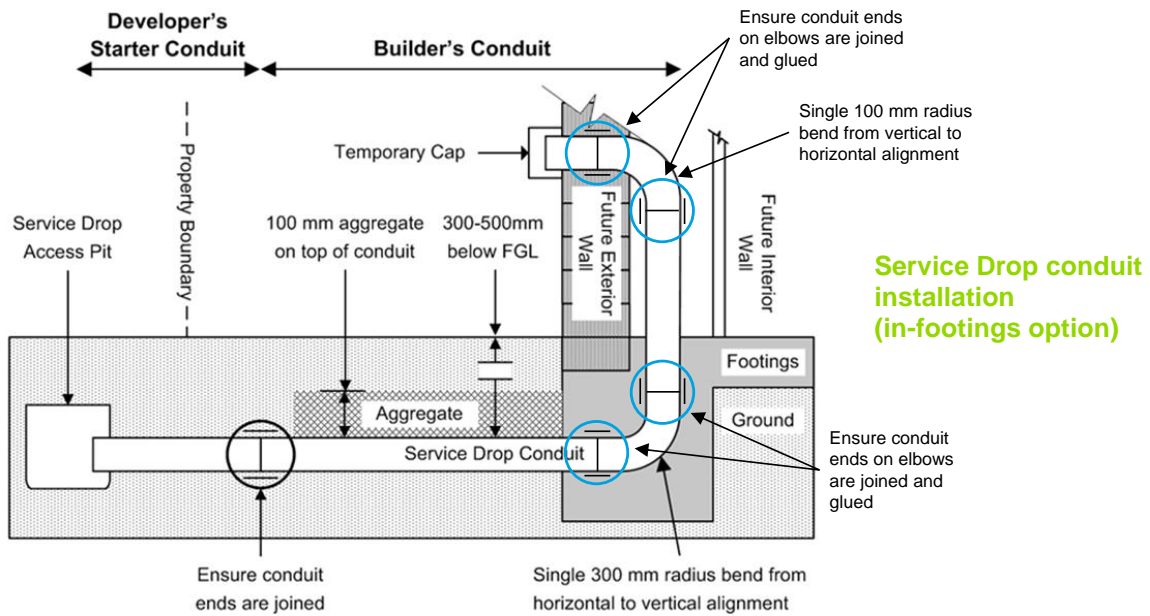


Figure 2 – Conduit passing through timber framing

3.5 Providing External Wall Space and Preparation for the PCD

NBN Co requires a location with sufficient space and clearance on the outside of the premises to allow the future installation of a Premises Connection Device (PCD).

When the fibre is later installed the service drop conduit may be open and the end of the internal conduit sealed.

3.5.1 PCD Installation Requirements

The following table describes the minimum clearances required for PCD installation.

<p>External Space Requirement</p>	<ul style="list-style-type: none"> • Width: 300 mm • Height: 300 mm • Depth: 100 mm • Additional 250 mm to left of PCD (to allow for open door)
<p>Installation Height</p>	<p>Measured from finished ground level to bottom of PCD:</p> <ul style="list-style-type: none"> • Minimum: 410 mm • Maximum: 1500 mm <p>Note: Only exceed the minimum installation height where you have to allow for a service that requires more space to take up the area closer to ground level. Example: Gas meter & regulator assemblies. For more information, see section 3.5.2</p>

Minimum Clearances (Measured from outer edges of PCD)	<ul style="list-style-type: none"> • 250 mm from fixed services including pipes, taps and meters • 150mm clearance from gas enclosure or combined utility enclosure • Outside exclusion zones around Gas Regulator/Boxes and Enclosures, and Gas Discharge Zones • 1500 mm from gas cylinders • 150 mm from corner of wall • 150 mm from exterior structure such as window or balcony
Distance Between Cable Entry Ports (Conduits)	<ul style="list-style-type: none"> • Minimum: 100 mm • Maximum: 140 mm

Table 7: PCD Installation requirements

Conduits Align With the PCD From Below

This provides a degree of protection from moisture entering the PCD when fitted. When planning the location for the PCD, note that the service drop conduit and internal conduit ends must be located *below* where the PCD will be fitted.

- The **service drop conduit** aligns with the PCD's **left-hand-side** cable entry
- The **internal conduit** aligns with the PCD's **right-hand-side** cable entry

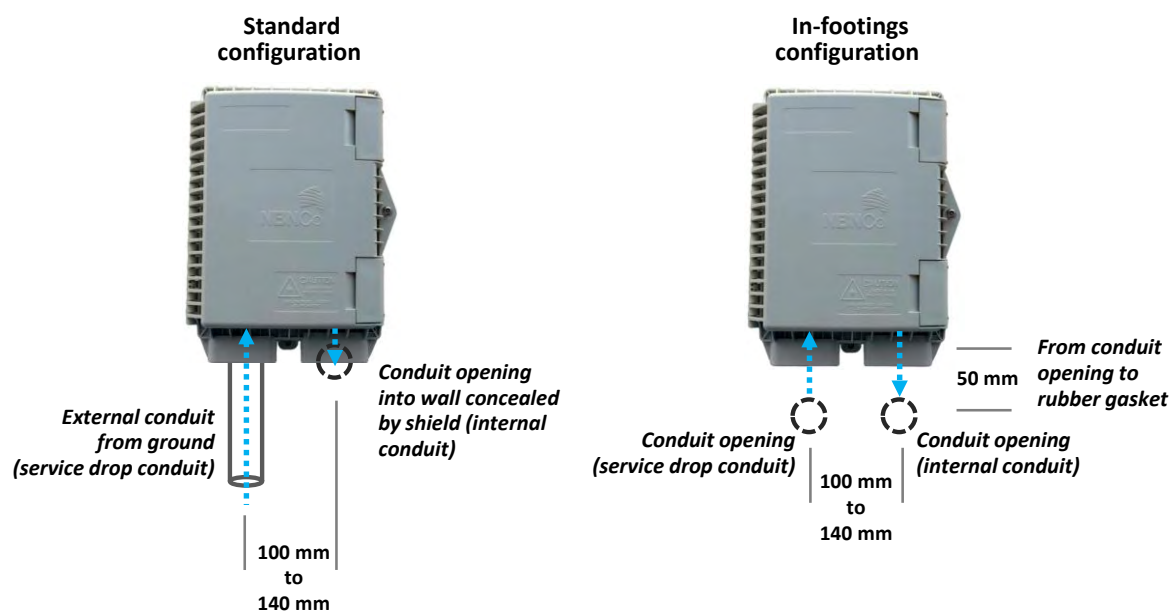


Figure 3 – Conduit alignment with PCD



Important: NBN Co has the right to request re-work from the builder if, due to these standards not being met, the equipment cannot be installed to comply with these specifications.

3.5.2 Variations on Requirements

Depending on the building type, and the location of other structures like fencing, the amount of wall space that needs to be shared by the utilities can be very limited.

It is important to take into account the clearances required by each utility to avoid disputes that may arise over many services competing for limited space.

When planning for the placement of conduits, consider the relationship between the service drop conduit and the internal conduit. The position of the internal conduit will be difficult to change later in the building cycle; for example, after the completion of masonry works.

When planning for the actual alignment for the relationship between the PCD and the conduits, the internal conduit placement plan may actually determine the positioning of the service drop conduit.

In many instances, locating the service drop conduit directly under an electrical meter/switchboard may not be practical; it may be better to locate it to either the left or the right of the meter/switchboard.

3.5.2.1 Limited Space

Where space is very limited, consider allowing for higher PCD placement (up to 1500mm) during building design.

If the allowed space for all utilities is very narrow, prepare a plan so that clearance can be met.

3.5.2.2 Conduits and Other Utilities

Builders may need to position the internal conduit so that it can pass adjacent to another device (such as an electrical meter/switchboard) when making its way inside. Consider the location of other facilities, such as in-wall cisterns, to ensure adequate space for conduit pathways.

In some regions there may also be enclosures for gas, and combined utility enclosures. Experience has shown that other utilities (for example, gas) are located closer to ground level, but typically require a lot of clearance.

Important: Required clearance for services can vary by region: check with local utilities for specifics in the area.

3.6 Internal Premises Wiring



Electrical Hazard

The NTD and NTD Enclosure along with its main power supply unit (PS/S or PS/B) must be installed in the same building as the electrical main meter box or distribution board. For communications customer cabling, the NBN Co Equipment is only certified for connection to customer cabling (structured wiring) which is entirely enclosed within the same building.

If any aerial or underground customer cabling is connected from the UNI-D or UNI-V ports of the NTD to a separate freestanding building, there is a risk to the user that a potential lightning hazard may be transferred via the external cable between the UNI-D or UNI-V ports to any connected equipment.

For specific safety guidelines about customer cabling beyond the network boundary, refer to the ACMA and the mandatory wiring rules.

The builder provides ...	NBN Co provides/installs ...
<ul style="list-style-type: none"> • GPO • Optional patch panel • Space for a routing gateway or consumer electronic device • Any structured wiring if used; there are many variations depending on consumer choice and need including wireless devices. 	<ul style="list-style-type: none"> • PS/S (Default) • PS/B (Optional) • NTD (in NTD Enclosure) • Fibre

Table 8: Provision of Internal Premises Wiring

The following example illustrates the relationships between the elements.

NTD Enclosure with PS/S:

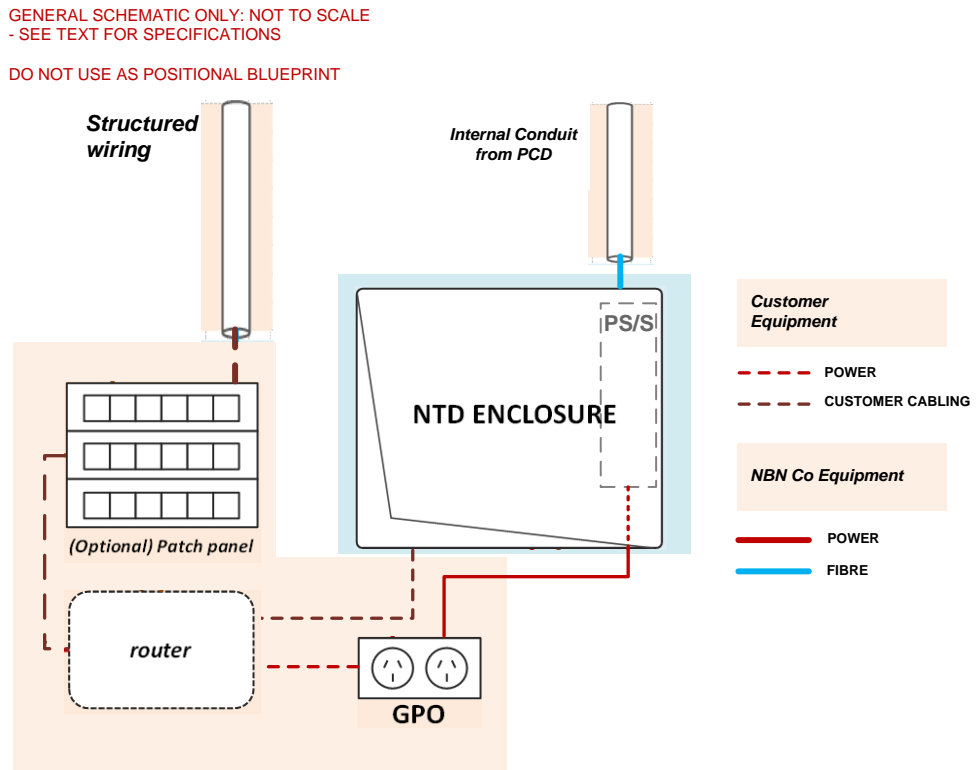


Figure 4 – NTD Enclosure with PS/S example

NTD Enclosure with PS/B:

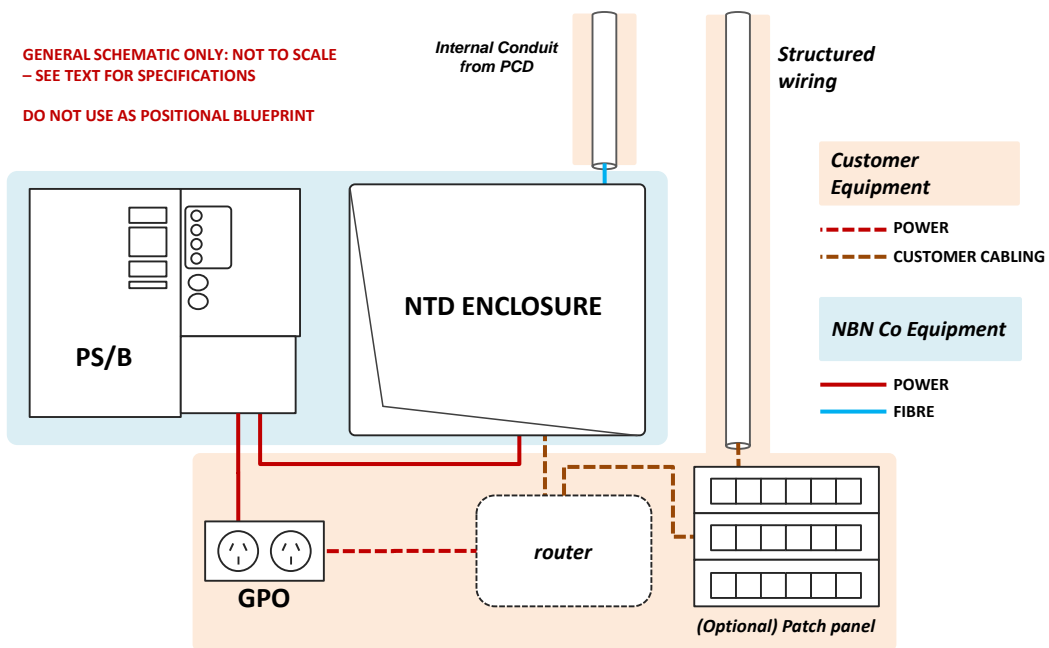


Figure 5 – NTD Enclosure with PS/B example

Note: Some Retail Service Provider equipment can offer more innovative ways for planning the distribution and connectivity in the premises.

As a builder, when you request a pre-installation date for NBN Co equipment to take place after 1st October onwards, you can nominate the pre-installation of a standard power supply or the power supply with battery backup. In most cases, a standard power supply is recommended for pre-installations unless you are aware that the first occupant will require battery backup capability. If you select the standard power supply, future occupants can still have the power supply with battery backup fitted later which can be arranged by their service provider at no cost and their service activation can still proceed. However if a power supply with battery backup is fitted first, and the first occupant does not require the battery backup service, the equipment cannot be uninstalled and the occupant will have unnecessary equipment and a battery to remove and dispose of.

- This initiative is part of a new Government policy whereby occupants at service activation will be provided with information by their service provider before they elect to take up a service with or without battery backup capability. Service providers will be required to record and retain the decision of the occupant. As a result, NBN Co recommends in the first instance, for pre-installations, a standard power supply is installed and battery backup should only be considered where it is known the occupant will require the capability.

3.6.1 Power Supply Unit (PS/S (default) or PS/B): AC Power Requirements

To allow the connection of the default power supply to the building's mains power, the builder must do the following:

- Install a single (minimum) mains power General Purpose Outlet (GPO).

This must be a dedicated socket for the exclusive use of the NBN Co Power Supply units. The power supply plug must connect **directly** to the socket. Devices such as a power board or double adaptor **must not** be used. If use of an Uninterruptible Power Supply (UPS) is proposed, please contact NBN Co.

Ensure that the GPO is positioned maximum 200 mm away from NBN Co's Equipment template layout (Refer to Section 4.3.3.1 for layouts details)

Recommended: Provide a double GPO, so that one socket is available for customer devices, such as an internet router. Locating the new GPO as close as possible to the equipment location minimises safety issues with excess cord, and improves the look of the installation.

- Ensure all mains power electrical cables associated with the NBN Co Equipment installation, meet the requirements of AS/NZS 3000:2007 (see [Appendix A – Australian and International Standards](#)).
- Maintain all cable separations according to AS/CA S009:2013 (or the latest issue at time of installation), summarised in the following table:

Service	Minimum Power Cable Separation Distance
Power	100 mm
Gas, Water, or Sewer	150 mm

Table 9: Internal service clearances

4 NBN Co Equipment inside the Premises

During the design phase, building plans will require a location set aside to allow the future installation of network equipment by NBN Co.

This section provides guidance for the three types of acceptable location for the installation of NBN Co Equipment.

This location will be the point to which the internal conduit from the PCD will transit, and the point at which any Customer Cabling will connect/interface.

4.1 Basic Equipment Requirements

Network equipment installed by NBN Co requires the following:

- Mains power outlet
- A location that:
 - Protects the integrity of the equipment for long-term use
 - Allows straightforward upgrade of the components over the life of the building
- Enough space within the location to install the equipment so that it can be readily:
 - Accessed by the occupants of the premises
 - Serviced by technicians

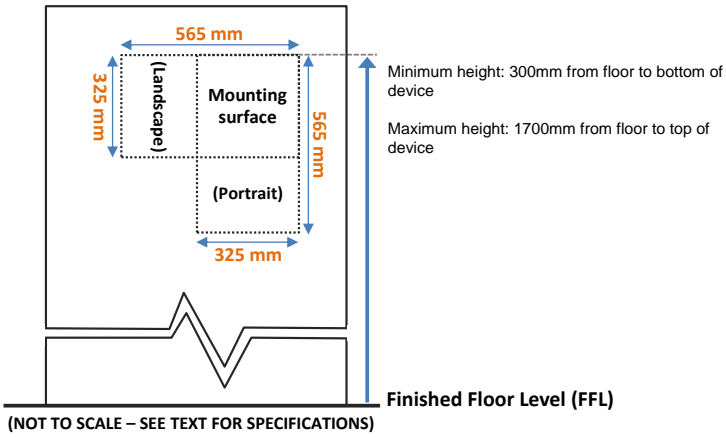


Important: When determining the location of the NBN Co Equipment, builders should consider the intended use of the premises in terms of accessibility, safety and aesthetics.

Example: Make sure that equipment is easily accessible to people with restricted mobility, but out of normal reach of children and pets.

4.2 NBN Co Equipment: Installation Requirements

The following table lists NBN Co's requirements for the installation of its network equipment. Builders and contractors should refer to this information when determining an appropriate location of the internal conduit.

Category	Requirements
Installation Height and Space Provided	<p>Between 300mm and 1700 mm from the finished floor level to the top of the space allocated for NBN Co Equipment</p> <p>This allows for either minimum portrait or landscape clear mounting surface dimensions. (Also called the mounting surface template; see section 4.3.1 for details.)</p>  <p>(NOT TO SCALE – SEE TEXT FOR SPECIFICATIONS)</p> <p style="text-align: center;">Figure 6 – NTD Height clearance</p>
Adjacent Equipment	<p>Includes the PS/B. Minimise distance as much as possible.</p> <ul style="list-style-type: none"> PS/B is less than 200mm radial distance from a dedicated mains power GPO.
Prohibited Locations	<p>Equipment must not be installed in any of the following locations:</p> <ul style="list-style-type: none"> Damp, humid, moist, or wet areas Examples: Kitchen; bathroom; toilet; laundry; under an open window. Where the ambient temperature routinely drops below 10°C Examples: An uninsulated garage. Where the ambient temperature routinely exceeds 40°C Examples: A ceiling, wall, or floor cavity; masonry wall facing north or west; near a water- or space-heater or heater vent; exposed to direct sunlight. A confined area with restricted air circulation Examples: A closed cupboard, wall cavity, or area restricted by curtains, clothes, or furniture. Subject to high dust Examples: Work area; under an open window. Subject to potential damage Examples: Workshop; work area. Outside the normal living area or outdoors A separate freestanding building Examples: Garage; shed; office. Below the Flood Hazard Level (FHL) in premises in designated Flood Hazard Areas.

Category	Requirements
Recommended Locations	<ul style="list-style-type: none"> • The primary connection point, as determined by the home owner • Study • Walk-in robe; acceptable open enclosure; home distributor • Lounge; living room • Rumpus room • Enclosed garage, or a garage under the main roof (not a separate building) where consideration has been given to ensuring in-building coverage requirements are met • Out of normal reach of children or pets and protected from accidental knocks, damage, disconnection, unplugging or being switched off
Indicator Lights	<ul style="list-style-type: none"> • Lights must easily accessible • Lights must be easily viewable by removing a cover, or opening a door
Audible Alarms	Must be readily audible when triggered, even if within an enclosure or home distributor.
Ventilation	Location must be adequately ventilated. See Appendix C for more information.

Table 10: NTD Installation requirement

4.3 Providing Space in the Premises for NBN Co Equipment

4.3.1 The Mounting Surface Template

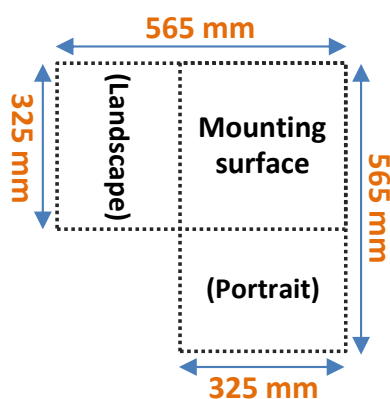
NBN Co requires builders to reserve space in each premise for the installation of NBN Co Equipment.



Important: The area is for **NBN Co Equipment only**. It allows room for the equipment; the associated power and data cables; and adequate ventilation.

The minimum area required is called the **mounting surface template**. This area has been designed as a reservation area that may allow for future generations of NBN Co Equipment during the life of the building.

The Mounting Surface Template must have the following minimum width and height, depending on orientation:



Orientation	Min Width	Min Height
Portrait	325 mm	565 mm
Landscape	565 mm	325 mm

Figure 7 – NTD mounting surface template

The mounting surface must also meet the following criteria:

Mounting surfaces must be...	
<input checked="" type="checkbox"/>	Free of obstruction
<input checked="" type="checkbox"/>	Adequately ventilated
<input checked="" type="checkbox"/>	Usable for mounting the equipment

4.3.2 Organising NBN Co Equipment

The NBN Co installer will determine and organise the ultimate positioning and orientation of NBN Co Equipment within the area defined by the Mounting Surface Template.

4.3.3 Example Equipment Layouts within Mounting Surfaces

The following diagrams show layout examples that use the current NBN Co Equipment components, within the mounting surface template.

Note: NBN Co installers may choose to arrange the equipment in configurations different from those shown here.

4.3.3.1 Layout Examples

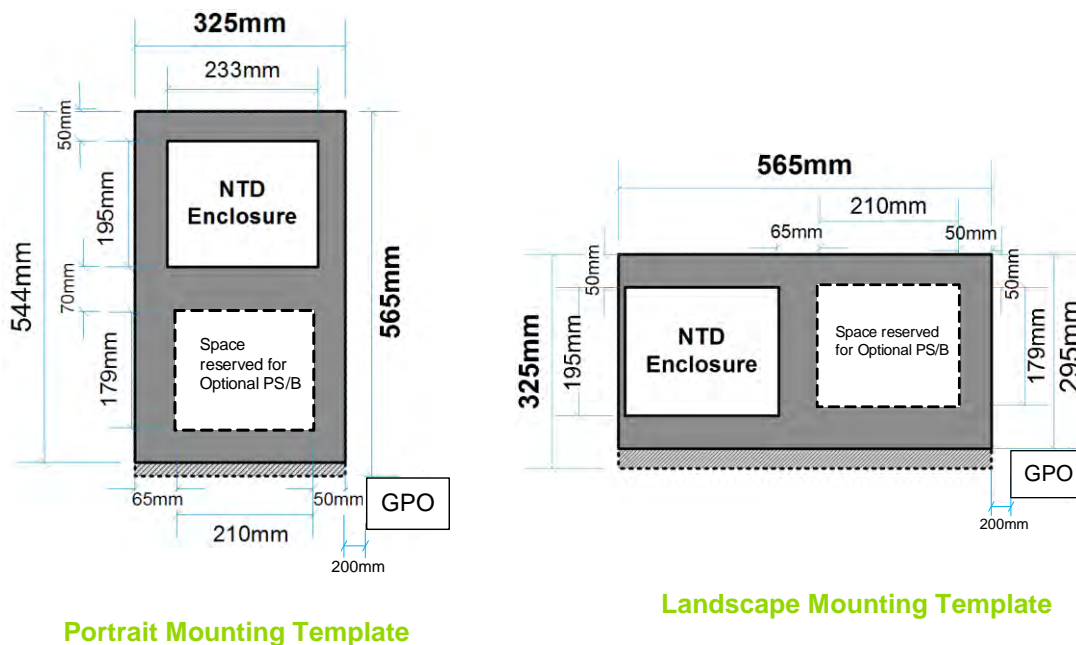


Figure 8 – NTD mounting surface template with GPO

Note: Ensure NTD Enclosure is installed to the left or right of the power outlet as shown in diagram above and **NOT** above or under it.

4.3.3.2 Cable entry locations

Builders must provide an interior cable entry hole of at least 15mm width to allow the fibre cable clear access from the conduit end to the NTD Enclosure.

As a guide to locating the entry point for the cable, the following diagram illustrates the NTD Enclosure's back-plate, showing the fibre cable access points:

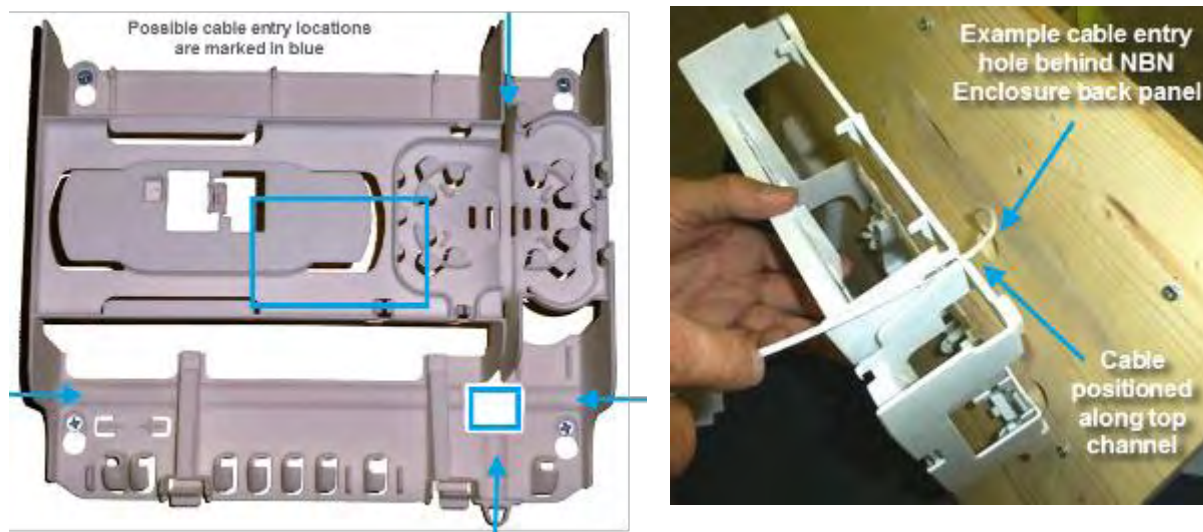


Figure 9 – Cable entry location for NTD Enclosure

4.3.4 Power Outlet(s)

The GPO to power the installation is not included within the dimensions of the mounting surface, but is shown adjacent in each of the above examples.

Ensure that the GPO is positioned up to 200mm from the NBNCo equipment template.

Recommended: Provide a double GPO, so that one socket is available for customer devices, such as an internet router. Locating the new GPO as close as possible to the equipment location minimises safety issues with excess cord, and improves the look of the installation.

4.3.5 Customer-Purchased Equipment

Where possible, builders should allow room to locate customer network equipment (such as a wireless router) and cabling adjacent to the proposed NBN Co Equipment location.

4.4 Mounting Locations

Both the National Broadband Network and the homes into which NBN Co Equipment will be installed, will last for many decades.

NBN Co anticipates that over this time, the technology within NTDs and PSUs will improve, and be upgraded in accordance with both the needs of customers and technology life-cycles.

The future occupants of a premise may have different requirements to today's residents. By ensuring that sufficient space and ventilation is provided for equipment today, we ensure the effective operation of that equipment now, and simplify the upgrade process in the future.

4.4.1 Types of Location

Builders and building owners must make one of the following types of location available for the installation of NBN Co Equipment.

Location type	Description
Open Wall Areas	An area on an open wall with either no obstructions, or only partial obstructions. Open Wall Areas use the bulk space of the room for air circulation. (E.g. walk-in robe, joinery or other designed spaces)
Open Enclosures	A partially-enclosed area that contains no internal obstructions. Open Enclosures use the bulk space of the enclosure and the absence of obstructions for air circulation.
Home Distributors	A cabinet or cupboard dedicated to communications equipment. Home Distributors need ventilation to be added to the design to improve the air circulation.

Table 11: Types of location to house NTD

4.4.2 Open Wall Areas

An Open Wall Area is an unenclosed, obstruction-free location with minimum dimensions equal to the Mounting Surface Template described in section 4.3.1

To be considered 'obstruction-free', the location must meet the following conditions:




Obstruction-free Conditions	
	Be clear of obstructions of any kind, both within the defined area, and off the face of the area. Example obstructions: Dividers, shelves, doors, covers, or hanging rails.
	Unobstructed ventilation into the bulk of the room in which it is located.
	Unimpeded air circulation within the bulk of the room in which it is located.




Table 12: Open wall area conditions

For more detail about standard circumstances for indoor NBN Co Equipment, refer to [Appendix B](#).

4.4.3 Open Enclosures

An Open Enclosure is a partially enclosed, obstruction-free location with minimum dimensions equal to the Mounting Surface Template described in section 4.3.1.

On request, NBN Co may mount the NBN Co Equipment into an Open Enclosure, as long as its design meets the following requirements:

Open Enclosure Design Requirements	
	Clear of internal obstructions of any kind. Example obstructions: Dividers, shelves
	Bounded by one or more solid or partially-solid obstructions above, below, to the left, or right of the Open Enclosure area. Examples: Shelf, divider, wall, floor
	Provides at least 500 mm of clear and unobstructed space from the equipment mounting face of the Open Enclosure to the nearest door or cover.



Open Enclosure Design Requirements	
	Discourages end users from using the space for other purposes. Examples: <ul style="list-style-type: none"> No hanging rails passing across or above the area, within 200mm of the equipment No useful shelves or solid surfaces (or provision for them, such as holes for adjustable shelving) below the Mounting Surface Template area for a distance of at least 500 mm
	Provides air circulation into a bulk space of a minimum volume of 1000 litres Examples: <ul style="list-style-type: none"> The bulk of a room Joinery cupboards without doors Wardrobes onto which NBN Co Equipment has been installed bare, onto a rear or side surface

Table 13: Open enclosure conditions

Note: If a door, cover, or obstruction is present (such as a cupboard door), the enclosure is probably a Home Distributor; see section 4.4.4.

4.4.3.1 Power Outlet Location




The GPO for use with the NBN Co Equipment installed in the Open Enclosure must be located in one of the following situations:

- Within the Open Enclosure itself (subject to available space *in addition* to that occupied by the Mounting Surface Template)
- Accessible from within the Open Enclosure through a hole of at least 50 mm diameter, as close as practical to the plane of the mounting surface

For more detail about standard circumstances for indoor NBN Co Equipment, refer to [Appendix B](#).

4.4.4 Home Distributors

A Home Distributor is an enclosed location with minimum internal dimensions equal to the Mounting Surface Template described in section 4.3.1 that meets the following requirements/definition:

Home Distributor Design Requirements	
	Meets the minimum Home Distributor dimensions defined in section 4.4.4.1
	Provides unimpeded air circulation; the home distributor must be installed in an area with a bulk space of at least 1000 litres volume. Examples: <ul style="list-style-type: none"> Wardrobe The bulk of a room or garage
	Is ventilated in accordance with Appendix C .


Home Distributor Design Requirements	
	<p>Manages any of (and <i>only</i>) the following equipment:</p> <p>Cabling</p> <ul style="list-style-type: none"> • In-premises telephone • Data • RF • Facilities associated with their cross-connection <p>Customer Networking Devices</p> <ul style="list-style-type: none"> • Residential Gateways • Routers • Access Points • Ethernet Switches • Analogue Telephone Adapters • Ethernet-over-Powerline adapters • Any other service or networking equipment that consumes power <p>Power Supply</p> <ul style="list-style-type: none"> • Power supplies associated with the above equipment • Batteries associated with the above equipment

Table 14: Home distributor conditions

**Important: Not for general household use!**

A Home Distributor must not be used for other purposes, such as general household storage. It should be designed and constructed so that alternative use would be impractical.

4.4.4.1 Minimum Home Distributor Dimensions

The Home Distributor must meet or exceed the following size requirements.

Parameter	Home Distributor Dimensions
Minimum inside volume	20 litres (20,000 cubic centimetres).
Minimum surface area of mounting required for an Indoor NTD composite layout	2,000 square centimetres, measured within the Home Distributor.
Minimum available depth of Home Distributor for mounting NBN Co Equipment	10 centimetres, providing a minimum 2 centimetre clearance between the NBN Co Equipment and the Home Distributor's door/cover.

Table 15: Home distributor parameters

4.4.4.2 Power Outlet(s) and Customer Equipment

If GPOs and customer equipment are also to be located within the Home Distributor, ensure that its internal dimensions are sufficient to contain the unobstructed Mounting Surface Template, and the additional equipment, cabling, and power outlet(s). Metallic Home Distributors that contain any mains power must be electrically safe.

For more detail about standard circumstances for indoor NBN Co Equipment, refer to [Appendix B](#).

4.4.5 Enclosures within Enclosures

When an enclosure (such as a Home Distributor) is installed within another enclosure (such as a wardrobe), apply the clearance and ventilation requirements individually to each enclosure, as if the other enclosure did not exist.

Example: If a small Home Distributor is installed in an area with a bulk space volume of **less than** 1000 litres, then the bulk space area also requires the ventilation methods described in [Appendix C](#).

For more detail about standard circumstances for indoor NBN Co Equipment, refer to [Appendix B](#).

5 Wiring inside the Premises

5.1 Who Provides What?

The following table lists the equipment for which each party is responsible

NBN Co	Builder (and Building Subcontractors)	Premises owner or occupier
<ul style="list-style-type: none"> Power Supply Unit Network Termination Device Fibre cabling to NBN Co Equipment 	<ul style="list-style-type: none"> Structured wiring General Power Outlet (Optional) Patch Panel 	<ul style="list-style-type: none"> Routers Unstructured wiring Other equipment supplied by ISP/RSP

Table 16: Provision responsibility from each sector

5.2 Services Available at the NBN Co NTD

The Network Termination Device (NTD) is part of the NBN Co Equipment installed by NBN Co.

The NTD provides User Network Interface (UNI) ports that the premises occupant uses to gain access to voice and data services that they order from Internet Service Providers (ISPs) or Retail Service Providers (RSPs).

NBN Co provides wholesale broadband services to the premises; the NBN Co NTD has two functions:

- Allows access to **data** (Internet) services: Up to four (4) services made available and presented as UNI-D ports
- Allows access to **voice** (Telephone) services: Two ports are provided for fixed-line telephones, presented as UNI-V ports

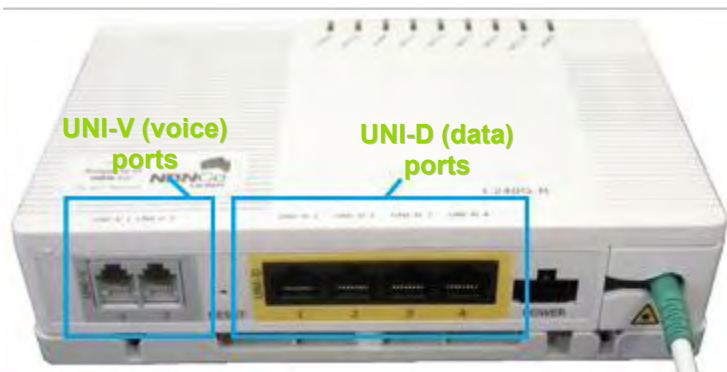


Figure 10 – Diagram of NTD Device

To activate any NBN Co service, the occupant must contact a Retail Service Provider of their choice. The RSP will provide services (and possibly additional equipment) to allow the occupant to access the NBN.

5.3 Customer Cabling

Customer cabling can be used to provide connectivity to consumer electronic devices or other equipment that is not located in close proximity to the planned NBN Co Equipment location.

Customer cabling within premises is **not** within the scope of NBN Co.

5.3.1 Customer-side Cabling Work

All cabling work performed on the customer side of the network boundary point is subject to ACMA requirements.

See section 2.3 for more information.

5.3.2 Customer Cabling is Optional

Customer cabling allows owners of premises to choose a location of NBN Co Equipment away from where the services may be used so as to improve data speeds within the premises, assist with aesthetics, and/or cater for greater additional scope such as a wired home network.



Important: While builders and cabling installers should let customers know about the benefits of pre-wiring at the time of home construction, also note that customer cabling is optional, and entirely at the discretion of the developer, builder, or premises owner.

5.3.3 Planning for Customer Cabling

5.3.3.1 End User Intentions

NBN Co cannot mandate the installation of customer cabling.

However, NBN Co suggests that developers, builders and premises owners think about:

- The proposed location for NBN Co Equipment
- Where premises occupiers are likely to use Internet services



Important: End users may intend to use a wireless or cable router plugged into a wall outlet in the premises. Where feasible, consult with the ultimate occupant of the premises about their home networking needs, as it is far more economical to install fixed wiring during building construction.

5.3.3.2 Cabled End User Access to NBN Co Equipment

Once the location of NBN Co Equipment within the premises is determined, additional planning may be required to determine if any customer cabling is needed to access the service from rooms or locations other than the one in which the NBN Co Equipment will be installed.

Example: If the NBN Co Equipment is to be located in an attached garage, further cabling is often required to allow occupants of the associated house to easily access services.

5.3.3.3 More Information

- Industry bodies provide advice about 'smart wired' homes
- ACMA Wiring rules for fixed or concealed customer cabling
- Retail Service Providers can provide guidance, and options for new and existing customers
- Electronic Retailers who provide products (such as a Wi-Fi router) for connectivity other than using customer cabling

5.3.4 Installing Customer Cabling

NBN Co recommends the installation of data cabling from the NBN Co Equipment location to wall sockets elsewhere in the premises.

In many instances, a Routing Gateway (RG) is needed to make full use of the internet services.

Suggestion: Provide a minimum of two runs of customer cabling from the NBN Co Equipment location, (or the associated Routing Gateway) to nominated locations in the premises, so that a telephone (using UNI-V) and an internet connection (using UNI-D) can be used in the home.

Data cabling:

- Can be used for either Telephone (UNI-V) or Internet (UNI-D)
- Uses four (4) pair data cables, with eight (8) position, eight (8) contact (8P8C) modular sockets and connecting cables
- Is 'star-wired' with a cable dedicated to each socket in the premises

Note: Legacy methods for traditional telephone cabling using telecommunications cable, looped or daisy-chain wiring and telephone sockets were not originally designed for Ethernet data transmission.

Modern data cabling (specifically, star-wired Category 5 or better) can, however, be used for both applications.

Where feasible, install customer cabling so that the addition of customer connecting cords, routing gateways, Ethernet switches or other devices provides an aesthetic appearance.

Give thought to how additional end user devices (such as routing gateways) will be positioned or mounted in the premises. Avoid excess cord wherever possible.

6 Multi Dwelling Units (MDUs)

For the purpose of this document, NBN Co divides Multi Dwelling Units (MDUs) into the following categories:

- **Duplexes, Triplexes, Rows of Villas or Terraces:** These require a direct pathway to each premises from the street pit
- **MDUs without street frontage and need some additional pit & pipe, or internal pathways to allow fibre cabling to be provided to multiple levels, or through the building to get access to each dwelling:** These require internal pathways inside the site for each premises
- **Additional Subdivisions or Superlots -** where a development is created beyond the original master development agreement (MDA) for a development, any builder or developer who intends to further subdivide a development needs to make application for adjustment for NBN Co fibre plans for the development. Some additional subdivisions may require additional pit & pipe to be provided by the additional subdivision developer to get access to each dwelling if they do not have street frontage. All super lot or additional subdivision developers and builders need to contact NBN Co prior to proceed with additional developments. Duplex and Triplex construction on a single lot may not have provisioned with suitable starter pipes as part of the major development in which they exist. NBN Co cannot allow pathways to dwellings that need to pass a neighbours dwelling to affect a service.

NBN Co's spatial and environmental requirements for equipment within premises in an External Cable Feed (MDU) are typically the same as those described in this document.

6.1 Dwellings with direct access to street boundary

External Cable Feed MDUs are similar to SDUs, in that the connection to each premise is via an external underground conduit into each individual premise.

Example: A row of Villas or Townhouses, duplex or triplex constructions.

- Where the conduit to each unit is directly from the pit and developer's starter pipe, then preparation will follow the SDU guidelines.
- Where a development requires pit and pipe to be provided on the site to provide pathways to the units, then the developer should refer to NBN Co pit and pipe guidelines for New Developments.

To make an application for the development, where pit and pipe is required within the development, the site developer must contact NBN Co for further guidance.

6.2 Internal Cable Feed MDUs

Refer to the NBN Co document *MDU Building Design Guide – New Developments* (NBN-TE-CTO-284).

This document outlines NBN Co's conduit and spatial requirements for deployment of its fibre-to-the-home infrastructure, within an Internal Cable Feed MDU.

For special building designs (such as hybrid MDU projects) contact NBN Co directly.

Any premises that is being constructed that has multiple dwellings that do not have street frontage for each dwelling, is a Multi Dwelling Unit and needs additional scope for making preparatory works for the NBN. Typical examples of these are high rise apartment buildings with two or more floors.

7 Pre-installation of NBN Co Equipment and Fibre Cabling

Recommended: By arrangement with builders or developers, NBN Co completes equipment installation while the builder is still in possession of the property, that is, while the builder still has control of both access to, and safety at, the construction site.

This provides both builders and NBN Co with the opportunity to quickly rectify any problems that may arise from the preparation works prior to occupancy, and avoid subsequent disruption to landscaping or finishes.

7.1 Arranging Pre-Installation

After the builder completes all preparatory work and before hand-over to the building owner, builders or developers should contact NBN Co to arrange for installation of the fibre equipment.

7.1.1 Prerequisites




	The Builder has completed all preparatory installation work.
	Electrical power is available.
	The building is at lock-up stage.

Table 17: Prerequisites before installing fibre equipment

7.1.2 Booking Pre-installation Appointment form online

Download a pre-installation booking request:

Single Premises Request Form:

http://www.nbnco.com.au/content/dam/nbnco/documents/NBN599_NEWDV_Pre-InstallRequestForm_SingleLocation_WEB.pdf

Multiple Premises Request Form:

http://www.nbnco.com.au/content/dam/nbnco/documents/NBN599_NEWDV_Pre-InstallRequestForm_SingleLocation_WEB.pdf

Complete details about the premise/s you wish to have the equipment installed.



Important: The pre-installation date must be at least 10 Business Days prior to hand-over.

7.1.3 Key Changes

This version includes some important updates:

1- NBN Co will make the Battery Backup Power Supply (PS/B) as an optional item from 19-12-2013. Standard Power Supply (PS/S) will be the default unit installed within the NTD Enclosure unless the End User favours to have a PS/B as their power supply (therefore lodging in a request in through their retail service provider). For developers and builders, this has no effect in planning for the NBN. When planning out the NBNCo Equipment location, space must still be provided for the PS/B device to allow End User to fit one at a later date.

2. For pre-installations of the NBN Co equipment prior to handover to ultimate occupiers after 1st October, 2014, builders can nominate the expected type of power supply needed at that time (i.e. PS/S or PS/B). In most cases, a standard power supply (PS/S) is recommended for pre-installations unless the builder is aware that the first occupant will require battery backup capability. The reservation space for the backup power supply (PS/B) still remains unchanged, since occupiers with different needs may exist during the life span of the dwelling.

3. Builders or Developer who plan to further subdivide a development, to deliver more lots or dwellings need to make plans for NBN Co fibre. For super lot or lot division, applications to NBN Co about the delivery of fibre to the premises, and to provide the necessary additional pit and pipe that can provide facilities for connection to each dwelling must be planned for. For builders and developers constructing duplex, triplex or other construction type care needs to be taken into consideration to provide service drop conduits directly to each dwelling without traversing a neighbours dwelling. For Multiple Dwelling Units (MDU) with more than one level, the scope is covered by an alternative guideline, NBN-TE-CTO-284, MDU building design guide. For commercial, mixed use or other construction type, please contact NBN Co for special guidance.

7.1.4 Pre-installation Activities

NBN Co will arrange site access with the builder. On arrival, NBN Co undertakes the following activities:

- Installation of the PCD, NTD Enclosure, NTD, and the default standard power supply, PS/S (PS/B if EUP requests for one)
- Installation of the service drop cable fibre from the street pit to the NTD, through the service drop conduit
- Verification that the system operates correctly, up to and including the NTD and default standard Power supply, PS/S

Note: NBN Co does not verify that the internal customer wiring is correctly installed.

7.2 Troubleshooting Connection Problems

Circumstances may arise during construction that could result in NBN Co being unable to readily connect the building to the NBN fibre network. Should this situation occur, the Building Owner will have to contact their Retail Service Provider (RSP) or Internet Service Provider (ISP) to facilitate service activation after hand-over. The RSP/ISP will then contact NBN Co to determine the appropriate remediation and arrange installation and connection to the NBN fibre network.

Note: The Building Owner may incur additional charges where remediation work is required.

Appendix A – Australian and International Standards

The following table lists the documents relevant to Australian and international cabling standard compliance guidelines.

Number	Title
AS/CA S008:2010	<i>Technical standard on requirements for Authorised Cabling Products</i>
AS/CA S009:2013	<i>Installation requirements for customer cabling (communications Wiring Rules)</i>
AS/NZS 3000:2007	<i>Electrical Wiring Rules</i>
AS/NZS ISO/IEC 15018	<i>Information Technology – Generic cabling for homes</i>
AS/NZS ISO/IEC 61935.1	<i>Specification for the testing of balanced and coaxial information technology cabling - Installed balanced cabling as specified in ISO/IEC 11801 and related standards</i>
HB252:2007	<i>Communications Cabling Manual module 3: Residential Communications Cabling Handbook</i>

Table 18: Australian and International standards table

Appendix B – Standard Circumstances Defined

B.1 Standard Circumstances: Checklist

Important: The Indoor NTD and its PS/S are only suitable for installation in **Standard Circumstances**.

All of the following checks must be true for an installation to be categorised as Standard Circumstances:

Requirement
<input type="checkbox"/> Both the NTD and PS/S are installed in a building where people normally live, work, or meet, but not in a place that is open to public access.
<input type="checkbox"/> Both the NTD and PS/S meet the following requirements: <ul style="list-style-type: none"> • Are installed inside the same building as each other • Are not installed on the external surface of an external wall This refers to the outside of a building, and would include, for example, an undercover area within an enclosed patio, plus similar circumstances. The installation of an NTD and PS/S on the internal surface of an external wall refers to the inside of a building and this situation is not meant to be precluded by these points, however may fall under other circumstances outlined later in this list • Are not installed in an enclosure situated on, or embedded into, the external surface of an external wall of the building This means that the Indoor NTD and PS/S should not be installed in a building or structure separate from where the services will be reticulated, or in a hut or street cabinet or another kind of enclosure such as a telephone booth where the environmental conditions may extend outside the specifications permitted for the NTD, PS/S or battery.
<input type="checkbox"/> The customer cabling remains wholly within the same building containing both the NTD and PS/S. This includes any cables that contain electrical conductors or conductive components, for the purpose of reticulating any UNI-V or UNI-D service, or reticulating PS/S power. This term is intended to mean the same as the term customer cabling in AS/CA S009 This requirement also means that there must not be any electrically conductive telephone or data or PS/S power cables between the main building and a separate free-standing building.
<input type="checkbox"/> Where a PS/B is deployed, it will be mounted permanently to a wall or permanent fixed enclosure.
<input type="checkbox"/> Neither the NTD nor the PS/S (or PS/B) are installed in a situation where they might be reasonably expected to experience damp, moist, or excessively humid conditions.
<input type="checkbox"/> Neither the NTD nor the PS/S (or PS/B) are installed within a roof cavity.
<input type="checkbox"/> Neither the NTD nor the PS/S (or PS/B) are installed below a floor outside the normal living, working, or occupancy areas of the building. This means that neither the NTD nor the PS/S (or PS/B) may be installed under a home between the floor and bare earth, or in a location that cannot be locked up.

Requirement
<input type="checkbox"/> Neither the NTD nor the PS/S (or PS/B) are installed in a cupboard/Enclosure/Home Distributor or in a confined space where any of the following are true: <ul style="list-style-type: none"> • It might reasonably be expected that linen, clothing or towels might be stored in direct contact with the NTD or PS/S (or PS/B) • It might be reasonably presumed that items could be stored that restrict free airflow around the NTD or PS/B • Gases may be trapped due to limited or no ventilation, or because the design or situation of the Enclosure/Home Distributor is such that there is a potential for ventilation to be inhibited <p>Note: VRLA batteries, of the kind used in the PS/B, may emit hydrogen and oxygen gas under some circumstances, such as battery overcharging.</p> <p>VRLA batteries may be installed into office or end user enclosures providing the enclosure provides for exchange of air with the ambient atmosphere, as described in section 2.4 of AS/NZS 4029.2. While not strictly applicable to NBN Co's application, sections 2.6 and 2.7 of AS 4086.2 provide relevant recommendations.</p>
<input type="checkbox"/> Neither the NTD nor the PS/S (or PS/B) are installed in either of the following situations: <ul style="list-style-type: none"> • In a location where the ambient temperature in the immediate vicinity of the NTD or the PS/S (or PS/B) might routinely exceed +40 degrees Celsius, or fall below 0 degrees Celsius • On a surface where the surface temperature might routinely exceed +40 degrees Celsius, or fall below 0 degrees Celsius <p>This means that neither the NTD nor the PS/S (or PS/B) may be installed directly onto a northern or western facing masonry wall where either of the following are true:</p> <ul style="list-style-type: none"> • The wall is likely to be subjected to heating through solar loading and the heat may be transferred to the surface on which the NTD and PS/S (or PS/B) is mounted • Near a space heater, water heater, or heater vent <p>Note 1: Indoor NTDs and PSUs may be installed on northern- or western-facing masonry cavity walls, where the cavity is fitted with R1.5 or higher-rated insulation batts.</p> <p>Note 2: In circumstances where a wall would be subjected to solar loading except for a tree currently providing shade, the installer must assess the location assuming that the tree is not present.</p>
<input type="checkbox"/> Neither the NTD nor the PS/B are installed in a location where either the power cabling or the customer cabling might be a tripping or strangulation hazard. <p>Note: Cables and equipment must be installed in accordance with local OH&S regulations and requirements. It is beyond the scope of this document to specify values.</p>
<input type="checkbox"/> Neither the NTD nor the PS/B are installed in a location where either the power or customer cabling can be accidentally wrenched or damaged by tripping, passing by, or other inadvertent disturbance. <p>Note: Cables and equipment must be installed in accordance with local OH&S regulations and requirements. It is beyond the scope of this document to specify values.</p>
<input type="checkbox"/> Neither the NTD nor the PS/B are installed in either of the following locations: <ul style="list-style-type: none"> • Onto an accessible conductive/metallic surface encompassing a General Purpose Outlet (power point) • Inside a conductive/metallic enclosure with accessible metallic parts encompassing a General Purpose Outlet (power point) <p>Exception: All accessible conductive surfaces and parts are protectively earthed, in accordance with AS/NZS 3000 and AS/CA S009.</p>
<input type="checkbox"/> Where PS/B AC is used, the power cord should not be routed through an opening in a metallic surface, <p>(Exception: The metallic edges of that opening are appropriately protected by a grommet or similar device.)</p>



Neither the NTD nor the PS/S (or PS/B) are at risk of being damaged.

Table 19: Standard Circumstances Checklist

B.2 Standard Purposes

Important: The Indoor NTD is only suitable for providing services for **Standard Purposes**.

The following situations *do not* qualify as Standard Purposes:

- Connection to untwisted cabling or other forms of non-standard cabling that do not meet the Indoor NTD technical requirements specified in [Appendix B.1](#)

Untwisted cabling is commonly deployed, for example, to a lift car, and with some fire alarm systems.

- Situations where customer cabling neither satisfies the requirements of AS/CA S009 or AS/NZS 3000 nor meets the technical requirements outlined in [Appendix B.1](#)

This addresses potential breaches of primary insulation, inadvertent detachment of live conductors coming into contact with exposed metallic parts, and other potential risks in situations where conductors carrying mains potential are routed into conductive/metallic enclosures.

Refer to sections 9.1.2 and 20.7 of AS/CA S009 for more information.

- Services delivered into a lift car
- MDU- or Body Corporate-managed alarm services, and/or Fire Indicator Panel alarm services

Appendix C – Ventilation of NTD Enclosure and Power Supply units

NBN Co requires the effective thermal ventilation of Open Enclosures and Home Distributors. This appendix outlines the reasons for this requirement and provides guidelines to facilitate it.

C.1 Reasons

C.1.1 Electronic Devices Generate Heat

All electronic appliances, including NBN Co's NTD and power supply units, consume energy. Some of that energy is dissipated as **heat**.

When installed into a closed enclosure or space, the energy dissipated by electronic appliances accumulates, and heats the air in the enclosure.

If the heated air cannot easily escape, it increases the **operating temperature** of the enclosed devices.

In any case the location of NBN Co Equipment should not be installed in an area where the ambient temperature exceeds the range described in [Appendix B.1](#).

C.1.2 Operating Temperature Affects Failure Rates

There is a relationship between an electronic device's long-term average operating temperature, and equipment failure rates.

General rule: failure rates approximately **double** for every **ten-degree rise** in long-term average temperature within an enclosure.

To reduce the chance and frequency of equipment failure, it is important to optimise an equipment enclosure's ability to dissipate heat. This in turn reduces inconvenience to the end user, productivity-loss, and the costs involved in managing failures and restoring services.

For these reasons, the design of an Open Enclosure or Home Distributor should be optimised to take advantage of **convection cooling**.

Convection currents established in the air within and around the enclosure carry heat away from the equipment, minimising temperature rise in the electronic equipment it houses.

Effective convection requires enclosures to be thermally ventilated.

C.2 Requirements

C.2.1 Ventilation Area

NBN Co requires that enclosures for the NBN Co Equipment only, satisfy the following thermal ventilation requirements:

Volume of Open Enclosure or Home Distributor	Required ventilation area (for <u>each</u> of the Upper and the Lower ventilation region)
20 litres (minimum volume requirement)	60 square centimetres.
Between 20 litres and 60 litres	60 square centimetres, <i>plus</i> an additional 1.5 square centimetres per litre of volume over 20 litres.
Greater than 60 litres	120 square centimetres, <i>plus</i> an additional 0.1 square centimetres per litre of volume over 60 litres.

Table 20: Ventilation Requirements

Calculating Ventilation Area

For each ventilation region, use the following steps to calculate the required ventilation area (in square centimetres):

1. Use the following formula to calculate the volume:

$$volume = \left(\frac{W \times H \times D}{1000} \right)$$

Where:

- W , H and D are the internal width, height and depth of the enclosure (in centimetres)
- $volume$ is expressed in litres

2. Based on the volume you calculated in step 1, determine the required ventilation area (in square centimetres).

- For volumes **between 20 litres and 60 litres**:

$$ventilation\ area = 60 + [(volume - 20) \times 1.5]$$

- For volumes **greater than 60 litres**:

$$ventilation\ area = 120 + [(volume - 60) \times 0.1]$$

Example

An enclosure with internal dimensions of width 38 cm, height 65 cm and depth 13 cm, has the following volume:

$$volume = \left(\frac{38 \times 65 \times 13}{1000} \right) = 32.13 \text{ litres}$$

As this volume is **between 20 litres and 60 litres**, we calculate the required ventilation area for each of the upper and lower ventilation areas as:

$$ventilation\ area = 60 + \left[\left(\frac{38 \times 65 \times 13}{1000} - 20 \right) \times 1.5 \right] = 78.2 \text{ cm}^2$$

C.2.2 Additional Requirements

Rule	Notes
Doors or covers must not obstruct ventilation	An Open Enclosure or Home Distributor design must not rely on a cover or doors being opened to meet the thermal ventilation requirements.
Obstructed ventilation does not count towards thermal ventilation assessment	Examples of obstructed ventilation include (but are not limited to) the following: <ul style="list-style-type: none"> • An Open Enclosure or Home Distributor is installed into a cavity • An Open Enclosure or Home Distributor is surrounded by a purpose-designed architrave • An Open Enclosure or Home Distributor is fitted with fixed shelving • An Open Enclosure or Home Distributor has the capability of being fitted with removable shelving
Ventilation openings must not be used for cable ingress/egress at any time	This ensures that cables can neither obstruct nor reduce the free flow of air into and out of the Open Enclosure or Home Distributor, and compromise its effective ventilation.

Table 21: Additional ventilation requirements

Appendix D – Builder Checklist: SDU/MDU Preparation

Task	
<input type="checkbox"/>	1. Locate developer's starter pipe at the property boundary.
<input type="checkbox"/>	2. Plan the preferred location for the future fitting of the Premises Connection Device by NBN Co, check for clearance requirements or exclusion zones from other utilities.
<input type="checkbox"/>	3. Install the service drop conduit with draw string from the developer's starter pipe to the nominated location for the Premises Connection Device on the exterior of the premises.
<input type="checkbox"/>	4. Plan the preferred location for the future fitting of NBN Co network equipment by NBN Co. Ensure the clear mounting surface space requirement for either landscape or portrait orientation is met. If the location is enclosed provide adequate ventilation, check guidelines for open enclosures or home distributors.
<input type="checkbox"/>	5. Install the internal conduit with drawstring from the Premises Connection Device location to the nominated NBN Co Equipment location.
<input type="checkbox"/>	6. Provide a dedicated General Power Outlet at the NBN Co Equipment Location to power the installation.
<input type="checkbox"/>	7. <i>(If required)</i> Plan for any Customer Cabling. If data cabling is installed collocate the cabling connections at the proposed NBN Co Equipment location. Ensure that additional space is provided to accommodate the wiring.
<input type="checkbox"/>	8. Take into account any space required for customer premises equipment if used such as routing gateways or other electronic devices. If space is required, either provide cable management or a method to provide an aesthetic installation.
<input type="checkbox"/>	9. <i>(When preparation work is complete, and the premises is at secure lock-up stage with power available)</i> Book a pre-installation of the NBN Co Equipment by NBN: <ul style="list-style-type: none"> a. Email newdevelopments@nbnco.com.au. b. Provide your consent and invitation for a NBN Co contractor to install the equipment and fibre cabling on your site. c. Submit PDF request form. d. Nominate any special preference to have a battery backup power supply installed (PS/B) instead of the normal NTD enclosure with standard power supply (PS/S).
<input type="checkbox"/>	10. <i>(When steps 1 to 9 are complete)</i> Advise the new premises owner or occupant that the premise is NBN-ready. Once the development is in service, the premises owner can contact a Retail Service Provider to order a broadband service or package that uses the fibre network.

Table 22: Builder checklist

Document Control

Revision History

Date	Version	Author	Comments
June 2013	8.0	Operation	Final Document
November 2013	9.0	NAT CTO Passive	Final Document Updates
June 2014	10	NAT CTO Passive	Final Document Updates

Reviewers

Name	Role
CTO	Passive Network
COO	New Development - Engagement

Approvers

Date	Version	Approver	Role
		Change Management Forum	

