

RESIDENTIAL PREPARATION AND INSTALLATION - SINGLE DWELLING UNITS (SDUS) AND MULTI- DWELLING UNITS (MDUS)

Standards

Document number	NBN-DES-STD-0011
Document category	Standard
Author	Standard
Approver (owner)	Senior Manager - Standards
Status	Published
Issue date	28 MAY 25
Revision number	16.0

Disclaimer

This document is provided for information purposes only. This document is subject to the information classification set out on this page. If no information classification has been included, this document must be treated as 'Public' and must not be disclosed other than with the consent of nbn co. The recipient (including third parties) must make and rely on their own inquiries as to the currency, accuracy and completeness of the information contained herein and must not use this document other than with the consent of nbn co.

Copyright © 2016 nbn co limited. All rights reserved.

Document control

Revision history

Date	Revision	Details
28 MAY 25	16.0	Refer to section 1.8 Changes in this revision, in revision 16.0, for details of changes between revision 15.0 and 16.0.
16 SEP 24	15.0	Refer to section 1.8 Changes in this revision, in revision 15.0, for details of changes between revision 14.0 and 15.0.
16 JAN 24	14.0	Refer to section 1.8 Changes in this revision, in revision 14.0, for details of changes between revision 13.0 and 14.0.
19 SEP 23	13.0	Refer to section 1.8 Changes in this revision, in revision 13.0, for details of changes between revision 12.0 and 13.0.
26 JUL 21	12.0	Refer to section 1.8 Changes in this revision, in revision 12.0, for details of changes between revision 11.0 and 12.0.
21 OCT 16	11.0	Refer to section 1.8 Changes in this revision, in revision 11.0, for details of changes between revision 10.0 and 11.0.

Contents

1 About this document	7
1.1 Purpose.....	7
1.2 Objective.....	7
1.3 Scope.....	7
1.3.1 In scope.....	7
1.3.2 Out of scope	7
1.4 Audience	8
1.5 Assumptions and constraints.....	8
1.6 Contact information	8
1.7 Referenced documents.....	9
1.8 Changes in this revision	10
2 Before you start.....	13
2.1 Health, Safety and Environment (HSE)	13
2.2 Compliance with Australian Standards and Codes.....	13
2.3 Network Boundary Point	14
3 Overview of provisioning requirements	15
4 Responsibilities	16
5 Lead-in requirements	18
5.1 Alternative lead-in	19
6 Pathway and space requirements	20
6.1 FTTP PCD installation requirements	20
6.1.1 PCD clearances	20
6.1.2 Ground clearances	21
6.1.3 PCD enclosure clearances	22
6.1.4 Conduit alignment with PCD from below.....	23
6.1.5 Building Entry Point to PCD location	24
6.2 FTTN NTD installation requirements	25
6.3 HFC PCD installation requirements	26
6.4 Variations on requirements	28
6.5 Internal conduit requirements.....	28
6.6 Conduits and structural integrity	30
6.7 Outbuildings and granny flats	32
7 nbn® FTTP equipment inside the premises	33
7.1 Location options.....	33
7.2 FTTP NTD.....	36
7.3 NTD Equipment templates	42
7.3.1 NTD only.....	43

7.3.2 NTD and Fibre TV.....	45
7.4 NTD Installation locations	47
7.4.1 Height.....	48
7.4.2 Mounting locations	49
7.4.3 Confined area	49
7.4.4 Home distributors	54
7.4.5 Minimum home distributor dimensions.....	54
7.4.6 Power and data outlet(s)	55
7.4.7 Enclosures within enclosures	55
7.5 Ventilation requirements	55
8 Utility clearances	58
8.1 Gas meter clearances.....	58
8.1.1 Enclosed Gas Meter	58
8.1.2 Unenclosed Gas Meter.....	59
8.2 Gas cylinder clearances.....	59
8.2.1 In-situ gas cylinders	59
8.2.2 Exchangeable gas cylinder	60
9 Customer cabling.....	62
10 Pre-installation of nbn[®] FTTP equipment and cabling.....	63
10.1 Arranging pre-installation	63
10.1.1 Prerequisites for installation of fibre equipment	63
10.1.2 Booking pre-installation appointment form online	63
10.1.3 Pre-installation activities	63
10.2 Troubleshooting connection problems	64
11 Glossary.....	65

Figures

Figure 1. Lead-in conduit	18
Figure 2. Marking tag example.....	18
Figure 3. PCD ground clearances	21
Figure 4. PCD ground clearances on an elevated balcony.....	22
Figure 5. PCD clearances on an external wall surface (sides, top and bottom).....	23
Figure 6. FTTP conduit alignment (left hand side example) with Madison PCD	24
Figure 7. FTTP conduit alignment (left hand side example) with Corning PCD	24
Figure 8. FTTN conduit alignment with NTD.....	25
Figure 9. HFC conduit alignment with PCD.....	26
Figure 10. Conduit passing through timber framing	30

Figure 11. LIC passing through footing and internal cavity wall	31
Figure 12. LIC surface mounted and internal conduit	31
Figure 13. Example schematic of nbn [®] equipment within the premises with direct connections to RSP router/modem	34
Figure 14. Example schematic of nbn [®] equipment within the Premises with connections to customer cabling and RSP router / modem	35
Figure 15. Legacy FTTP NTD	36
Figure 16. FTTP 1-port NTD	37
Figure 17. FTTP 4-port NTD	37
Figure 18. FTTP NTD - single UNI-D port.....	38
Figure 19. FTTP NTD - 4 UNI-D Port.....	39
Figure 20. FTTP NTD 12V DC PSU	39
Figure 21. 1-port FTTP NTD and wall mount bracket dimensions	40
Figure 22. 4-port FTTP NTD and wall mount bracket dimensions	40
Figure 23. 1-port NTD wall mount bracket dimensions and rear access	41
Figure 24. 4-port NTD wall mount bracket dimensions and rear access	41
Figure 25. NTD orientation	42
Figure 26. NTD clearances and minimum / maximum height schematic	42
Figure 27. NTD landscape layout orientation (dimensions in mm)	43
Figure 28. NTD portrait layout orientation (dimensions in mm).....	44
Figure 29. Fibre TV and NTD - landscape layout orientation (dimensions in mm)	45
Figure 30. Fibre TV and NTD - Portrait layout orientation (dimensions in mm).....	46
Figure 31. Arm's reach	48
Figure 32. Typical built out shelf	50
Figure 33. Built out shelf - landscape	51
Figure 34. Built out shelf - portrait	52
Figure 35. Typical side view of NTD within an open enclosure/robe	53
Figure 36. Ventilation upper/lower areas	56
Figure 37. Gas meter clearances - enclosed	58
Figure 38. Gas meter clearances - unenclosed.....	59
Figure 39. In-situ gas cylinder showing removable yellow cap	59
Figure 40. Exchangeable gas cylinder showing green tap with 'OPEN' and 'CLOSE' markings	60
Figure 41. Gas cylinder clearances – 360° view.....	60
Figure 42. Gas cylinder clearances – side view against a wall.....	61

Tables

Table 1. Contact information	8
Table 2. Responsibilities	16
Table 3. LIC requirements	19
Table 4. PCD clearances	20
Table 5. NTD installation requirements	25
Table 6. HFC PCD installation requirements	27
Table 7. Internal conduit requirements.....	29
Table 8. Location options for housing of the NTD.....	33
Table 9. Mounting locations	49
Table 10. Home distributor parameters	55
Table 11. Ventilation requirements	56
Table 12. Additional ventilation requirements.....	57
Table 13. Standard circumstances checklist	68
Table 14. Builder checklist.....	71

1 About this document

1.1 Purpose

The purpose of this document is to specify nbn's requirements for the provisioning of appropriate lead-ins, pathways and spaces within Single Dwelling Units (SDUs) and small Multi Dwelling Units (MDUs) for the delivery of nbn® Fibre to the Premises (FTTP), and In some cases other nbn® technologies such as Hybrid Fibre Coaxial (HFC) and copper (via Fibre to the Node [FTTN]) infrastructure.

1.2 Objective

The objective of this document is to assist developers, building owners and builders of new developments to provision premises correctly and to arrange connections for access to the nbn® network.

These requirements have been provided for new developments, where the developer has an agreement with nbn to provide broadband to the premises within the new development.

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

Developers, building owners and builders must adhere to these requirements to ensure a smooth connection of nbn® services to the premises.

1.3 Scope

1.3.1 In scope

Requirements for the following premises:

- residential SDUs
- small MDUs, to which SDU methods can be applied ('small' meaning each end user premises (EUP) has their own lead-in)
- Greenfield new premises constructed on vacant lots of land within a new housing estate
- duplex or triplex premises

1.3.2 Out of scope

- Large MDUs such as residential, commercial or retail new developments (refer to [16] *NBN-TE-CTO-284 MDU Building Engineering and Design Standard – New Developments*).
- The provision of internet or telephone services directly to occupants.

Note: Occupants of each premises must contact their service provider of choice to activate telephone and/or data services.

- Housing estate pit and pipe installation information, processes, methods and practices (refer to [15] *NBN-TE-CTO-194 New developments: deployment of the nbn™ pit and conduit network*).
- RSP connection equipment or information.

1.4 Audience

This document is intended for:

- new development site designer, developer, consultant, builders and electrical contractors
- nbn designers or planners
- nbn Delivery Partners
- nbn enAble training partners
- nbn trained New Developments suppliers

1.5 Assumptions and constraints

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

Failure to do so may result in delays in connecting the premises to nbn services or result in nbn's inability to make a network connection to the new premises.

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

1.6 Contact information



Note: The contact information below is for Developers and Builders and anyone else performing work under the New Developments process detailed on the nbn public website.

Table 1 below contains nbn new developments contact information. Refer also to the website <http://www.nbnco.com.au/newdevelopments>.

Table 1. Contact information

Method	Address
email	newdevelopments@nbnco.com.au
website	http://www.nbnco.com.au/newdevelopments
Contact us webform	Contact us form nbn

To request a booking for pre-installation of nbn® equipment, apply online at the following link:

<https://www.nbnco.com.au/develop-or-plan-with-the-nbn/new-developments/prepare-for-connection/ntd-pre-installation-request>

1.7 Referenced documents

Note: The table below only contains documents referenced within this document.

Document	Owner
[1] <i>AS/CA S008 Requirements for Customer Cabling Products</i>	Communications Alliance
[2] <i>AS/CA S009 Installation requirements for customer cabling (Wiring rules)</i>	Communications Alliance
[3] <i>AS/NZS 1477 PVC pipes and fittings for pressure applications</i>	Standards Australia
[4] <i>AS/NZS 1596 The storage and handling of LP Gas</i>	Standards Australia
[5] <i>AS/NZS 1892.1 Portable Ladders</i>	Standards Australia
[6] <i>AS 1926.1 Swimming pool safety, Part 1: Safety barriers for swimming pools</i>	Standards Australia
[7] <i>AS 1926.2 Swimming pool safety, Part 2: Location of safety barriers for swimming pools</i>	Standards Australia
[8] <i>AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)</i>	Standards Australia
[9] <i>AS/NZS 3084 Telecommunications installations - Telecommunications pathways and spaces for commercial buildings</i>	Standards Australia
[10] <i>AS/NZS 4645.1 Gas distribution networks, Part 1: Network management</i>	Standards Australia
[11] <i>AS/NZS ISO/IEC 15018 Information technology – Generic cabling for homes</i>	Standards Australia
[12] <i>AS/NZS IEC 61935.1 Testing of balanced communication cabling in accordance with ISO/IEC 11801 Installed cabling</i>	Standards Australia
[13] <i>HB 252-2007 Comm Communications Cabling Manual Module 3: Residential communications cabling handbook</i>	SAI Global
[14] <i>Building Code of Australia</i>	www.abcb.gov.au
[15] <i>NBN-TE-CTO-194 New developments: deployment of the nbn™ pit and conduit network</i>	nbn
[16] <i>NBN-TE-CTO-284 MDU Building Engineering and Design Standard – New Developments</i>	nbn

1.8 Changes in this revision

Changes in this document revision 16.0 dated 28 May 25 compared to the previous revision 15.0 dated 15 SEP 24 are summarised below:

Section	Details
Throughout document	<ul style="list-style-type: none"> Removed the word 'enclosure' after 'NTD'. Changed PS/S to PSU.
1.4 Audience	<ul style="list-style-type: none"> Added nbn trained New Developments suppliers
1.6 Contact information	<ul style="list-style-type: none"> Deleted 'Contact phone' number and replaced with link to 'Contact us' website.
1.7 Referenced documents	<ul style="list-style-type: none"> Deleted documents not available from public website (and also wherever they appeared in the body of the document).
2.3 Network Boundary Point	<ul style="list-style-type: none"> Added network boundary point for Fibre TV.
4 Responsibilities	<ul style="list-style-type: none"> In Table 2. Responsibilities, updated item no. 9 to read 'the required number of' GPOs rather than a single GPO.
6.1.4 Conduit alignment with PCD from below	<ul style="list-style-type: none"> Deleted important box with: 'In cases where conduits are installed within wall cavities and there are constraints in aligning the conduit ends below the PCD, please refer to NBN-CON-BI-4671 for alternative installation methods.'
6.7 Outbuildings and granny flats	<ul style="list-style-type: none"> Added new section.
7 nbn [®] FTTP equipment inside the premises	<ul style="list-style-type: none"> Deleted: 'This location will be the point to which the internal conduit from the PCD/NTD will transit and the point at which any customer cabling will connect/interface'. Deleted Figure 13. FTTP NTD enclosure with PS/S example.
(7.1 Services available at the FTTP nbn NTD)	<ul style="list-style-type: none"> Deleted section.
7.1 Location options	<ul style="list-style-type: none"> Added important box with text and link for optimising Wi-Fi router location. Added note to 'Home distributors' line item in Table 8: 'To ensure optimum performance of Wi-Fi devices within the premises, it is generally recommended that a Wi-Fi router or gateway is NOT installed within an enclosure or home distributor and is instead installed in a centralised location'.

Section	Details
	<ul style="list-style-type: none"> Added second bullet point in important box: 'if structured cabling is provided, there should be sufficient cabling to enable a Wi-Fi router or gateway to be either collocated with the NTD or installed in a separate location (which may require 2 or more separate ports at multiple wall outlets)'. Added Figure 13. Example schematic of nbn® equipment within the premises with direct connections to RSP router/modem. Added Figure 14. Example schematic of nbn® equipment within the Premises with connections to customer cabling and RSP router / modem.
7.2 FTTP NTD	<ul style="list-style-type: none"> Added new section with details of 1 and 4-port NTDs and legacy NTD.
7.3 NTD Equipment templates	<ul style="list-style-type: none"> Replaced existing section 'NTD layouts' with new section.
(7.4 NTD layouts)	<ul style="list-style-type: none"> Deleted section.
7.4.3 Confined area	<ul style="list-style-type: none"> Updated diagrams. Added sentence: 'The layouts and sizes shown are for a built-out shelf with Fibre TV RF equipment. If no Fibre TV is being deployed, then smaller layouts as per section 7.3 NTD Equipment templates can be used'. Replaced Figure 32. Typical built out shelf, with new version including relevant clearance details overlaid in red text, and added paragraph reinforcing clearance requirements: 'The built-out shelf shall be no lower than 300mm from finished floor level, the maximum height to the top of the shelf shall be below 2400mm, and the depth of the shelf shall be between 100mm – 150mm for ease of access.' Updated Figure 33. Built out shelf - landscape, and Figure 34. Built out shelf - portrait, with clearer versions and more clearance details. Added paragraph above Figure 35: 'Whilst 300mm minimum clearance from the Finished Floor Level is required, it is desirable to position the NTD higher up the wall to avoid items stored on the floor of the wardrobe blocking airflow and/or access.' Updated caption for Figure 35. Typical side view of NTD within an open enclosure/robe, and inserted text underneath: 'Where an NTD is installed within a wardrobe, there must be a clearance of 200mm from the wall to the end of the hanging rail to ensure accessibility to the NTD and suitability ventilation. Refer to Figure 35 below.'
7.5 Ventilation requirements	<ul style="list-style-type: none"> Deleted top diagram in Figure 36. Ventilation upper/lower areas.

Section	Details
9 Customer cabling	<ul style="list-style-type: none"> Updated wording in first paragraph. Added note: 'Customer cabling within premises is not within the scope of the nbn'. Added sentence: 'All cabling work performed on the customer side of the NBP is subject to ACMA requirements (refer to [2] AS/CA S009 Installation requirements for customer cabling (Wiring rules))'. Replaced bullet point for 'Category 5e or better (Category 6)' with: 'Category 6 (or better to support nbn speed tiers)'. Added bullet points: <ul style="list-style-type: none"> 'may be a maximum 100m in length from the NTD may require the use of a patch panel and multiple cables running to one or more rooms to support intended customer uses, e.g. a Wi-Fi router in a different location to the nbn[®] NTD' Added Important box with link to optimisation information online.
10 Pre-installation of nbn [®] FTTP equipment and cabling	<ul style="list-style-type: none"> Added introductory sentence: 'Pre-installation of nbn[®] FTTP equipment is available for dwellings being connected to the nbn[®] FTTP network as part of a New Development.'
10.1.3 Pre-installation activities	<ul style="list-style-type: none"> Updated first bullet point to remove 'NTD enclosure' and change 'the standard power supply of PS/S' to 'PSU'. Changed 'PS/S' to 'PSU'.
A.1 Standard circumstances: checklist	<ul style="list-style-type: none"> Updated terminology in relation to NTD and PSU to align with new equipment.
Appendix B Builder checklist: SDU/MDU preparation	<ul style="list-style-type: none"> Updated step 9 to point to online booking form.

2 Before you start

2.1 Health, Safety and Environment (HSE)



Note: The information below is for internal nbn employees and Delivery Partners. It is expected that Developers, Builders and anyone else following the requirements in this document will comply with relevant HSE legislation, and their own HSE processes.

nbn takes health, safety and environment management very seriously, and expects the same with all internal employees and our Delivery Partners. Whilst undertaking the activity associated with this document, all workers (both nbn employees and delivery partner's employees) must comply with relevant HSE legislation, their own HSE processes, contractual HSE obligations and nbn's HSE Critical Risk Controls.

The Critical Risk Controls (CRC) set out nbn's minimum expectations for carrying out work where there is a risk of exposure to one or more HSE critical risks. The mandatory requirements specified in the nbn® HSE Critical Risk Controls are in addition to other requirements under legislation and do not replace or limit any nbn or Delivery Partner obligation to manage HSE risks. It is also important to note that the Critical Risk Controls are not exhaustive of all controls required to manage HSE risks.

The information within this document has been prepared with an understanding that HSE risks may be evident and will require assessment with due consideration to CRC requirements by nbn or the Delivery Partner participating in any activity prescribed within the document and controls are documented in relevant safe work systems (e.g. SWMS, Procedure etc.) and adhered to.

2.2 Compliance with Australian Standards and Codes

All design and build works undertaken in respect of the new development MDU should be done in accordance with this document and the following standards:

1. **Space requirements** must be applied in accordance with [9] *AS/NZS 3084 Telecommunications installations - Telecommunications pathways and spaces for commercial buildings*.
2. **Customer cabling** must be applied in accordance with:
 - [2] *AS/CA S009 Installation requirements for customer cabling (Wiring rules)*
 - [11] *AS/NZS ISO/IEC 15018 Information technology – Generic cabling for homes*
 - [12] *AS/NZS IEC 61935.1 Testing of balanced communication cabling in accordance with ISO/IEC 11801 Installed cabling*
 - [13] *HB 252-2007 Comm Communications Cabling Manual Module 3: Residential communications cabling handbook*
3. **Customer cabling products** must be applied in accordance with [1] *AS/CA S008 Requirements for Customer Cabling Products*.
4. **Power** must be applied in accordance with [8] *AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)*.

5. **Fire sealing** must be applied in accordance with the National Construction Code of Australia (NCC), relevant Australian Standards and State specific legislation.

2.3 Network Boundary Point

The Network Boundary Point is deemed to be the boundary of a Carrier's Telecommunications Network for determining whether cabling or equipment is customer cabling or customer Equipment for the purpose of technical regulation under Part 21 of the Telecommunications Act 1997 (the Act).

The NBP differs for each technology:

- For FTTP, the NBP is defined as the service output ports on the nbn® NTD; specifically, the data (UNI-D) service sockets on the device.
- For FTTN copper, the NBP is defined as the external NTD or the internal MDF where the customer interconnects.
- For HFC, the NBP is defined as the service output port on the nbn® modem.
- For Fibre TV, the NBP is defined as the UNI-RFe port of the Fibre TV receiver.

As per [2] *AS/CA S009 Installation requirements for customer cabling (Wiring rules)*, the nbn® NTD is labelled as an NTD.

3 Overview of provisioning requirements

nbn has common requirements for any nbn® technology being connected to premises within scope of this document, which are:

- Lead-in conduit (LIC) or service drop conduit.
- Space for external connection devices.
- Provision of a general power outlet (GPO).
- Designated space for nbn active equipment within the end user's premises.

This section defines those minimum requirements.

The owner/builder must perform the following tasks to prepare a premises for connection to the nbn® fibre, copper or HFC network:

- a. Extend the nbn® service drop conduit with a LIC from the property boundary to the external PCD location, complete with internal drawstring.
- b. Provide sufficient space for the future fitting of the external PCD or NTD with sufficient clearance from other utilities, such as electrical meter panels and gas meter assemblies.
- c. Supply the pathway (a nominal P20 white communications conduit with drawstring) from the external PCD, NTD or NCD location to the nbn® equipment location.
- d. For fibre, co-locate the internal fibre exit location with the internal NTD as part of the home equipment installation.
- e. Provide adequate space for the future fitting of nbn® equipment inside the premises, and if home wiring is installed, collocate with any customer cabling
- f. Provide for mains power requirements at the proposed nbn® equipment location to support both the customer and nbn® equipment.

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 nbn® equipment, consider the intended use of the premises in terms of accessibility, safety and aesthetics. For example: ensure equipment is easily accessible to people with restricted mobility, but out of reach of children and pets.

4 Responsibilities

Table 2 contains a simple matrix view of responsibilities split up by party (e.g. responsibility of nbn, responsibilities of builder/developer). The table is also organised in a sequential format based on the order each activity would generally occur.

Table 2. Responsibilities

No.	Description	Area	Owner/ builder	Developer	nbn
1.	Network Connectivity.	nbn® Network			✓
2.	Installation of a PCD/copper NTD as required. This device is attached to an external wall and will have optical fibre, copper or HFC Radio Grade (RG) cable connected.	nbn® Network			✓
3.	Install the cable from the street to the PCD and NTD (dependent on the FTTx technology).	nbn® Network			✓
4.	Provision of pit and pipe within the new estate.	Housing estate pit and pipe		✓	
5.	Provision of Lead-In Conduit (LIC) through which to run cable from the street to the external Premises Connection Device (PCD) or Network Termination Device (NTD).	Lead-in	✓		
6.	Makes application to nbn for any additional subdivisions within a development (like a super lot development). Any additional pit and pipe would have to be provisioned by the subdivision developer.	Additional subdivisions		✓	
7.	Provision of space externally at the end of the LIC for nbn to install PCD.	End user premises	✓		
8.	Provision of a conduit or pathway within the building to the nbn® equipment location.	End user premises	✓		
9.	Allocation of the required number of General Power outlets (GPOs) at the desired nbn equipment® location.	End user premises	✓		
10.	Allocation of space for a nbn FTTP NTD within the building at the end user's desired nbn® equipment location.	End user premises	✓		

No.	Description	Area	Owner/ builder	Developer	nbn
11.	Installation of an FTTP NTD (the nbn [®] network termination point at the network boundary) within the end user premises for FTTP.	End user premises FTTP			✓
12.	Installation of a wall plate and HFC Radio Grade (RG) cable.	End user premises HFC			✓
13.	Installation of a min CAT 5e copper cable from external NTD to first Telecommunications Outlet (TO).	End user premises FTTN	✓		
14.	Customer cabling/structured cabling, or in home wiring, downstream of the nbn [®] network boundary NTD.	End user premises	✓		
15.	Test and commissioning of nbn [®] Fibre to each end user premises.	nbn [®] Network			✓
16.	Customer cabling past nbn Network Boundary Point.	End user premises	✓		
17.	Provision of router to connect or other equipment supplied by ISP/RSP.	End user premises	✓		

5 Lead-in requirements

nbn requires a LIC to be provided to each premises. This also applies to small MDUs such as a duplex or triplex where the LIC must be provided between the street property boundary and PCD location on each dwelling.

This must be installed from (and connected to) the nbn® service drop conduit at the property boundary (if available) and run to the building entry at the nominated location where the PCD or NTD will be located externally on the premises.

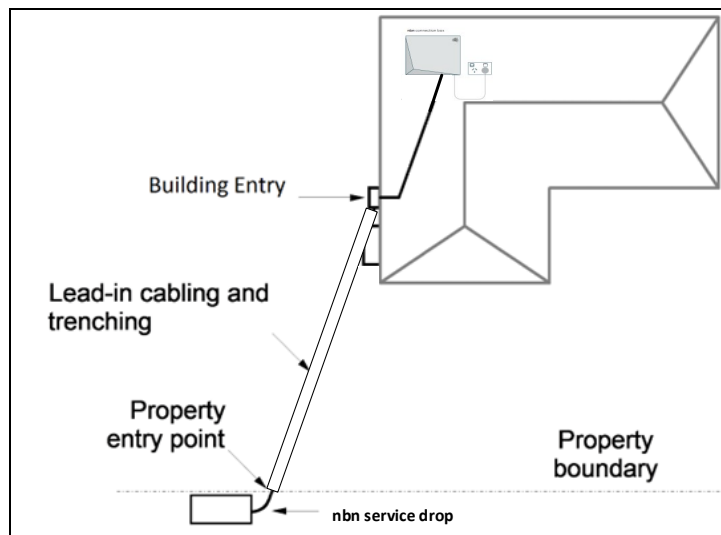


Figure 1. Lead-in conduit

On new estates, the developer will have provided a marking tag in the street network pit servicing the lot, to help locate the developer's starter pipe.

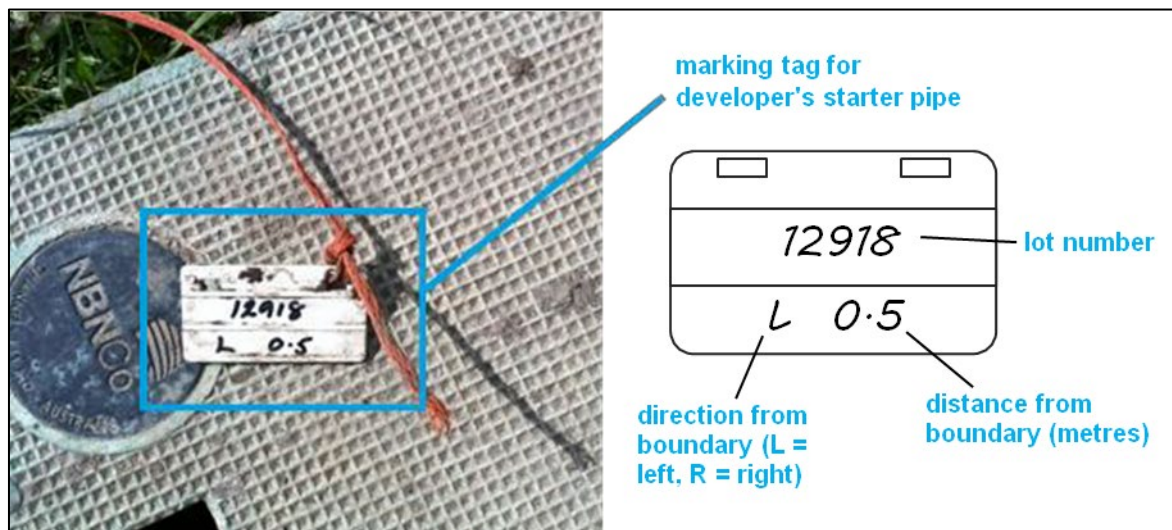


Figure 2. Marking tag example



For duplex or triplex developments, the LIC must have clear access from the property boundary directly to the PCD or NTD location for each dwelling. A LIC cannot traverse a neighbour's property.

The LIC must conform to the requirements in Table 3. LIC requirements, below:

Table 3. LIC requirements

Type	<ul style="list-style-type: none"> SDU: nominal P20 (23mm ID; 26.6mm to 26.8mm OD) white PVC-U telecommunications conduit, compliant with [3] <i>AS/NZS 1477 PVC pipes and fittings for pressure applications</i>.
Installation	<ul style="list-style-type: none"> Minimum depth of cover below finished ground level: 300mm. Maximum depth of cover below finished ground level: 500mm. Covering: all excavation work performed as part of installing the LIC shall be backfilled with suitable fill, compacted and reinstated to match the surrounding area. Increase minimum depth of cover to 450mm for any service drop conduits planned to pass under a driveway.
Bend angles	<ul style="list-style-type: none"> Minimum radius: 300mm underground and 100mm above ground. Maximum individual bend angle: 90 degrees. Maximum total (cumulative) bend angles: 270 degrees (this is taken from the pit to the LIC end at the PCD/NTD location)>
Drawstring	Installed in the P20 LIC from the street network pit and exiting at the premises end.
Draw rope	Installed in the P50 or P100 LIC for MDUs from the street network pit to the communications room or cupboard.
Seals	Temporarily seal at premises end during construction activity to avoid debris entering and blocking the conduit.
Connection	Connected to the developer's service drop conduit from the pit on the footway, as shown in the LIC installation (in the footings option).

5.1 Alternative lead-in

nbn reserves the right to allow nbn Delivery Partners or nbn technicians to connect the property by an alternative method or route other than the Developer / owner installed LIC as required above.

An alternative lead-in method may be provisioned by nbn or the nbn Delivery Partner to minimise remediation of the nbn® network.



The alternative lead-in does not remove the requirement for the provision of a LIC by the Developer/builder or property owner.

6 Pathway and space requirements

Depending on the technology being deployed i.e. FTTP, FTTN, or HFC, nbn will require external wall space to be provided at the building entry point for:

- a PCD for FTTP and HFC
- an NTD for FTTN

Note: For FTTN and HFC connections, ensure there is sufficient space and clearance to also allow for the future installation of an nbn utility device such as FTTP PCD to replace the FTTN NTD or HFC PCD.

nbn® devices should not be placed directly below electrical switchboards.

6.1 FTTP PCD installation requirements

6.1.1 PCD clearances

Table 4 describes the minimum clearances required for PCD installation.

Table 4. PCD clearances

From	Clearance
Ground to bottom of PCD	400mm minimum
Ground to top of PCD	1.8m maximum
Ground of elevated balcony to top of PCD	1.8m maximum
Other devices, fixtures, or structures (including roof eave)	150mm minimum except when placed directly above a telecommunications box. Note: all other clearances still need to be maintained.
In front of PCD	Mandatory 1m if opposite a switchboard. 900mm minimum working clearance from the front surface of the device to any permanent fixture (1m or greater preferred).
Heater or air conditioning unit	500mm minimum
Fence enclosing a pool or other body of water or adjacent land parcel	900mm minimum
Gas meter - enclosed	500mm minimum
Gas meter – unenclosed	500mm minimum
Exchangeable gas cylinder	Refer to Figure 41. Gas cylinder clearances – 360° view and Figure 42. Gas cylinder clearances – side view against a wall.

From	Clearance
In-situ gas cylinder	Refer to Figure 41. Gas cylinder clearances – 360° view and Figure 42. Gas cylinder clearances – side view against a wall.
Any power source	150mm minimum
Water pipes, taps or meters	150mm minimum

6.1.2 Ground clearances

The PCD must be installed no lower than 400mm from the bottom of the PCD to the ground and should be installed no higher than 1.8m from the top of the PCD to the ground.

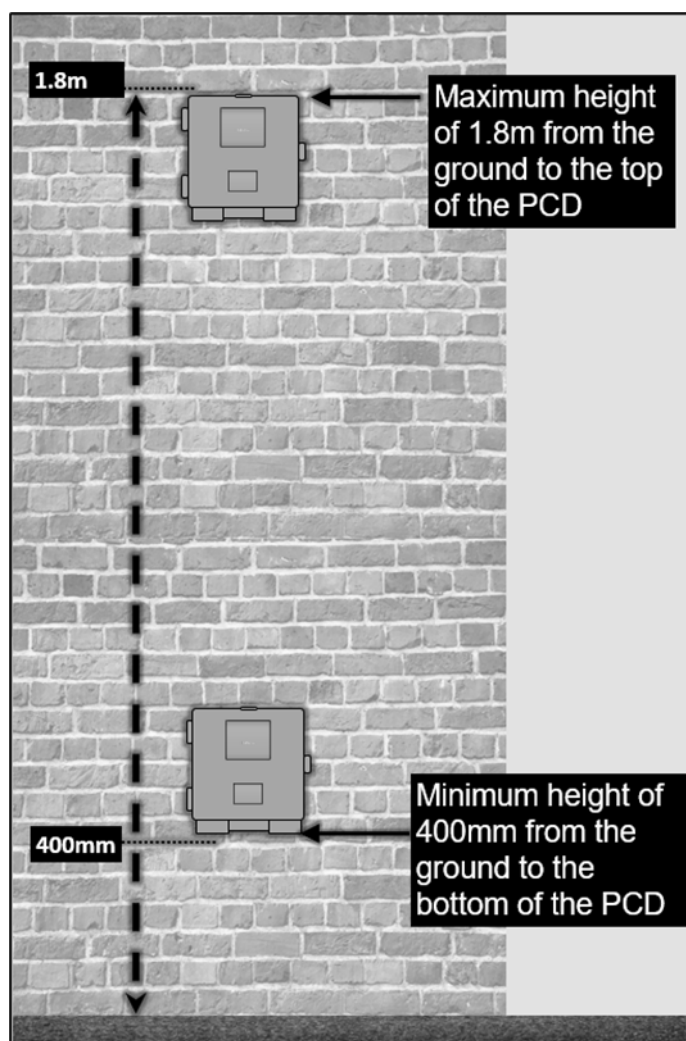


Figure 3. PCD ground clearances

Where a PCD is required to be installed and accessed from an elevated balcony, the following requirements must be met:

- g. The height must not exceed 1.8m from the elevated balcony finished floor level (FFL) to the top of the PCD.
- h. The worker installing or accessing the PCD must be able to remain wholly within the balcony without leaning out.
- i. The PCD must be accessible using a ladder that can be safely located, secured, and used by one person.

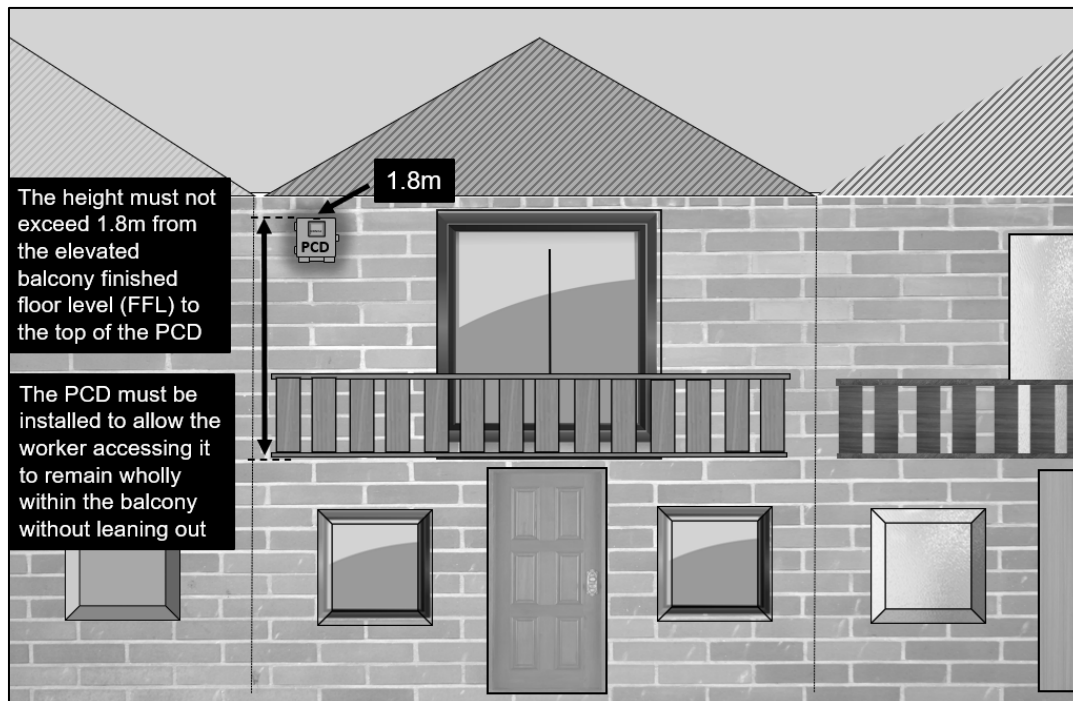


Figure 4. PCD ground clearances on an elevated balcony

6.1.3 PCD enclosure clearances

The following minimum clearances must be maintained from the PCD device:

- 150mm from the top (including between the PCD and a roof eave)
- 150mm from the right-hand side (RHS)
- 150mm from the left-hand side (LHS), or hinged side, to allow the door to open to at least 90 degrees
- 400mm from the bottom
- 500mm from a heater or air conditioner
- 1m working clearance from the front of the PCD if possible, and mandatory when placed opposite a switchboard.
- 900mm between a PCD and a fence enclosing a pool or other body of water or adjacent land parcel

Note: Refer to local authority requirements and [6] AS 1926.1 *Swimming pool safety, Part 1: Safety barriers for swimming pools*, and [7] AS 1926.2 *Swimming pool safety, Part 2: Location of safety barriers for swimming pools*.

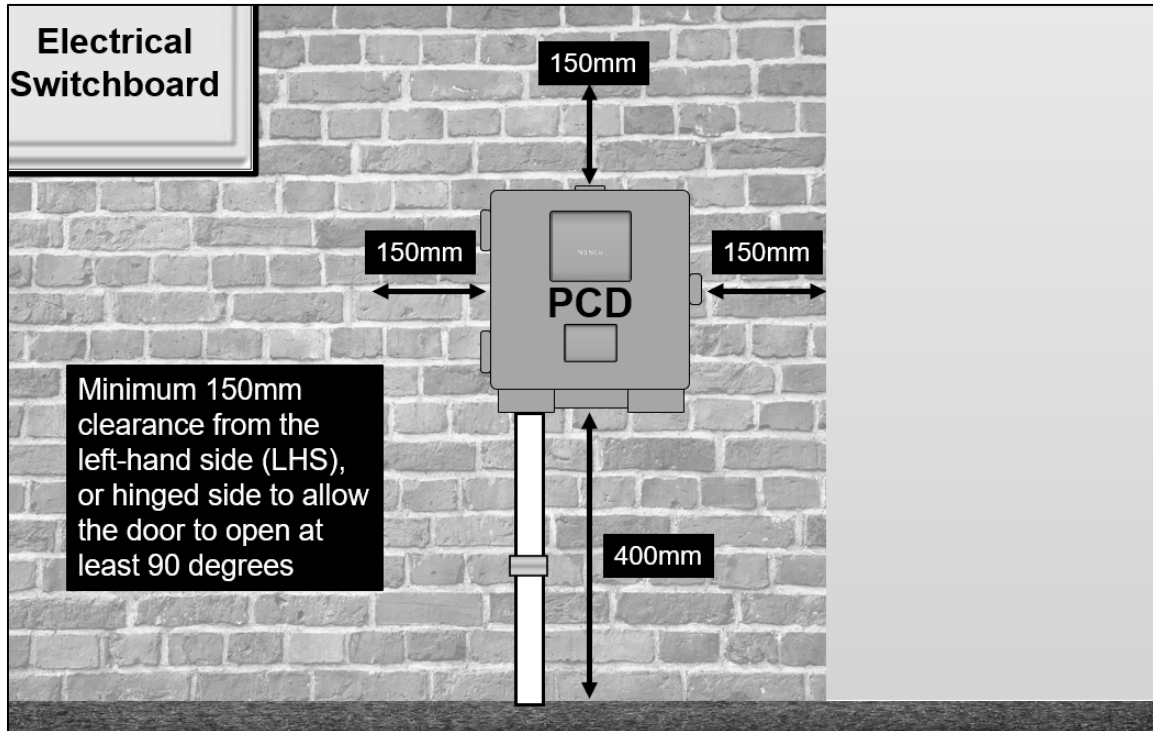


Figure 5. PCD clearances on an external wall surface (sides, top and bottom)

6.1.4 Conduit alignment with PCD from below

When determining the PCD's location, ensure that the LIC and internal conduit ends are positioned below the PCD. The LIC and internal conduit shall use separate entry ports into the PCD.

For examples of conduit alignment, refer to Figure 6 and Figure 7.

For Madison and Corning PCDs:

- The LIC aligns with either the left or right entry points of the PCD.
- The internal conduit aligns with the PCD's vacant port not used by the LIC.

For TE/CommScope PCD:

- The LIC aligns with the left entry point of the PCD.
- The internal conduit aligns with the right entry point of the PCD

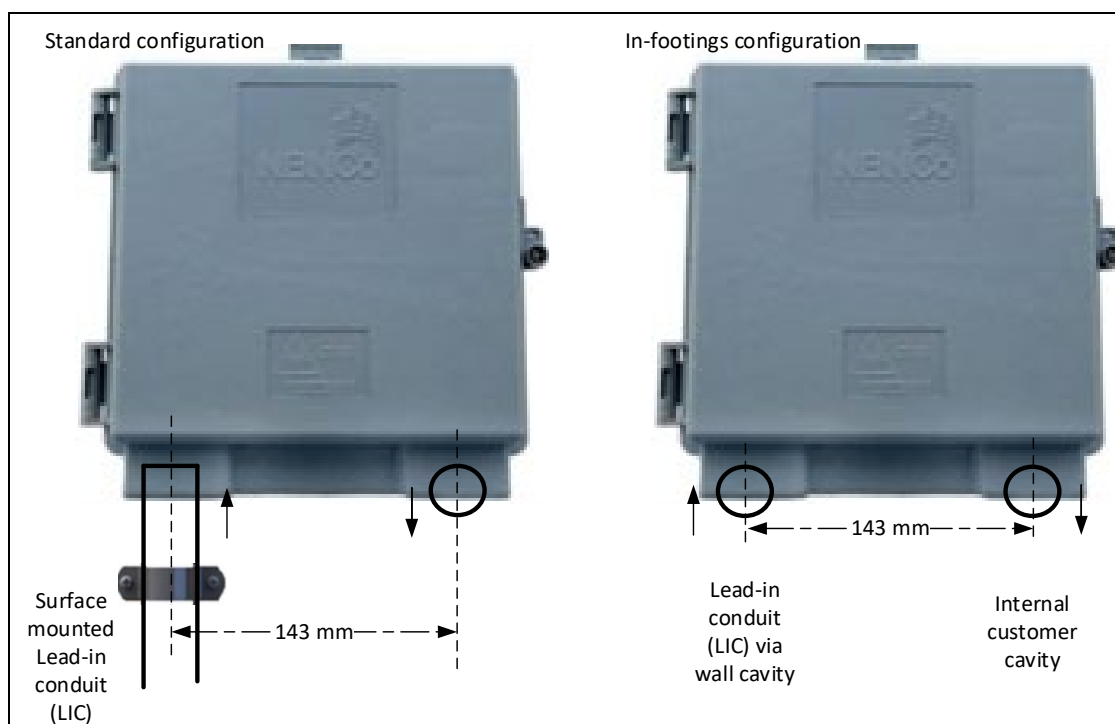


Figure 6. FFTP conduit alignment (left hand side example) with Madison PCD

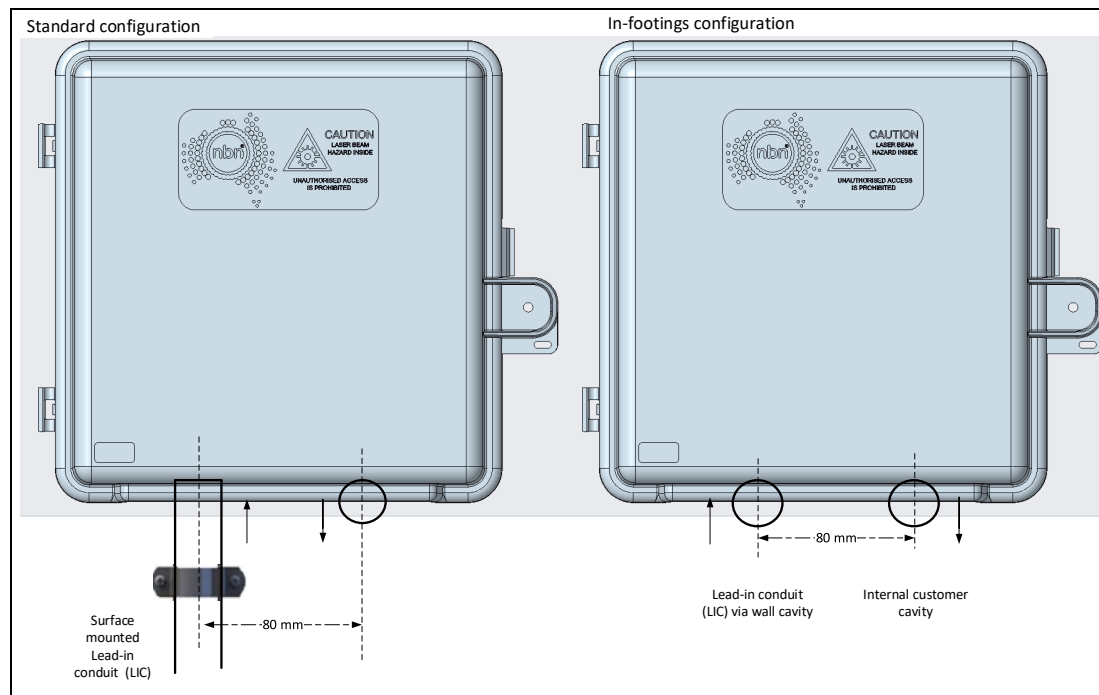


Figure 7. FFTP conduit alignment (left hand side example) with Corning PCD

6.1.5 Building Entry Point to PCD location

Note: Any penetration/conduit which acts an entry pathway for nbn® cabling into a building, must be sealed in accordance with the relevant State building code and any additional requirements for bush fire zones.

6.2 FTTN NTD installation requirements

- The LIC must align with the NTD's left hand side cable entry.
- The internal conduit must align with the NTD's right hand side cable entry.

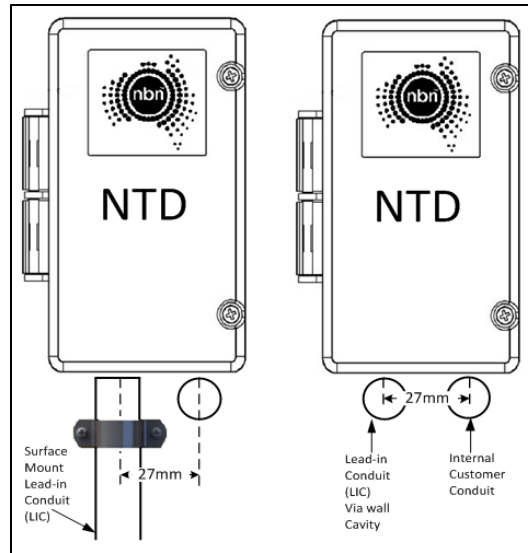


Figure 8. FTTN conduit alignment with NTD

Table 5. NTD installation requirements

External space requirement	<ul style="list-style-type: none"> • Width: 91mm • Height: 134mm • Depth: 27mm • Additional 150mm to left of NTD (to allow for open door)
Installation height	<p>Measured from finished ground level to bottom of NTD:</p> <ul style="list-style-type: none"> • minimum: 400mm and maximum: 1500mm <p>Important: Only exceed the minimum installation height when allowing for a service that requires more space at ground level (e.g. gas meter and regulator assemblies). Refer to Section 6.4 Variations on requirements</p>
Minimum clearances (measured from outer edges of NTD)	<ul style="list-style-type: none"> • 150mm from fixed services, including pipes, taps • 500mm clearance from gas enclosure or gas meter • Outside exclusion zones around gas regulator/boxes and enclosures, and gas discharge zones • 1500mm from in-situ refill gas cylinders • 100mm from the corner of the wall • 150mm from an exterior structure, such as a window or balcony
Distance between cable entry ports (conduits)	Minimum: 0mm and maximum: 27mm

6.3 HFC PCD installation requirements

- The LIC aligns with the PCD's left hand side cable entry.
- The internal conduit aligns with the PCD's right hand side cable entry.

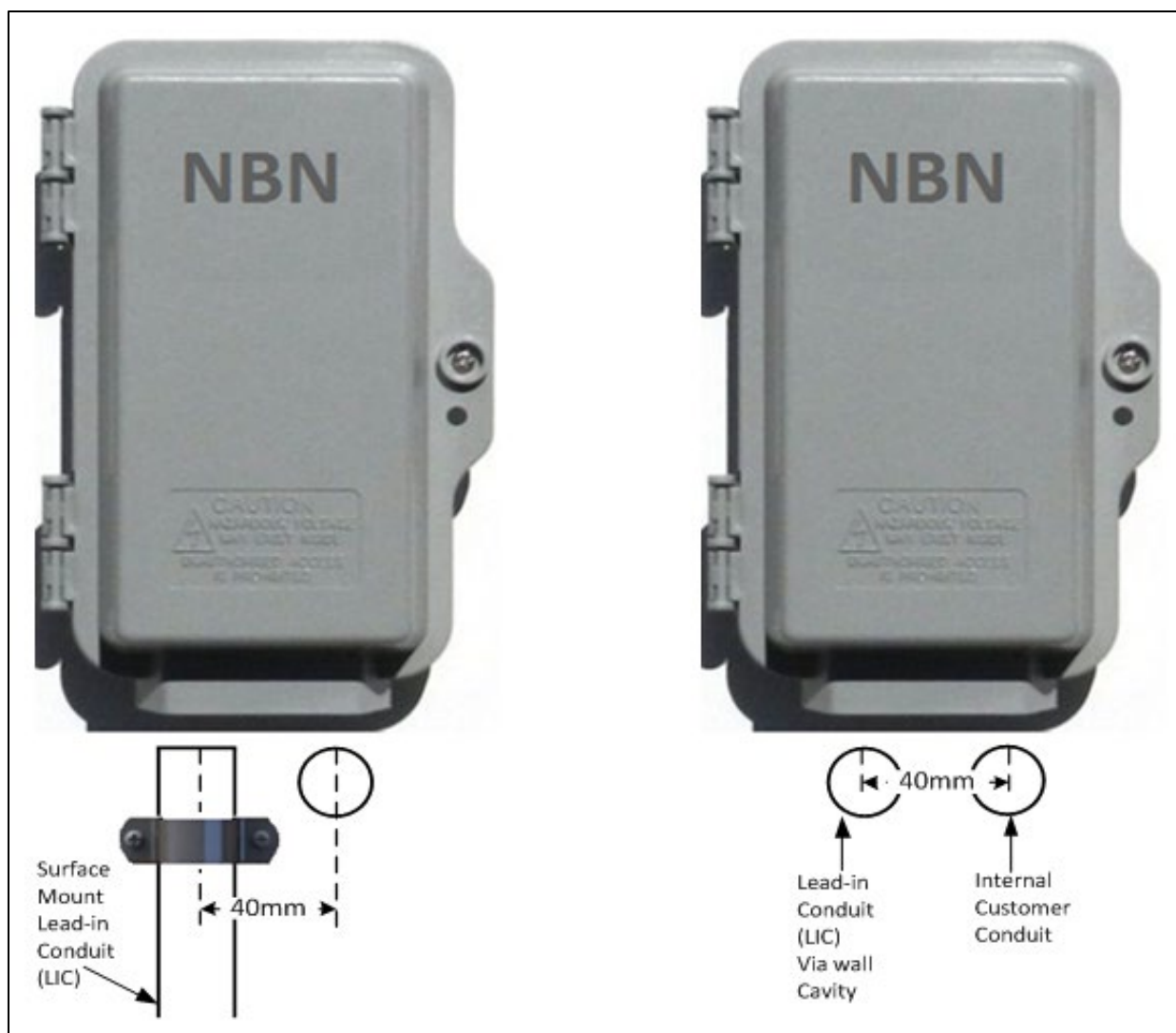


Figure 9. HFC conduit alignment with PCD

Table 6. HFC PCD installation requirements

External space requirement	<ul style="list-style-type: none"> Width: 136mm Height: 215mm Depth: 60mm Additional 150mm to left of NTD (to allow for open door)
Installation height	<p>Measured from finished ground level to bottom of connection device:</p> <ul style="list-style-type: none"> minimum: 400mm and maximum: 1500mm <p>Important: Only exceed the minimum installation height when allowing for a service that requires more space at ground level (e.g. gas meter and regulator assemblies). Refer to Section 6.4 Variations on requirements</p>
Minimum clearances (measured from outer edges of NTD)	<ul style="list-style-type: none"> 150mm from fixed services, including pipes, taps 500mm clearance from gas enclosure or gas meter Outside exclusion zones around gas regulator/boxes and enclosures, and gas discharge zones 1500mm from in-situ refill gas cylinders 100mm from the corner of the wall 150mm from an exterior structure, such as a window or balcony
Distance between cable entry ports (conduits)	Minimum: 0mm and maximum: 50mm

Important:



- nbn has the right to request re-work from the builder if these standards have not been met and the equipment cannot be installed to comply with these specifications.
- nbn has the right to move the PCD to an alternative location as required to meet any alternative installation of the lead-in cable.

6.4 Variations on requirements

Depending on the building type and location of other structures like fencing, the amount of wall space that utilities must share can be very limited.

It is important to consider 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 LIC and the internal conduit. The position of the internal conduit will be difficult to change later in the building cycle (e.g. after the completion of masonry works).

When planning for the alignment of the relationship between the PCD or NTD and the conduits, the placement of the internal conduit may determine the positioning of the LIC.

In many instances, locating the LIC directly under an electrical meter/switchboard may not be practical. It may be better to locate the LIC to either the left or right of the meter/switchboard.

Where space is very limited, consider allowing for higher PCD or NTD 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.



Important: The required clearance for services can vary by region. Check with local utilities for specific requirements.

6.5 Internal conduit requirements

nbn requires an internal conduit to be installed with drawstring from the external PCD/NTD location to the equipment location internally.

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 (e.g. in-wall cisterns), to ensure adequate space for conduit pathways.

Table 7 below describes the internal conduit requirements.

Table 7. Internal conduit requirements

Type	Nominal P20 (23.3mm ID; 26.6 to 26.8mm) OD white PVC-U telecommunications conduit, compliant with <i>AS/NZS 1477:2017 PVC pipes and fittings for pressure applications</i>
Installation	<ul style="list-style-type: none"> • FTTN PCD: 100mm - 140mm separation between the LIC and the internal conduit, aligned on the horizontal plane on the external wall as per 6.1 FTTN PCD installation requirements. • FTTN NTD: 27mm separation measured from the centre of the LIC to the centre of the internal conduit, aligned on the horizontal plane on the external wall as per 6.2 FTTN NTD installation requirements. • HFC PCD: 40mm separation between the LIC and the internal conduit, aligned on the horizontal plane on the external wall as per 6.3 HFC PCD installation requirements. <p>Important: In all situations for FTTN, FTTN and HFC, the following shall apply:</p> <ul style="list-style-type: none"> • The location shall be planned to be outside exclusion zones for hazardous services, such as gas regulator and meter assemblies. • An internal conduit from the PCD location to the customer 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: 100mm • Maximum individual bend angle: 90 degrees • Maximum total (cumulative) bend angles: 270 degrees between accessible draw points <p>Important: Contact nbn for advice on special building types if the number of required bends exceeds these guidelines.</p>
Drawstring	<p>Installed along the length of the conduit:</p> <ul style="list-style-type: none"> • In cavity walls: at the end of the conduit, drawstring must be presented and tagged as 'NBN' for easy identification and location. • For masonry walls: conduit may be chased into the masonry and the end presented to line up with the NTD access penetrations as per the spatial template. • For surface conduit: present as a neat conduit end to line up with the edge of the mounting spatial template provided by the builder.
Joins and bends	All glued with conduit solvent cement and primer.

6.6 Conduits and structural integrity

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

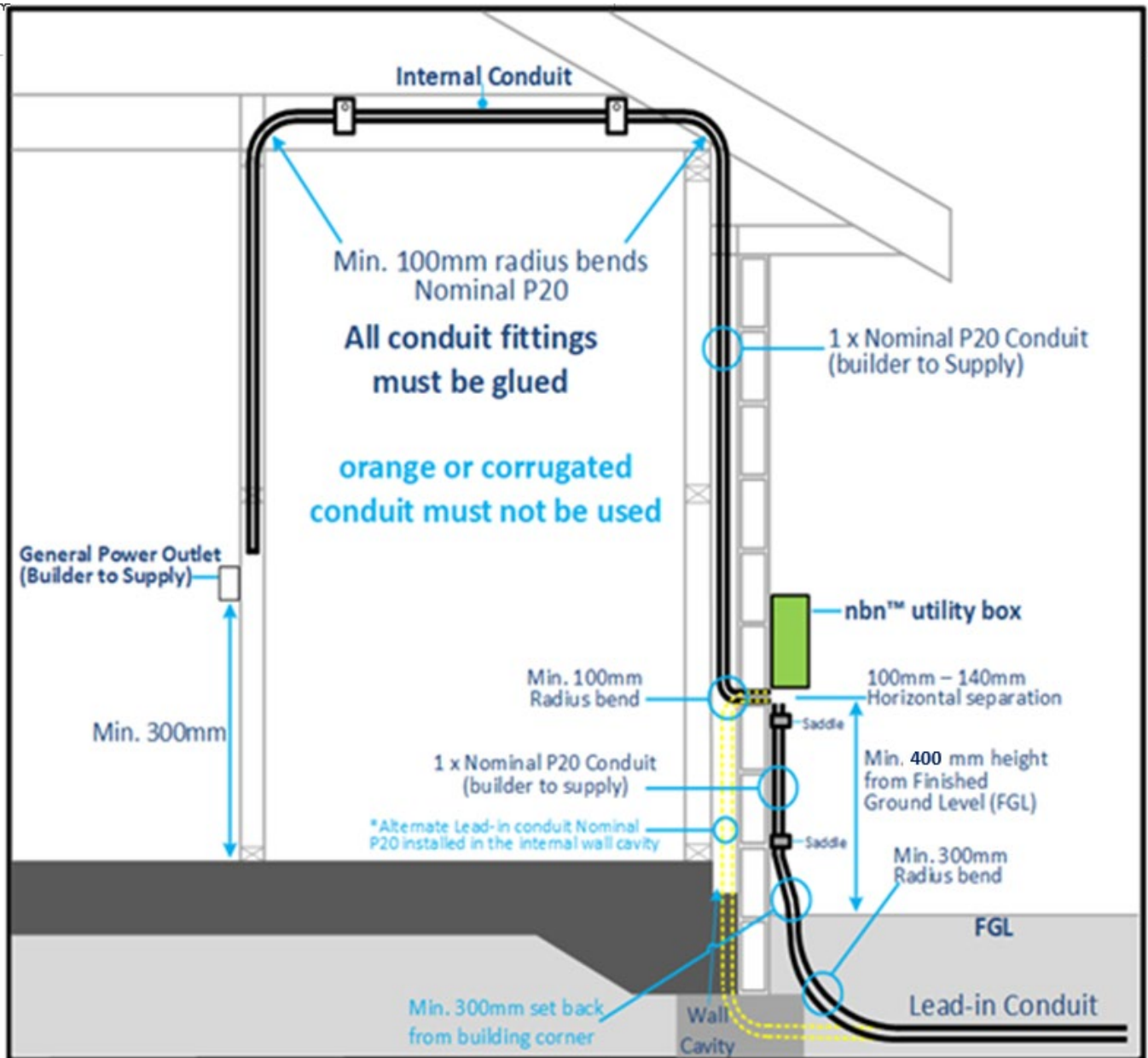


Figure 10. Conduit passing through timber framing

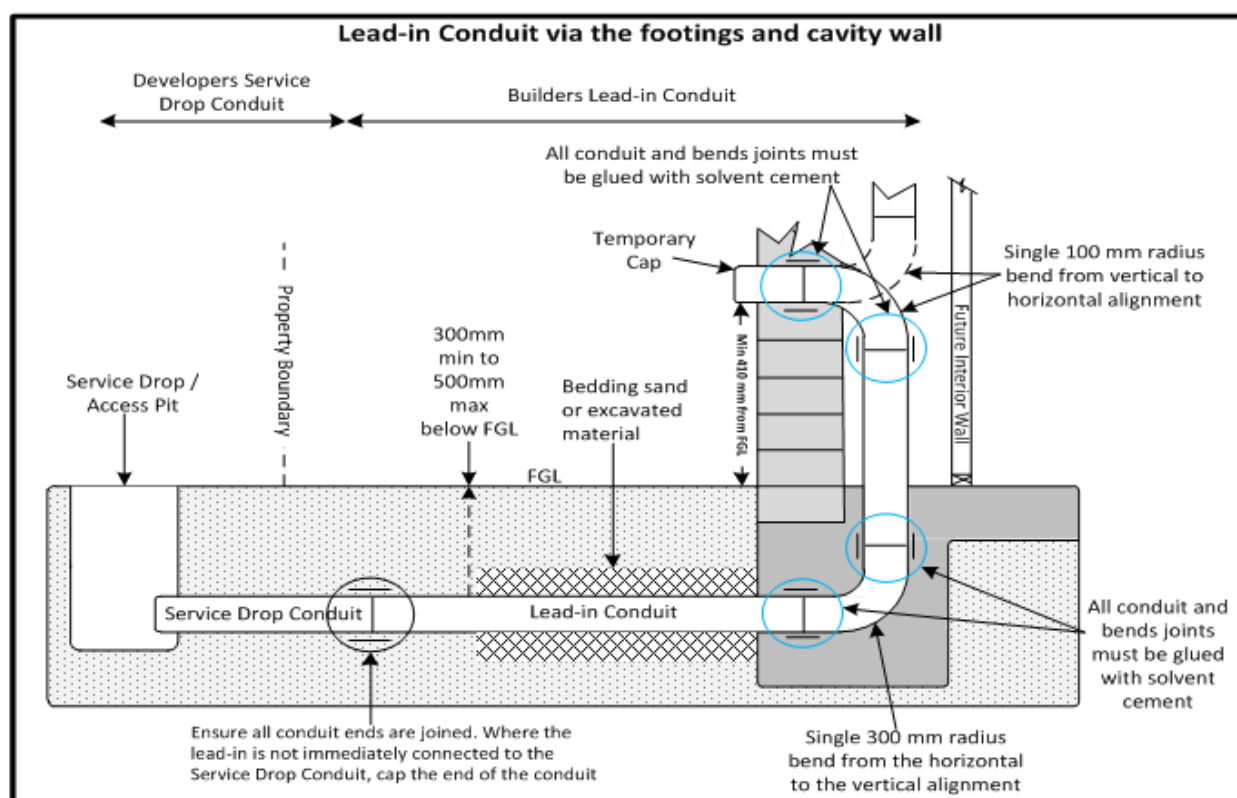


Figure 11. LIC passing through footing and internal cavity wall

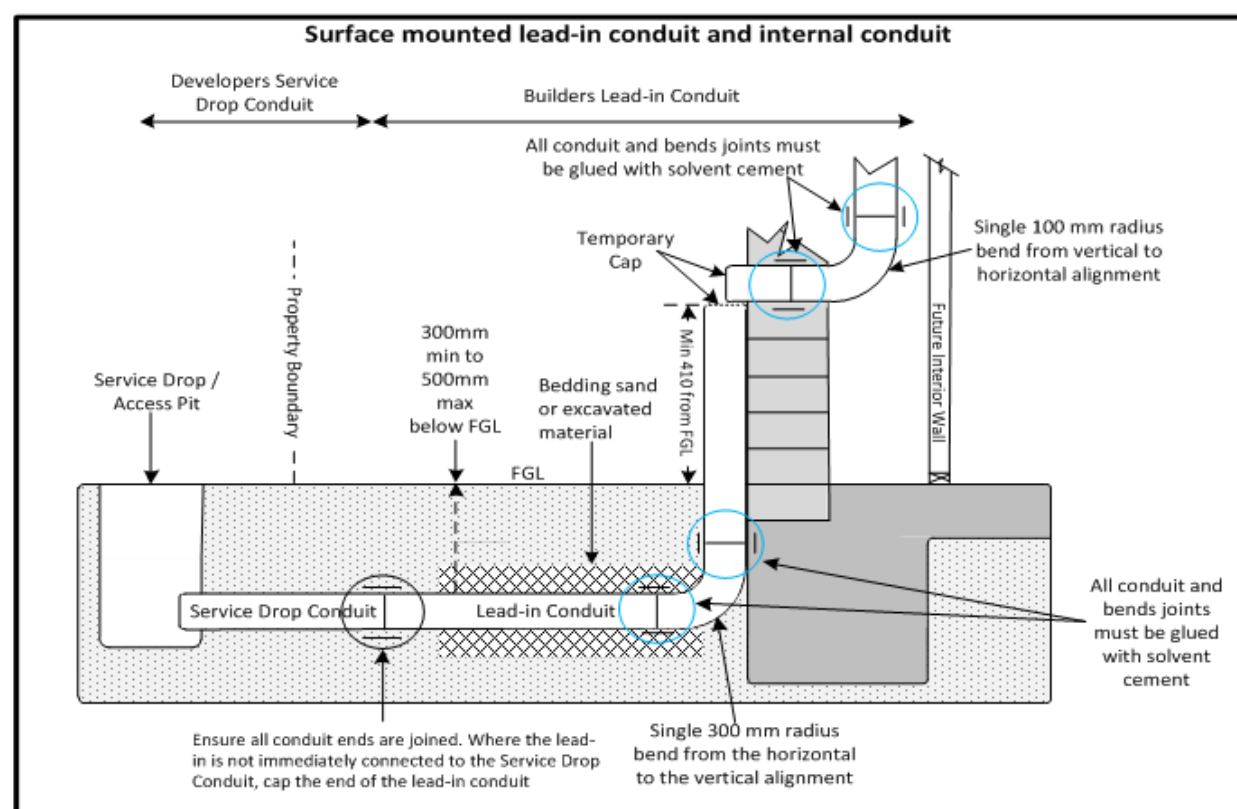


Figure 12. LIC surface mounted and internal conduit

6.7 Outbuildings and granny flats

When building a new dwelling and/or outbuildings (such as a granny flat or assisted living unit), it is important to consider future connectivity needs. To avoid a scenario where there are additional costs or civil work required to connect an outbuilding, nbn requires that a P20 telecommunication conduit is deployed between the PCD location on the main dwelling, and a PCD location on the outbuilding.

This applies in situations where the property is on the same land title. Any properties that are subdivided and where buildings are (or will be) on separate land title should build a direct lead-in per section 5 Lead-in requirements.

7 nbn® FTTTP equipment inside the premises

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

This section provides guidance for the three (3) types of acceptable locations for the installation of nbn® equipment.

Network equipment installed by nbn requires the following:

- a. a mains power outlet (GPO) This must be a dedicated socket for the exclusive use of nbn® PSU. The power supply plug must connect directly to the socket.
- b. a location that:
 - i. protects the integrity of the equipment for long-term use
 - ii. must be adequately ventilated (refer to 7.5 Ventilation requirements, for further information)
 - iii. allows for a straightforward upgrade of the components over the life of the building
- c. enough space within the location to install the equipment so it can be readily:
 - i. accessed by the occupants of the premises
 - ii. serviced by technicians

This location will be the point to which the internal conduit from the PCD/NTD will transit and the point at which any customer cabling will connect/interface.

7.1 Location options



Important: Information for builders and homeowners to optimise use of the nbn® network, including considerations for Wi-Fi router location, structured cabling and other factors, is available online at: <https://www.nbnco.com.au/learn/optimisation>.

Builders and building owners must make one of the following locations available for the installation of nbn® equipment.

Table 8. Location options for housing of the NTD

Location	Description
Open wall areas (recommended)	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.

Location	Description
	Home distributors need ventilation to be added to the design to improve the air circulation.
	Note: To ensure optimum performance of Wi-Fi devices within the premises, it is generally recommended that a Wi-Fi router or gateway is NOT installed within an enclosure or home distributor and is instead installed in a centralised location.

Important: When determining the location of the nbn® equipment, builders should consider the intended use of the premises in terms of accessibility, safety and aesthetics.

For example:



- make sure that equipment is easily accessible to people with restricted mobility, but out of normal reach of children and pets.
- if structured cabling is provided, there should be sufficient cabling to enable a Wi-Fi router or gateway to be either collocated with the NTD or installed in a separate location (which may require 2 or more separate ports at multiple wall outlets).

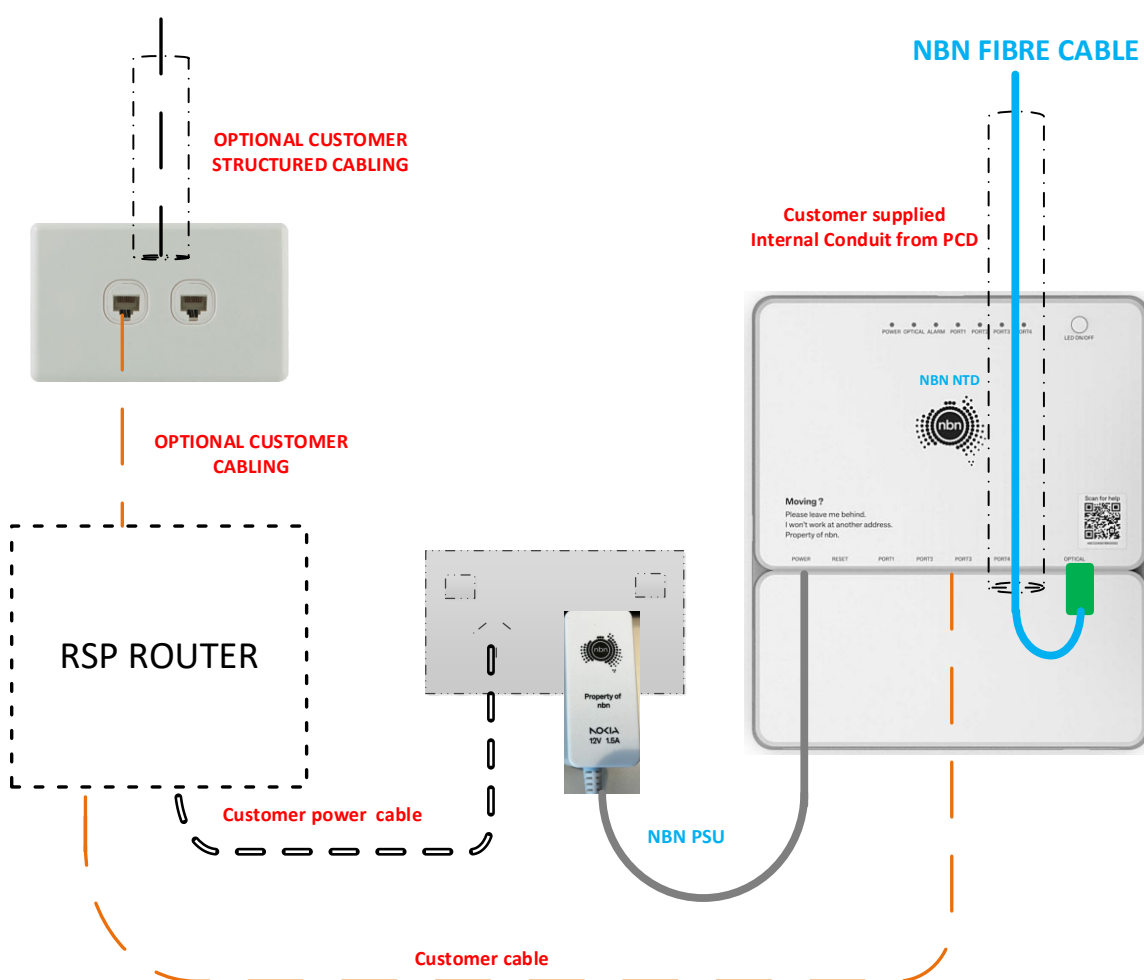


Figure 13. Example schematic of nbn® equipment within the premises with direct connections to RSP router/modem

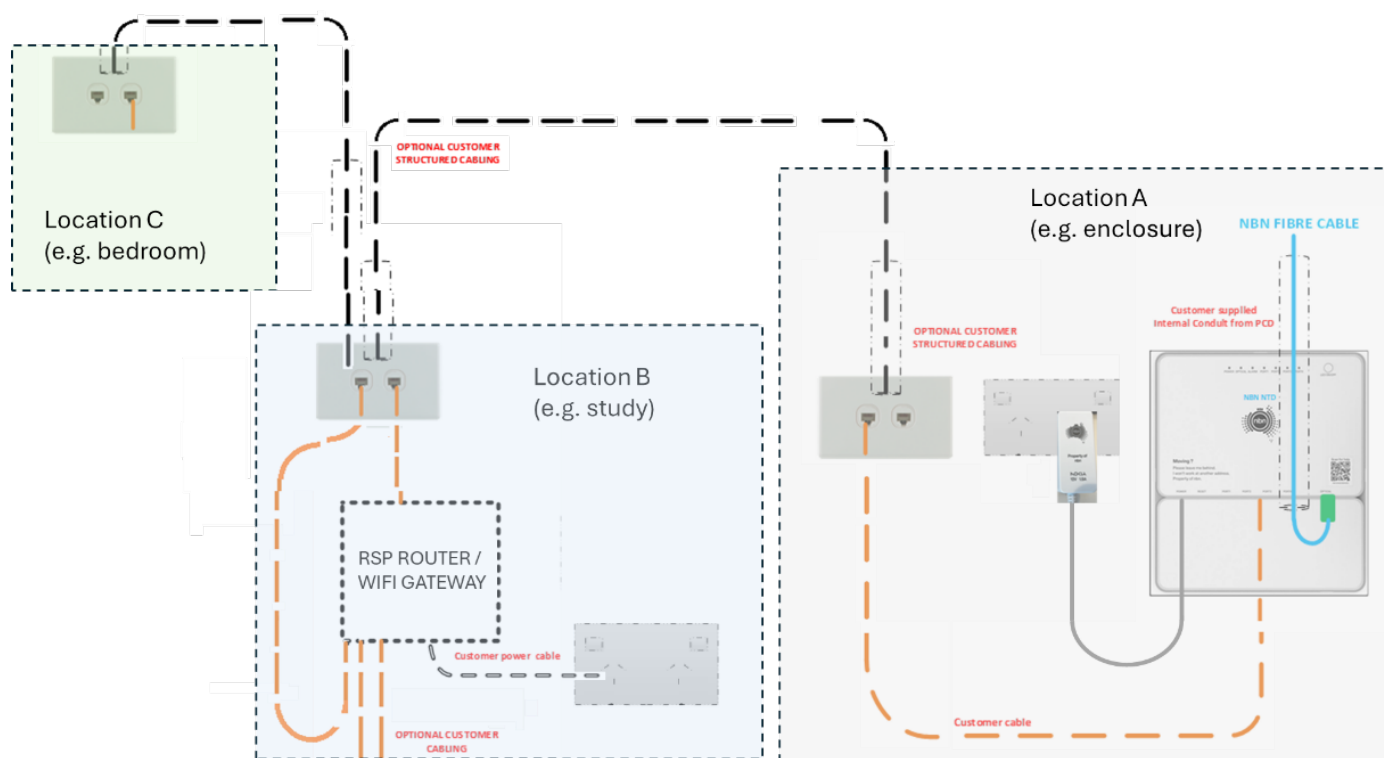


Figure 14. Example schematic of nbn® equipment within the Premises with connections to customer cabling and RSP router / modem

For additional information on customer cabling, refer to section 9 Customer cabling.

7.2 FTTP NTD

The NTD is part of the nbn® FTTP equipment installed by nbn.

The NTD provides User Network Interface (UNI) ports that enable access to data (internet) services via an RSP modem, which the premises occupant orders from an ISP or RSP.

nbn has two current NTD models: a variant with one UNI-D port, and a variant with four UNI-D ports (both variants are supplied by two vendors).

Standard installations will use the 1-port variant. The new 4-port NTD will be deployed as required for services ordered through a Retail Service Provider (RSP), for example where a customer requests multiple services.

nbn previously used a legacy 4-port FTTP NTD device, which has been replaced by the two current variants.



Figure 15. Legacy FTTP NTD

To activate any nbn® service, the occupant must contact an RSP of their choice. The RSP will provide services (and possibly additional equipment) to allow the occupant to access the nbn® network.



Figure 16. FTTP 1-port NTD



Figure 17. FTTP 4-port NTD

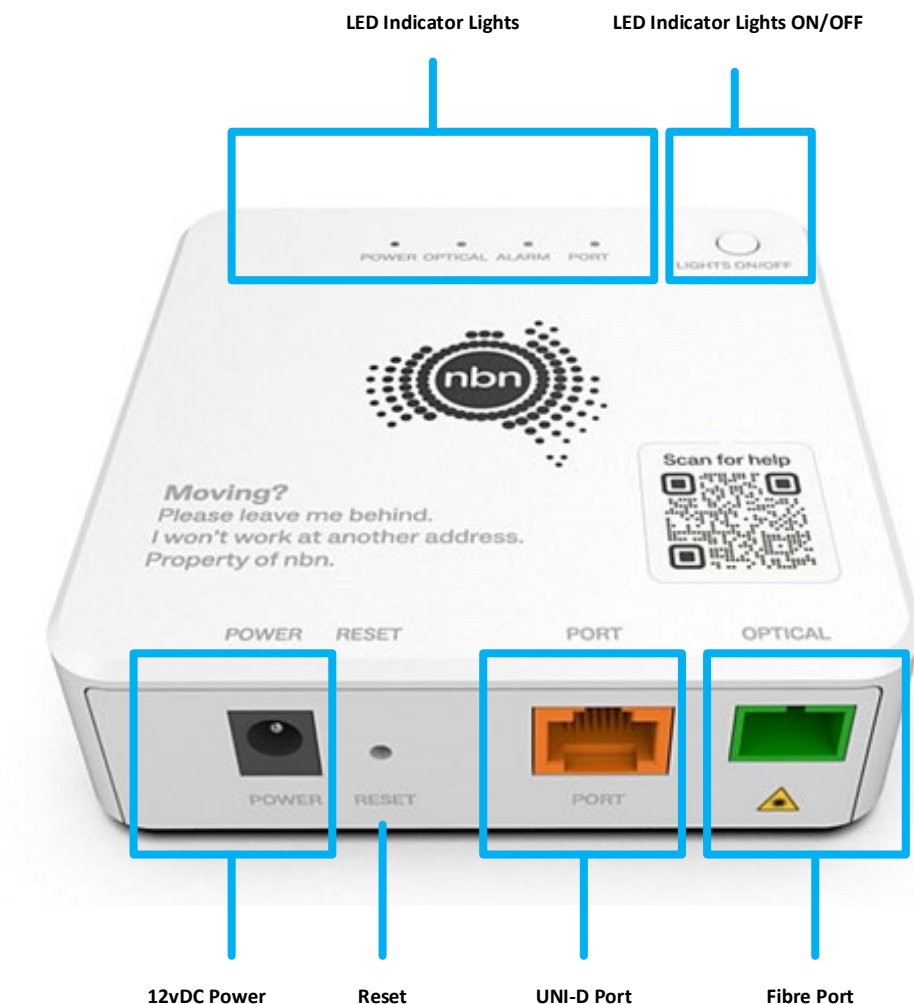


Figure 18. FTTP NTD - single UNI-D port

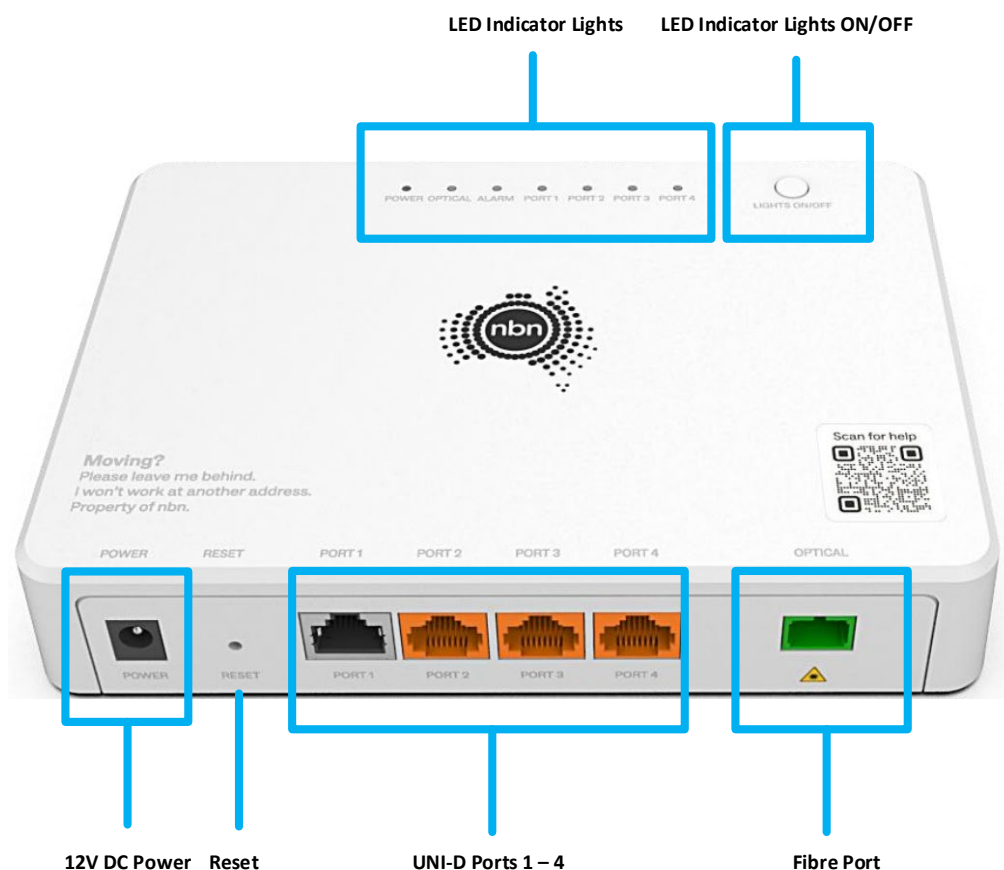


Figure 19. FTTP NTD - 4 UNI-D Port

Both NTDs are supplied with a wall mount bracket and a single PSU (12V DC, 2 PIN 1.5A power lead 1.5m in length).



Figure 20. FTTP NTD 12V DC PSU

Wall mount brackets cover the wall penetration for the incoming fibre-optic cable and provide cable management for the PSU lead and ethernet cabling.

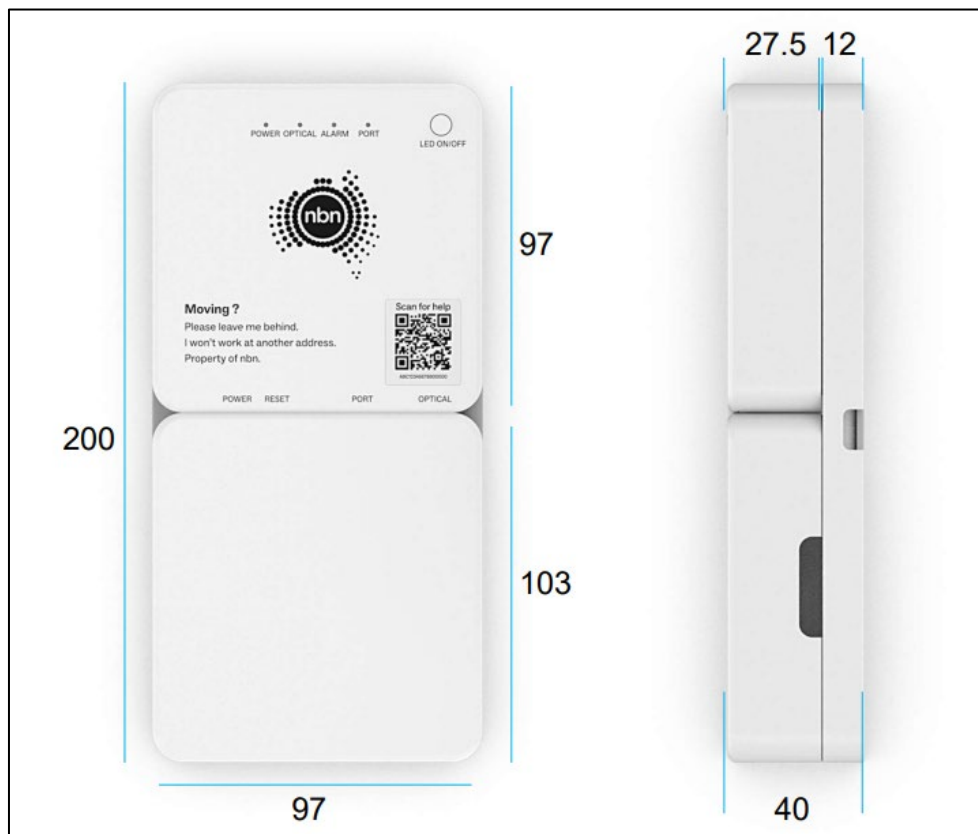


Figure 21. 1-port FTTP NTD and wall mount bracket dimensions

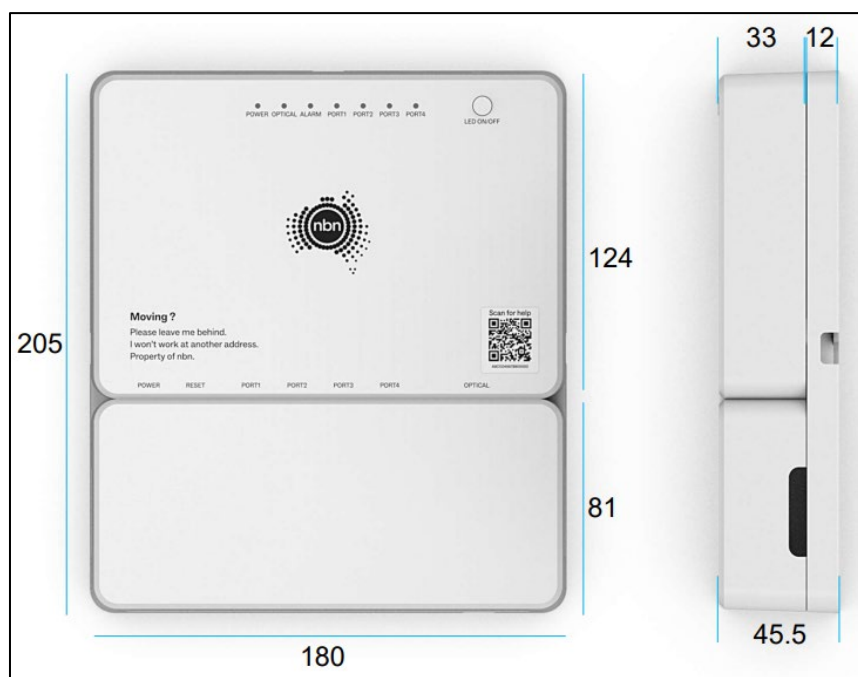


Figure 22. 4-port FTTP NTD and wall mount bracket dimensions

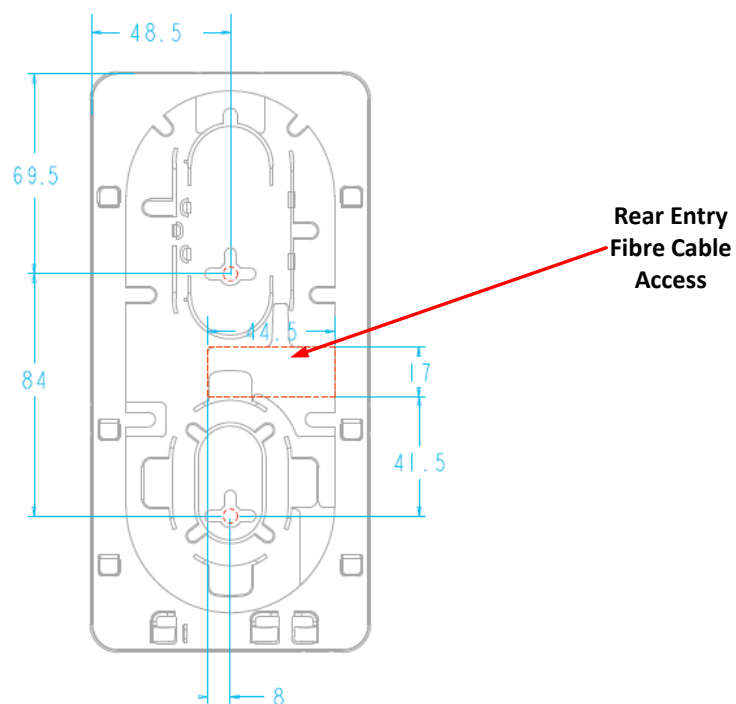


Figure 23. 1-port NTD wall mount bracket dimensions and rear access

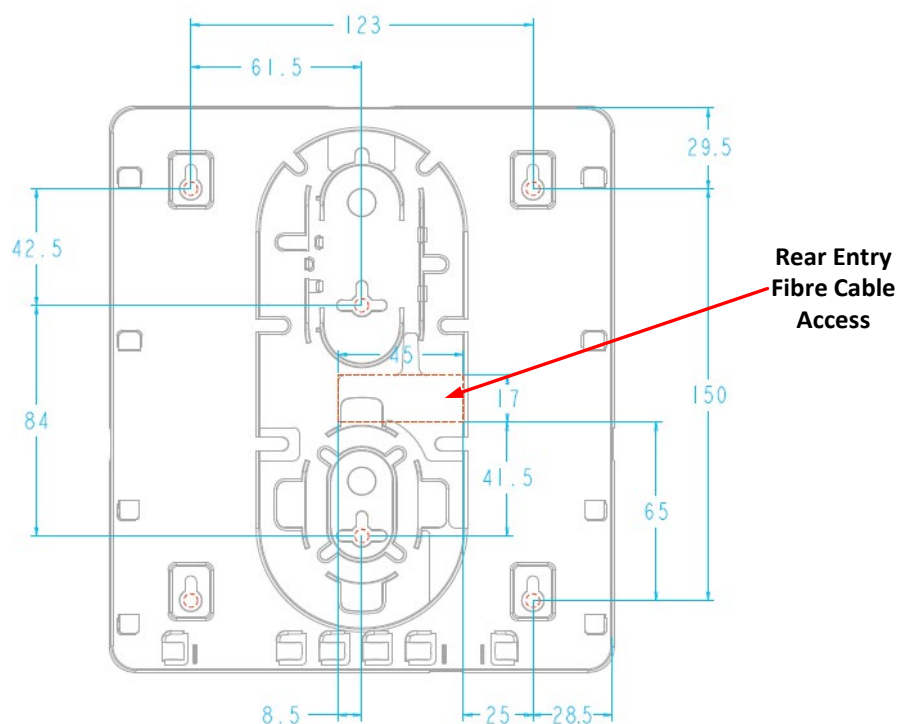


Figure 24. 4-port NTD wall mount bracket dimensions and rear access

7.3 NTD Equipment templates

Minimum clearances must be maintained to allow for installation and maintenance of the NTD.

Two sets of layout examples are provided below. They are split into ‘NTD only’ (i.e. without Fibre TV deployment) and ‘NTD and Fibre TV’ (i.e. with Fibre TV deployment). Both sets are available in landscape or portrait and include spatial provisions for customer cabling, data face plates, double GPO outlets, Fibre TV receivers (Fibre TV layouts only), and future nbn® fibre wall outlets (FWO).

Either a landscape or portrait layout can be applied.

The sizes shown are the minimum footprints that can accommodate a 4-port NTD. This footprint must be used for the smaller 1-port NTD to accommodate a potential future upgrade to a 4-port NTD. In both layouts, the NTD and enclosure must be mounted with the NTD LED Indicators at the top, as shown in Figure 25.



Figure 25. NTD orientation

All clearances and dimensions below are in mm.

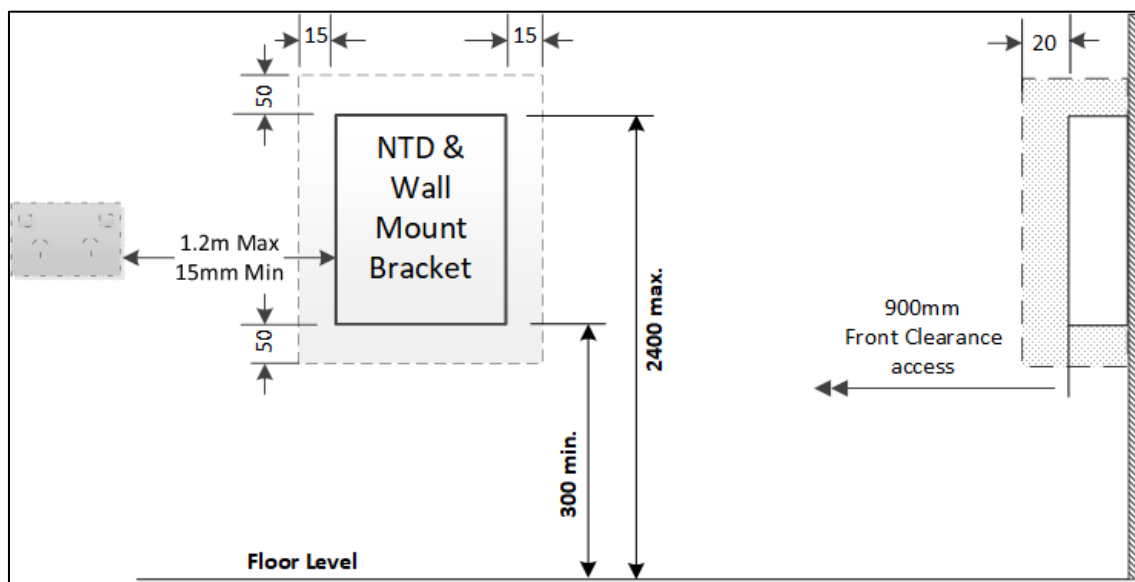


Figure 26. NTD clearances and minimum / maximum height schematic

7.3.1 NTD only

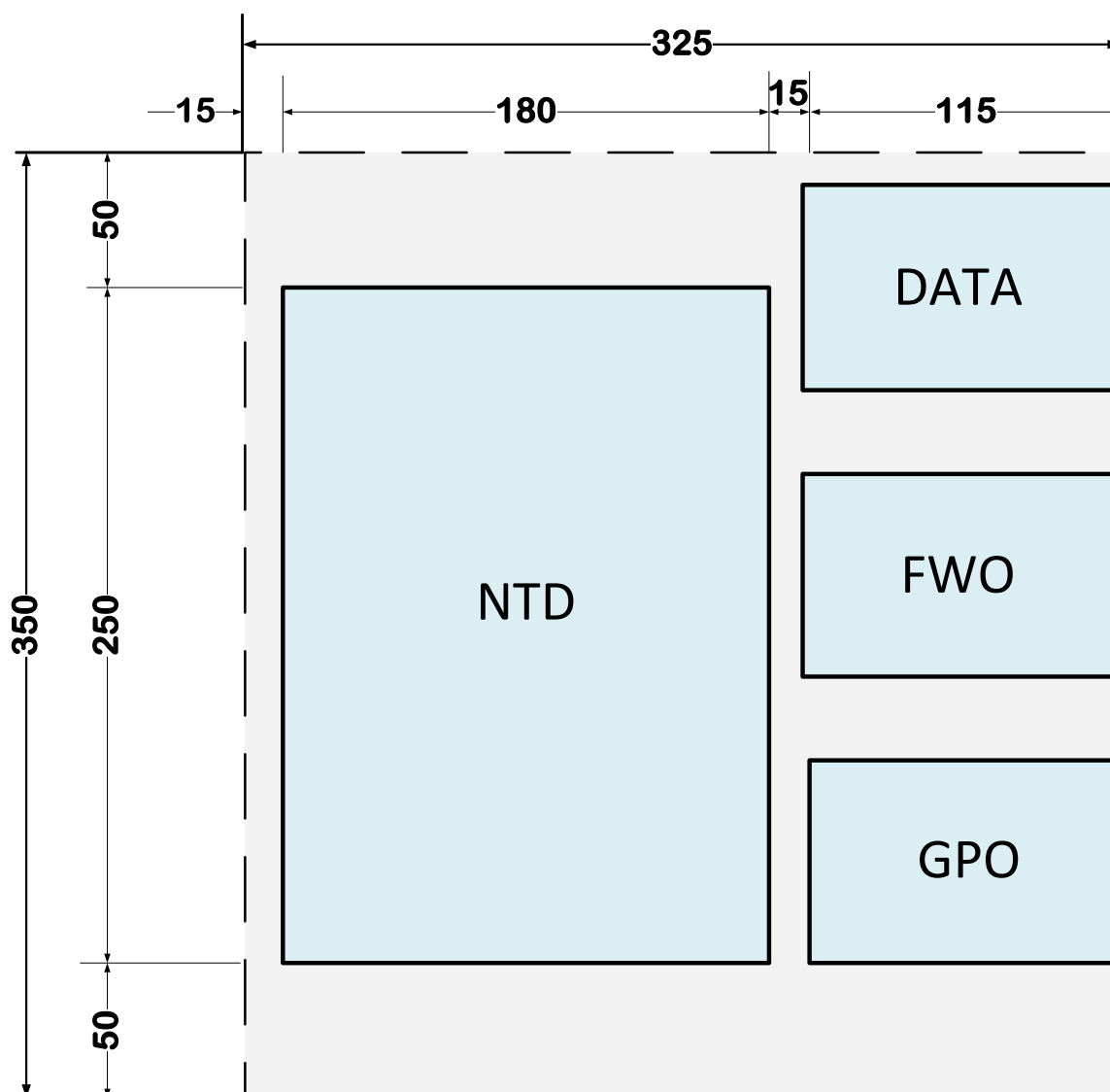


Figure 27. NTD landscape layout orientation (dimensions in mm)

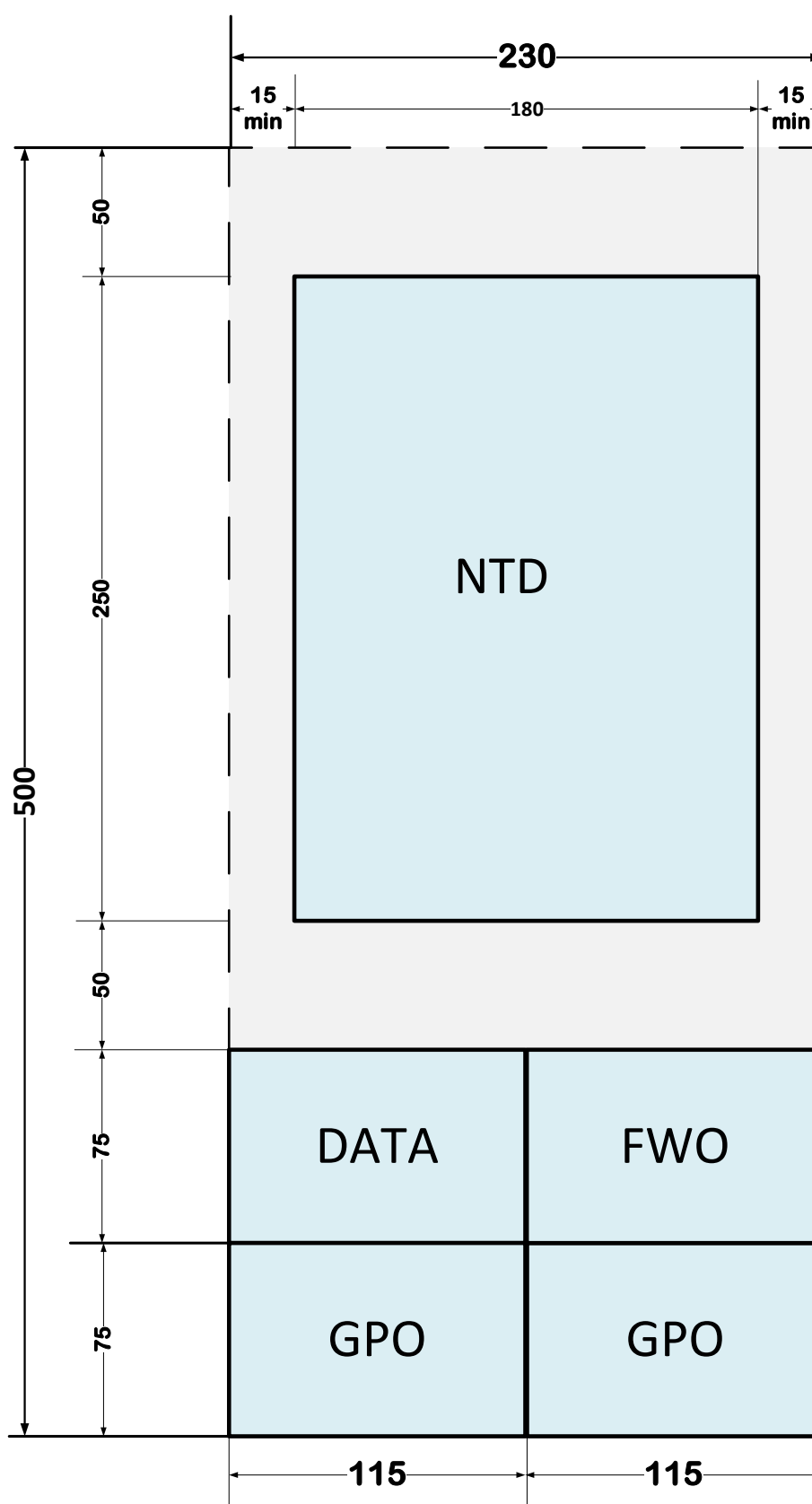


Figure 28. NTD portrait layout orientation (dimensions in mm)

7.3.2 NTD and Fibre TV

The following or larger layouts shall be applied with 1 or 4-port NTDs when Fibre TV is to be included in the development.

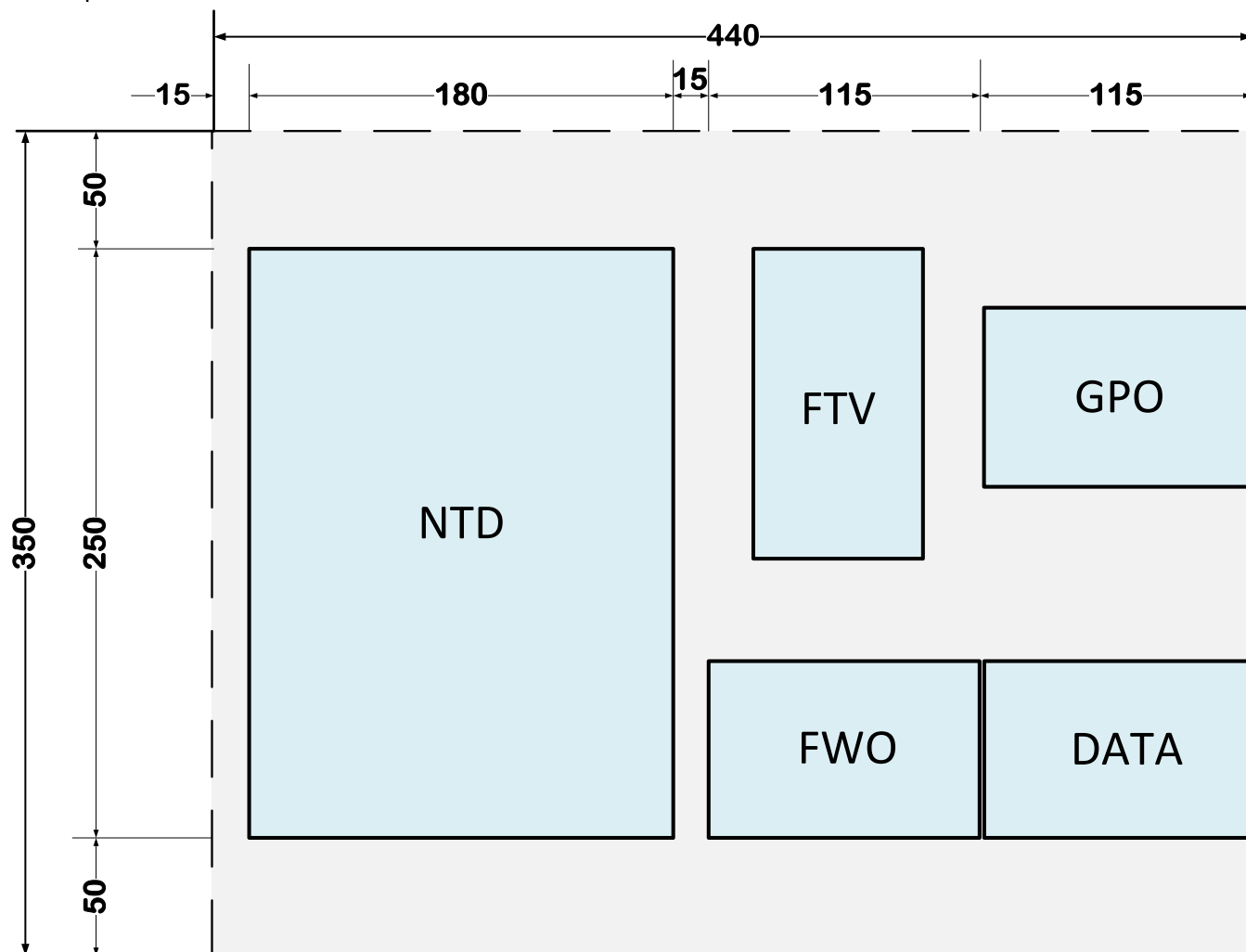


Figure 29. Fibre TV and NTD - landscape layout orientation (dimensions in mm)

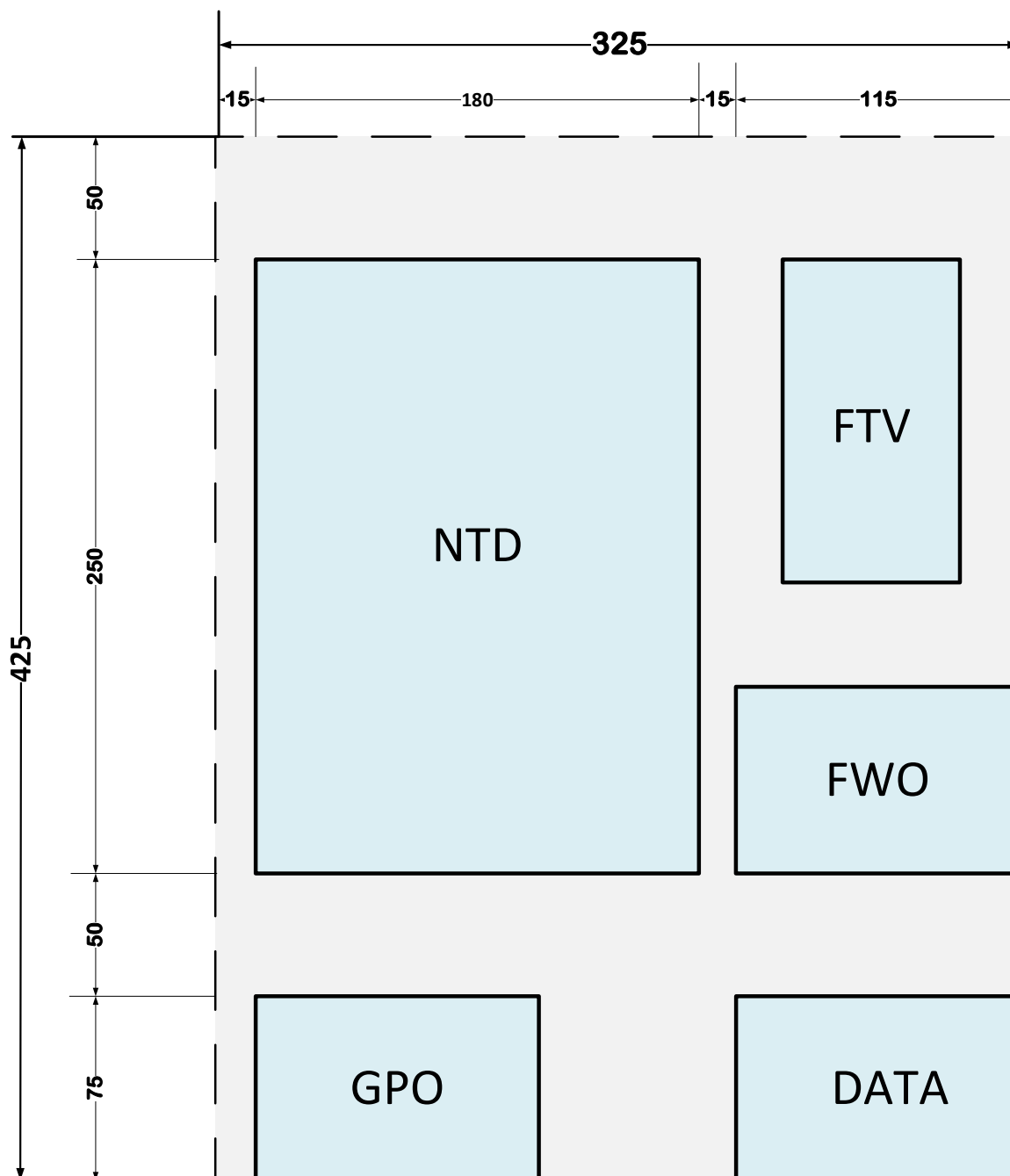


Figure 30. Fibre TV and NTD - Portrait layout orientation (dimensions in mm)

Installation of GPOs Data cabling faceplates and Fibre TV Units shall maintain clearances from the 4 port NTD Footprint even on the installation of a 1-port NTD.

Note: Larger areas can be used.

A GPO is required to power each NTD installation. Double GPOs are recommended.

All power provisioned for nbn® equipment must meet the requirements in [8] *AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)*.

A second double GPO is recommended for developments with Fibre TV, so that one socket is available for customer devices (such as an internet router) and may be positioned anywhere adjacent to the perimeter of

the equipment template and as close as practical to it, in accordance with wiring standards. The electrician should avoid mixing power cabling with data, telephone, radio frequency (RF) and fibre in the same vertical corridor.

In scenarios where only two GPO are available, a double adaptor or power board may be used to provide power to the nbn® NTD and/or Fibre TV equipment. However, where at all possible this should be avoided to prevent accidental disconnection.

Secondary GPOs must be located within 200mm of the nbn® equipment template.

The Fibre Wall Outlet (FWO) footprint within the NTD equipment template, has been allocated to allow for future build changes by nbn.

The Fibre TV unit is included within the NTD equipment templates.

Space has been allocated within the dimensions of the equipment templates for one data wall plate/socket.

7.4 NTD Installation locations

The NTD and PSU must be installed:

- a. In a building where people normally live, work or meet, but not in a place that is open to public access.
- b. In the same building as each other.

Note: The end user cabling remains wholly within the same building containing the NTD and PSU.

The NTD and PSU must not be installed:

- a. Externally.
- b. In an enclosure situated on or embedded into the external surface of an external wall of the building.
- c. In a situation where they might be reasonably expected to experience damp, moist or excessively humid conditions e.g. in a bathroom or laundry.
- d. Within a roof cavity.
- e. Below a floor outside the normal living, working or occupancy areas of the building.
- f. In a cupboard, enclosure, home distributor or in a confined space where:
 - i. It might reasonably be expected that linen, clothing or towels might be stored in direct contact with the NTD or PSU.
 - ii. It might be reasonably presumed that items could be stored that restrict free airflow around the NTD or PSU.
 - iii. gases may be trapped due to limited or no ventilation, or because the design or situation of the enclosure or home distributor is such that there is potential for ventilation to be inhibited.
- g. In a location where the ambient temperature in the immediate vicinity of the NTD or PSU might routinely exceed +40°C or fall below 0°C.
- h. On a surface where the temperature might routinely exceed +40°C or fall below 0°C.
- i. In a location where the power or end user cabling might:
 - i. Be a tripping or strangulation hazard.

- ii. Be accidentally wrenched or damaged by tripping, passers-by or another inadvertent disturbance.
 - j. Onto an accessible conductive/metallic surface.
 - k. Encompassing a general power outlet (GPO), unless all accessible conductive surfaces and parts have been protectively earthed in accordance with [8] *AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)*.
- Note:** The PSU AC power cord must not be routed through an opening in a metallic surface, unless the metallic edges of that opening are appropriately protected by a grommet or similar device.
- l. In a location where they are at risk of being damaged.

7.4.1 Height

nbn is committed to providing accessible products and services for people and customers with disability and access needs. nbn has a responsibility to ensure that its workplace environment, activities, and the network it builds are created accessibly and inclusively for employees, customers, communities, and Delivery Partners.

When allocating space for each nbn® NTD please consider:

1. **Location** - where it is not difficult to access.
2. **Height** - ensuring it's within arm's reach.
3. **Relocatable** - should the customer make a request.

NTDs must be installed in an accessible location, allowing both the end user and technicians clear access for removal and replacement of the NTD from the enclosure.

The location must be within arm's reach of an average person, with arm's reach defined as a zone extending from any point on a surface where persons usually stand or move about, to the limits that a person can reach with the hand in any direction without assistance (e.g. tools or ladder) and as shown in Figure 31.

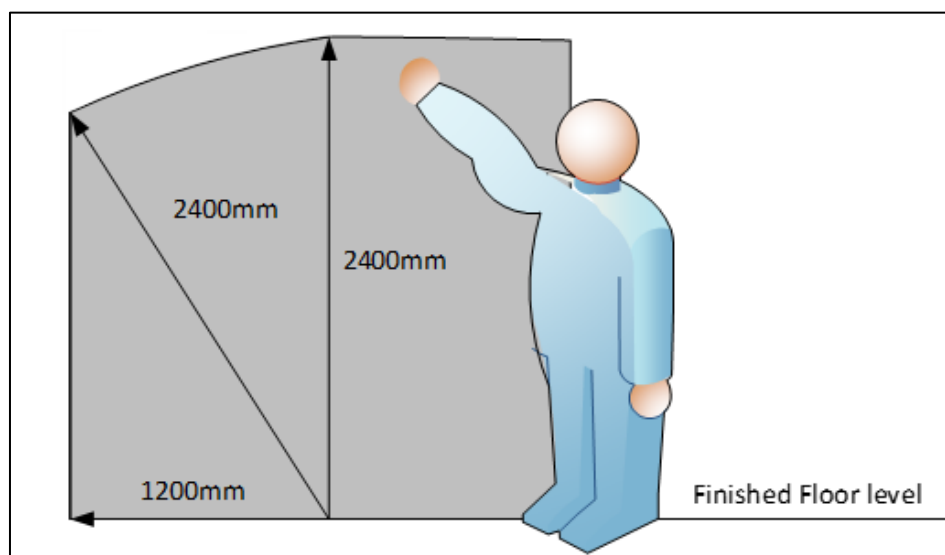


Figure 31. Arm's reach

The grey area shows the zone into which an average person can reach an arm from the surface shown, if there are no permanent obstructions such as walls or balustrading. The zone reduces if a permanent obstruction prevents access. If an obstruction has an opening in it, the access through the opening is to be considered when assessing mounting locations.

- The NTD must be located a minimum of 300mm from FFL to the base of the NTD/NTD enclosure and up to a maximum height of 2.4m to the top of the NTD, with nbn's preferred height below 1.8m.
- Consideration should be given to end user's known and unknown accessibility requirements with optimal installation for access being between 300mm and 900mm from FFL.

7.4.2 Mounting locations

Builders and building owners must make one of the following three mounting locations available, within the defined height range requirements, for the installation of nbn® equipment.

Mounting locations must be in an accessible location, allowing both the end user and technicians clear access for removal and replacement of the NTD from the enclosure, with recommended access clearance of 900mm from the front of the NTD.

Table 9. Mounting locations

Location	Description
1. Open wall area	An area on an open wall with either no obstructions or only partial obstructions. Note: Open wall areas use the bulk space of the room for air circulation.
2. Open enclosure	A partially enclosed area that contains no internal obstructions. Note: Open enclosures use the bulk space of the enclosure and the absence of obstructions for air circulation.
3. Confined area	A cabinet or cupboard (including a home distributor or utilities enclosure) dedicated to communications equipment. Note: Confined areas require ventilation to be added to the design to improve the air circulation.

Note: nbn requires contractors to adhere to construction and ventilation requirements when installing equipment in mounting locations.

7.4.3 Confined area

An internal NTD can be placed within a dedicated built out shelf within an EUP.

Ventilation is required to allow heat dissipation, as per section 7.5 Ventilation requirements.

Height of confined areas should be considered for optimal installation height as per section 7.4.1 Height.

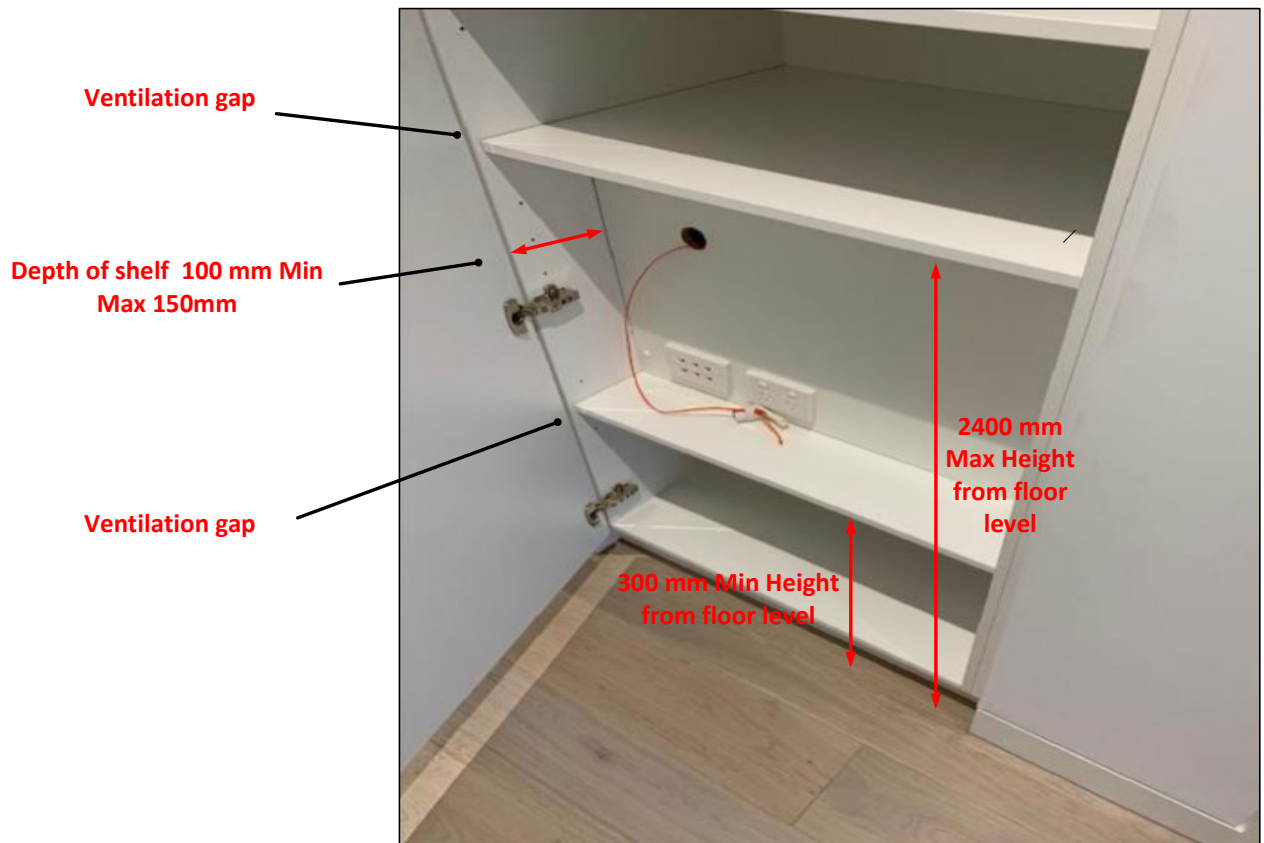


Figure 32. Typical built out shelf

The layouts and sizes shown are for a built-out shelf with Fibre TV RF equipment. If Fibre TV is not being deployed, then smaller layouts as per section 7.3 NTD Equipment templates can be used.

The built-out shelf shall be no lower than 300mm from finished floor level, the maximum height to the top of the shelf shall be below 2400mm, and the depth of the shelf shall be between 100mm – 150mm for ease of access.

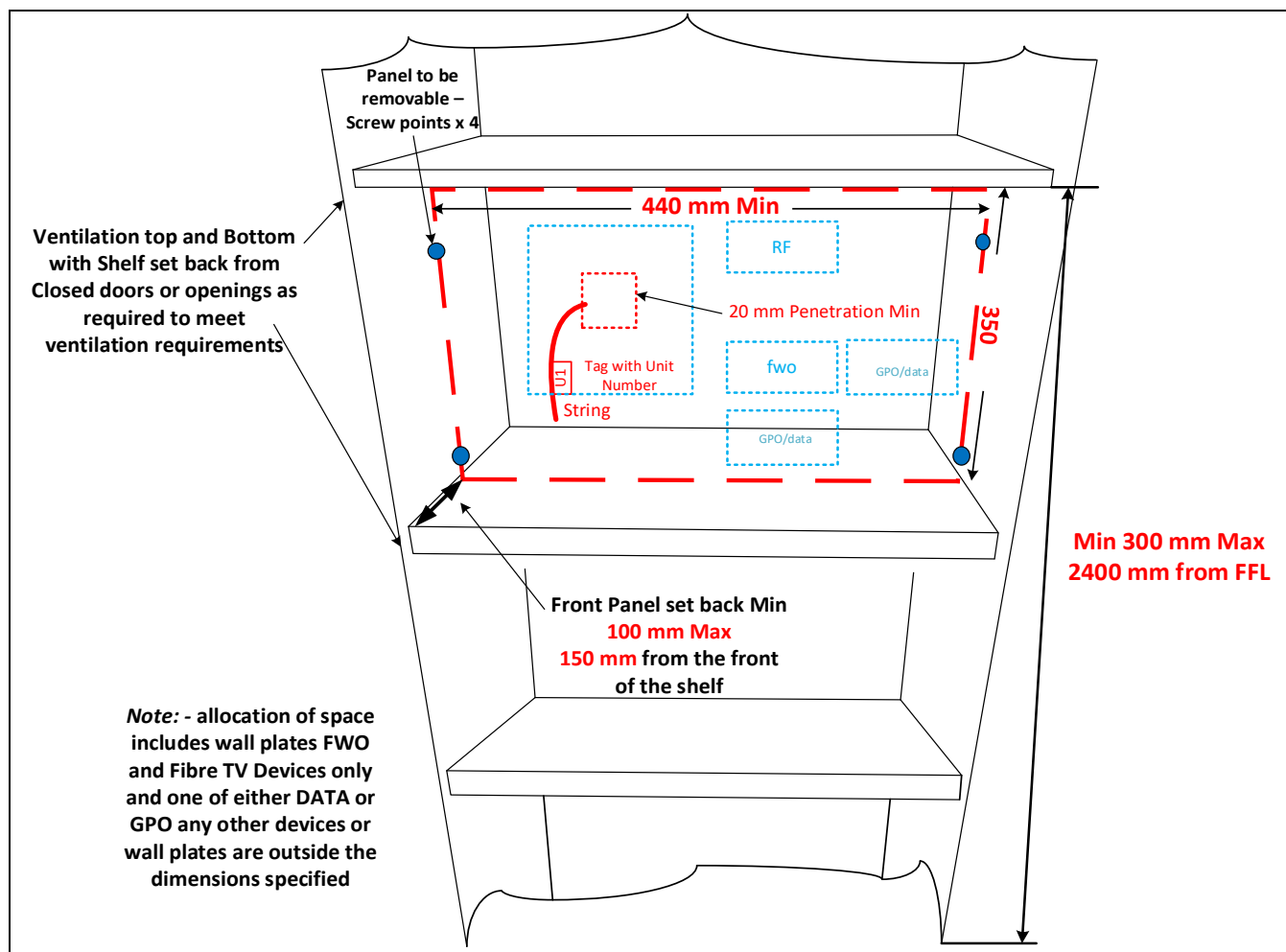


Figure 33. Built out shelf - landscape

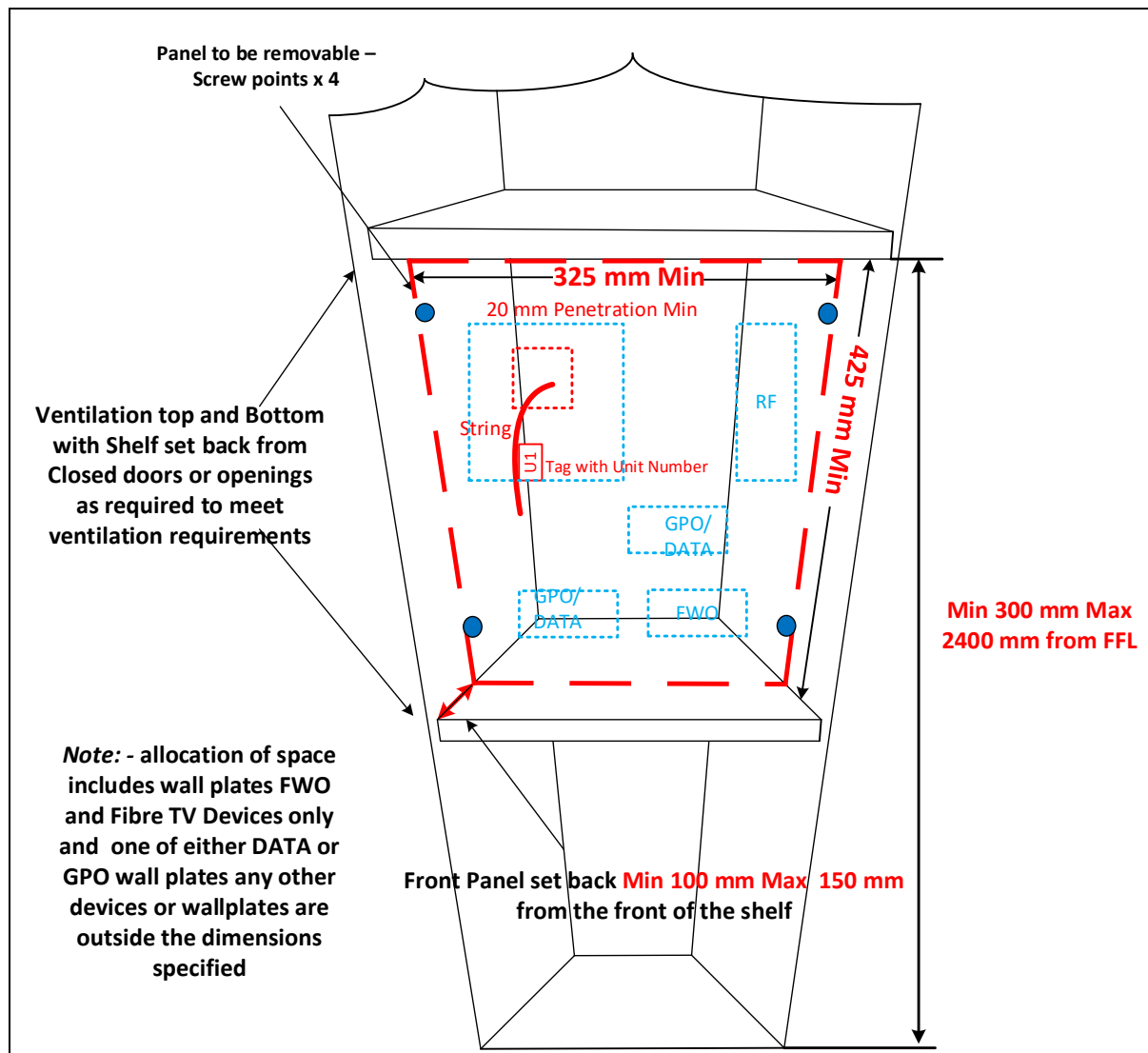


Figure 34. Built out shelf - portrait

Where an NTD is installed within a wardrobe, there must be a clearance of 200mm from the wall to the end of the hanging rail to ensure accessibility to the NTD and suitable ventilation. Refer to Figure 35 below.

Whilst 300mm minimum clearance from the Finished Floor Level is required, it is desirable to position the NTD higher up the wall to avoid items stored on the floor of the wardrobe blocking airflow and/or access.

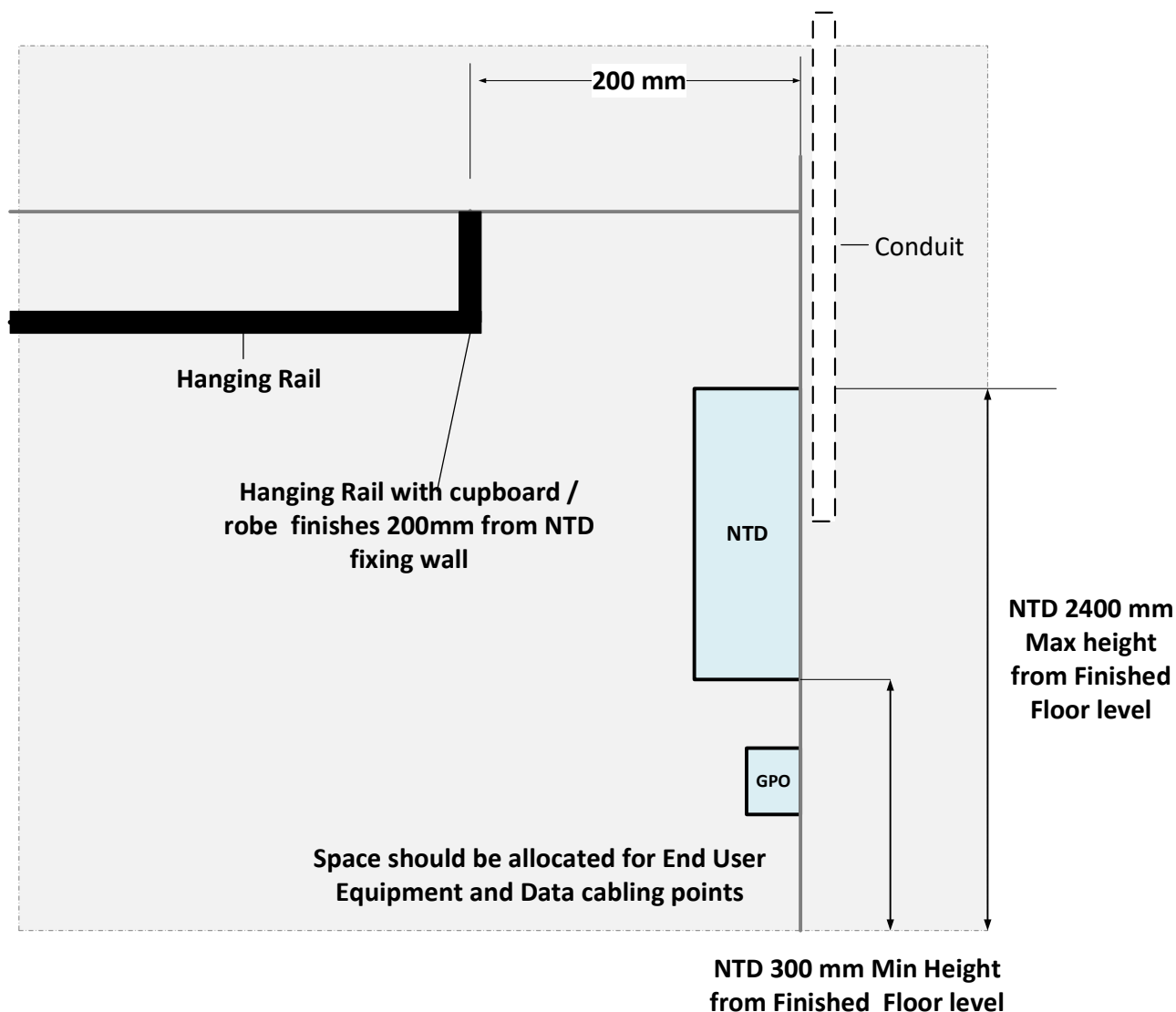


Figure 35. Typical side view of NTD within an open enclosure/robe

7.4.4 Home distributors

A home distributor is an internal enclosed location which can be used to house the nbn® NTD and PSU. This can be either a prefabricated enclosure or enclosed space built within a wall or cupboard.

The minimum internal dimensions must be equal to the mounting surface templates described in section 7.3 NTD Equipment templates, meet the requirements for ventilation in section 7.5 Ventilation requirements and meet the definitions in 7.4.4 Home distributors.

Home distributors must meet the following design requirements:

- a. Minimum home distributor dimensions defined in section 7.4.5 Minimum home distributor dimensions.
- b. Bounded by one or more solid or partially solid obstructions above, below, to the left or to the right of the open enclosure area (e.g. shelf, divider, wall, floor).
- c. Ventilated in accordance with section 7.5 Ventilation requirements.
- d. Manages any of (and only) the following equipment:
 - i. Cabling
 - in-premises telephone
 - data
 - RF
 - facilities associated with their cross-connection general power outlets
 - ii. Power supply
 - power supplies associated with the above equipment.
 - batteries associated with the above equipment
- e. Home distributors should not be used to house RSP gateways/modems as the enclosures may impact performance of RSP/end user supplied equipment.

Note: Metallic home distributors that contain any mains power must *meet the requirements in AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)*.

RSP gateways should be placed centrally in an open area away from appliances such as microwaves, TVs and refrigerators.

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.

7.4.5 Minimum home distributor dimensions

The home distributor must meet or exceed the size requirements in Table 10. Home distributor parameters, while supporting the layout dimensions and clearances detailed within section 7.3 NTD Equipment templates.

Table 10. Home distributor parameters

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® equipment	10 centimetres, providing a minimum two (2) centimetre clearance between the nbn® equipment and the home distributor's door/cover

7.4.6 Power and data outlet(s)

If GPOs and data cabling outlets 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).

For further information about standard circumstances for indoor nbn® equipment, refer to Appendix A Standard circumstances defined.

7.4.7 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 though the other enclosure did not exist.

For 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 also requires the ventilation methods described in 7.5 Ventilation requirements.

For further information about standard circumstances for indoor nbn® equipment, refer to Appendix A Standard circumstances defined.

7.5 Ventilation requirements

The nbn® NTD, PSU and other end user devices (e.g. residential gateway) consume energy, which is dissipated as heat. When installed into a closed enclosure or space, the combined energy dissipated by devices accumulates and causes the ambient temperature of the surrounding air to rise.

If the warm air is trapped and cannot easily escape, the operating temperature of the devices can increase significantly, with long term average operating temperature directly affecting equipment failure rates.

Appropriate ventilation can be physical gaps in joinery, slots or circular openings and sized as per the volume of the enclosure. confined space.

nbn requires that enclosures for nbn® equipment satisfy the following thermal ventilation requirements (**note:** if other end user devices are stored in the same location, new calculations will need to be made).

Table 11. Ventilation requirements

Volume of open enclosure or home distributor	Required ventilation area (for each of the upper and the lower ventilation region)
20 L (minimum volume requirement)	60cm ²
Between 20 L and 60 L	60cm ² , <i>plus</i> an additional 1.5 square centimetres per litre of volume over 20 L
Greater than 60 L	120cm ² , <i>plus</i> an additional 0.1 square centimetres per litre of volume over 60 L

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

The ventilation openings are required to be present in both the top and bottom end faces of the enclosure/ confined space or within 100mm of the top or bottom, if placed within the front face:

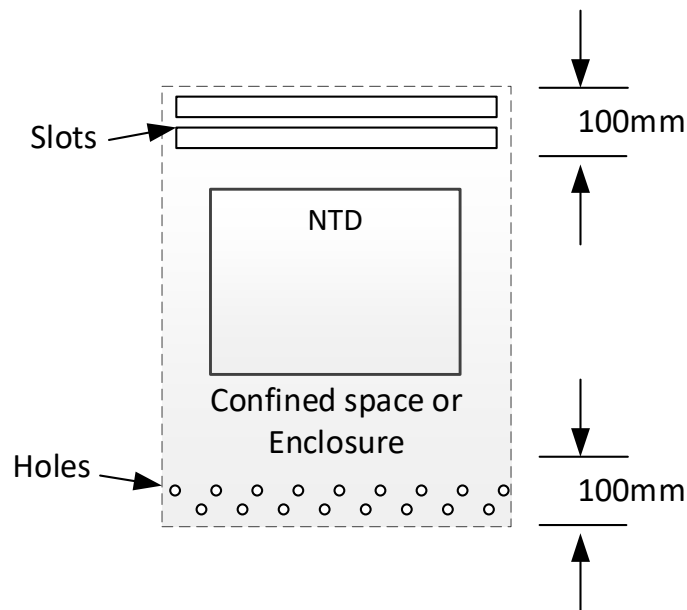


Figure 36. Ventilation upper/lower areas

Table 12. Additional ventilation 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	<p>Examples of obstructed ventilation include (but are not limited to) the following:</p> <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.

8 Utility clearances

The following sections detail the clearances that must be maintained for the safety and practicality of installing nbn® passive fibre equipment within EUPs in relation to other utility services.

Clearance from other utilities such as fixed services, including pipes and taps and meters must adhere to the Building Code of Australia and the clearances listed below.



The developer must confirm any additional spatial separation with its local gas distribution authority, relating to commercial gas applications.

8.1 Gas meter clearances

Note: The clearances below are nbn's minimum clearances based on [10] *AS/NZS 4645.1 Gas distribution networks, Part 1: Network management*.

The clearance for a gas meter is dependent on whether the gas meter is located within an enclosure (enclosed) or outside of an enclosure (unenclosed).

The distances are measured from the surface of the gas meter, gas regulator or any gas fitting, whichever is the outermost.

8.1.1 Enclosed Gas Meter

A minimum clearance of 500mm is required from an approved gas meter enclosure.

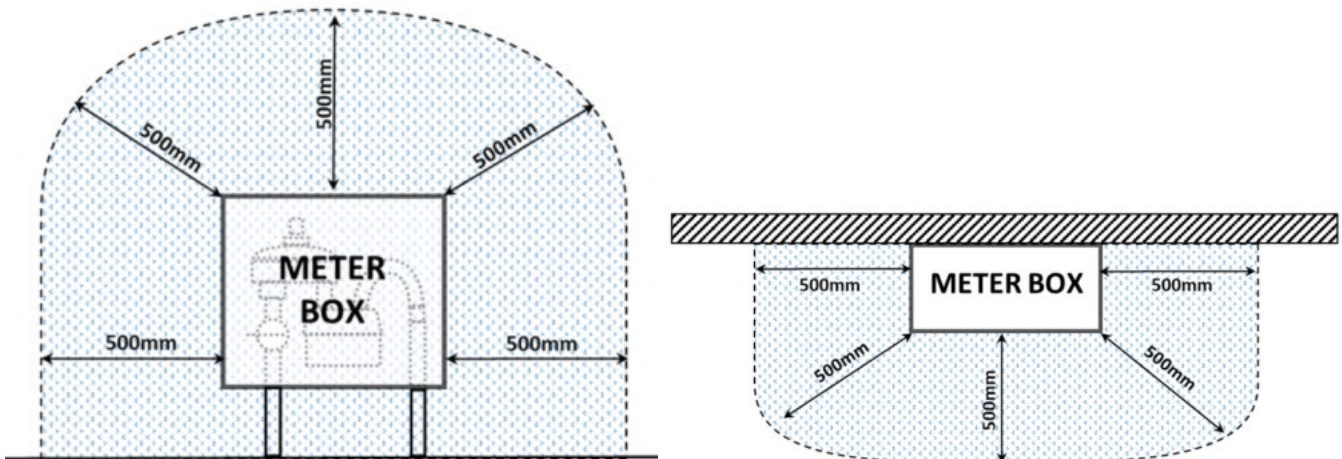


Figure 37. Gas meter clearances - enclosed

8.1.2 Unenclosed Gas Meter

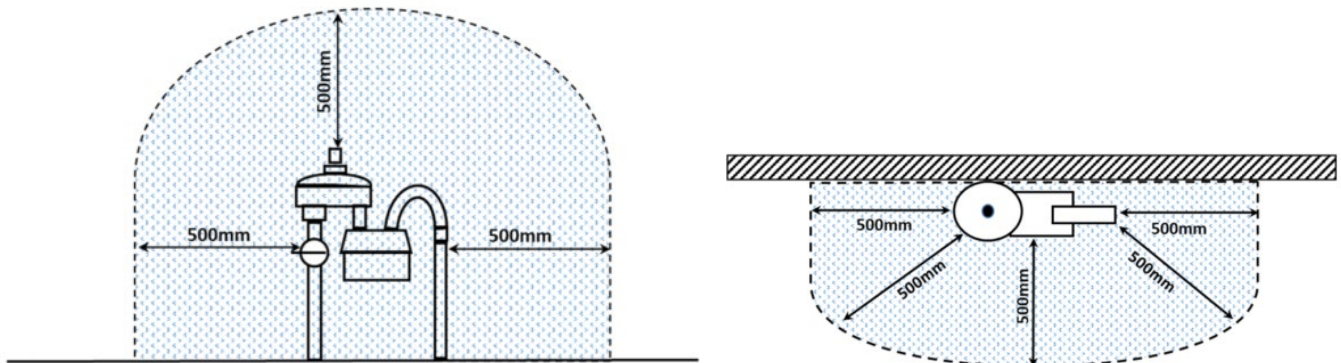


Figure 38. Gas meter clearances - unenclosed

8.2 Gas cylinder clearances

There are two types of gas cylinders: in-situ and exchangeable.

8.2.1 In-situ gas cylinders

In-situ gas cylinders are filled onsite and are not physically removed. Although the valve is on top of the cylinder, it will not have a fixed tap on top on it. The **On** and **Off** tap will be on the side. Typically, the valve will have a yellow cap on it, however if not yellow, it will be distinguishable by the fact it can be removed.



Figure 39. In-situ gas cylinder showing removable yellow cap

8.2.2 Exchangeable gas cylinder

Exchangeable gas cylinders are physically removed on empty to fill. The valve on the top of the cylinder will normally have a green tap to turn the gas on and off and cannot be removed. Typically, the tap will be green, however, if not green, it will be distinguishable by the fact it has **OPEN** and **CLOSE** marked on it.



Figure 40. Exchangeable gas cylinder showing green tap with 'OPEN' and 'CLOSE' markings

The following clearances apply for an in-situ or exchangeable gas cylinder and are nbn's minimum clearances based on [4] AS/NZS 1596 *The storage and handling of LP Gas*.

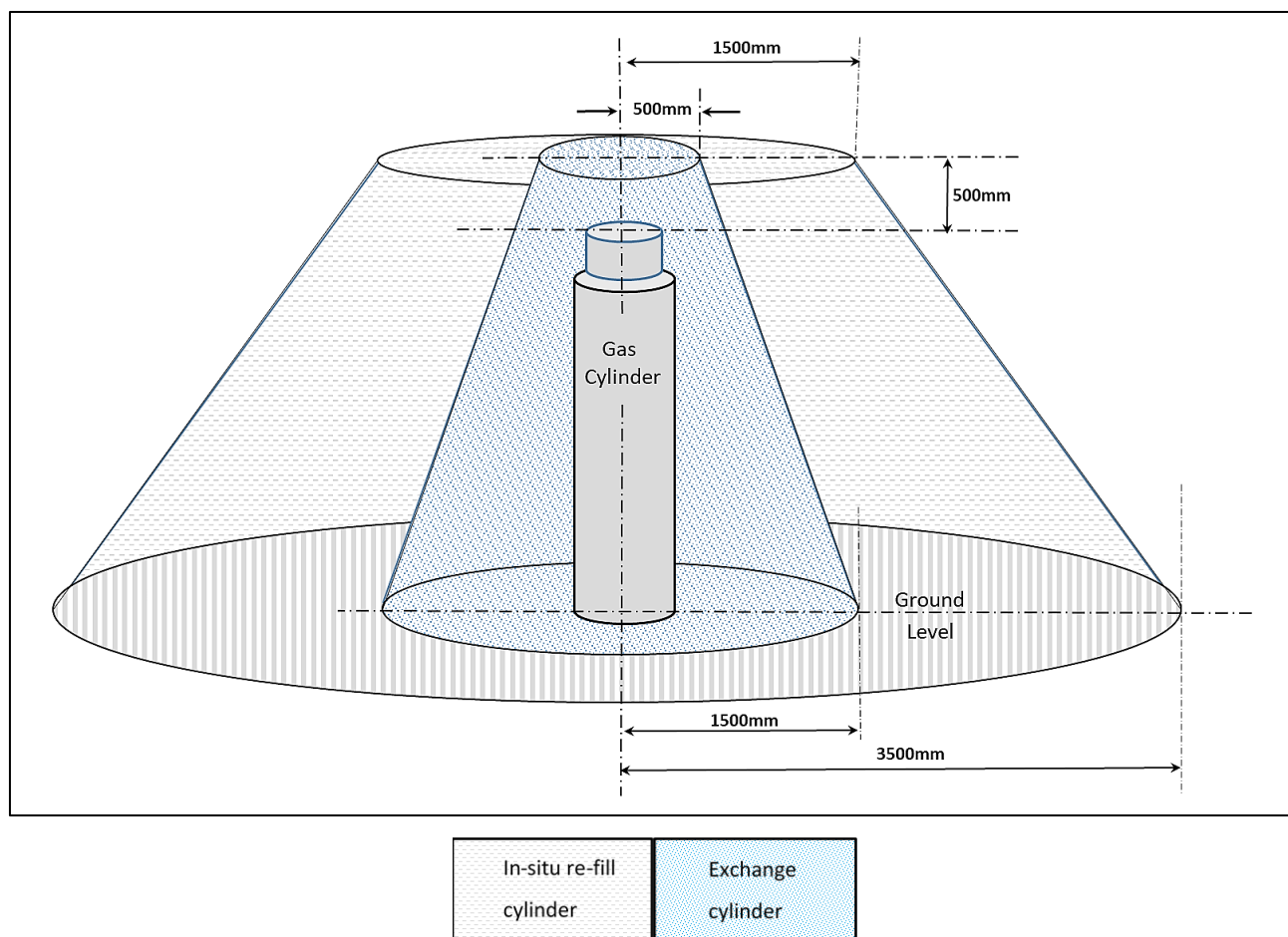


Figure 41. Gas cylinder clearances – 360° view

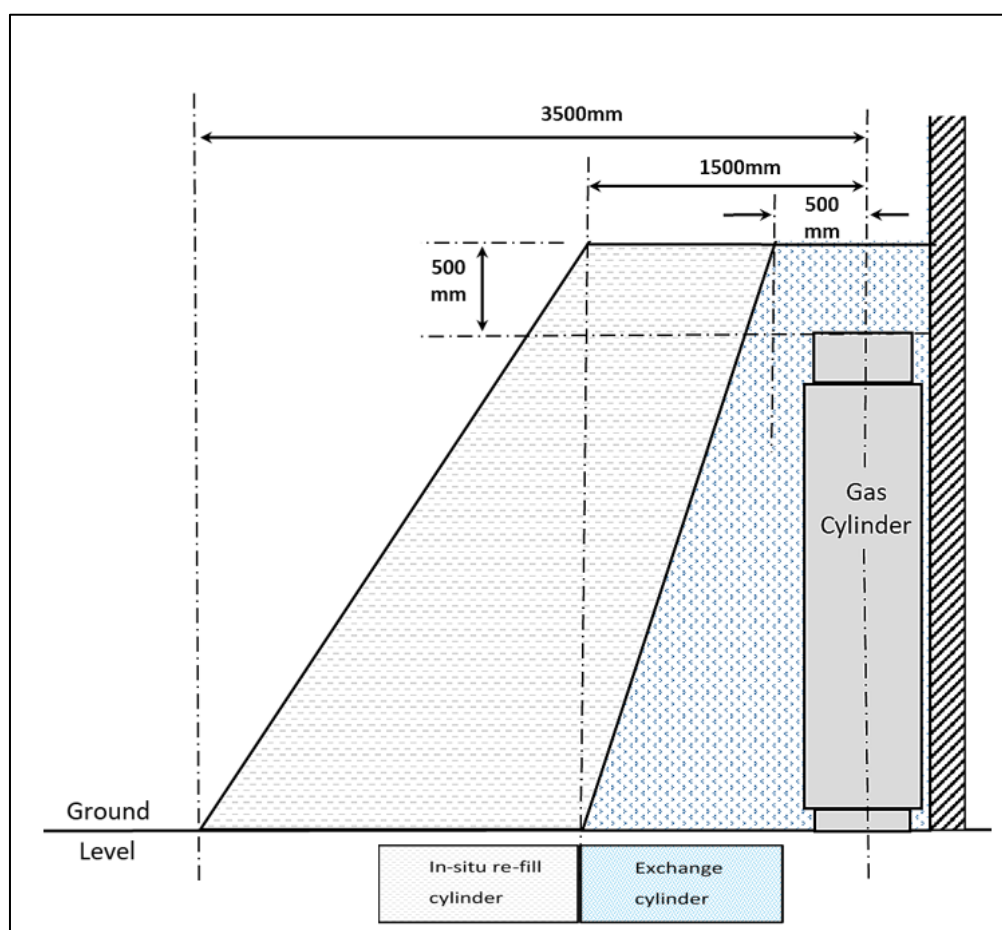


Figure 42. Gas cylinder clearances – side view against a wall

Note: The horizontal distances are measured from the centre line of the gas cylinder.

8.2.2.1 Electricity clearances

The clearance from any power sources including the point where the premises power supply cable connect to the property electrical switchboard is 150mm.

Refer to [8] *AS/NZS 3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)* for clearances from electrical switch equipment.

8.2.2.2 Water clearances

The clearances from any fixed water services such as pipes, taps and meters must be a minimum of 150mm on all sides.

9 Customer cabling

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

Note: Customer cabling within premises is not within the scope of the nbn.

All cabling work performed on the customer side of the NBP is subject to ACMA requirements (refer to [2] *AS/CA S009 Installation requirements for customer cabling (Wiring rules)*).

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

RSP gateways/modems are best located centrally within the premises, outside of cupboards, home distributors and away from appliances such as refrigerators, televisions or microwaves.

nbn recommends the installation of data cabling from the nbn® equipment location to wall sockets elsewhere in the premises.

In many instances, a routing gateway is needed to make full use of the internet services.

Data cabling:

- can be used for internet (UNI-D)
- Category 6 (or better to support nbn speed tiers)
- uses four (4) pair data cables, with eight (8) positions, eight (8) contact (8P8C) modular sockets and connecting cables
- is 'star-wired' with a cable dedicated to each socket in the premises.
- may be a maximum 100m in length from the NTD
- may require the use of a patch panel and multiple cables running to one or more rooms to support intended customer uses, e.g. a Wi-Fi router in a different location to the nbn® NTD



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



Important: Information for builders and homeowners to optimise use of the nbn® network, including considerations for Wi-Fi router location, structured cabling and other factors, is available online at: <https://www.nbnco.com.au/learn/optimisation>.

10 Pre-installation of nbn® FTTN equipment and cabling



Recommended: By arrangement with builders or developers, nbn 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.

Pre-installation of nbn® FTTN equipment is available for dwellings being connected to the nbn® FTTN network as part of a New Development. This provides both builders and nbn 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.

10.1 Arranging pre-installation

After the builder completes all preparatory work and before handover to the building owner, builders or developers should contact nbn to arrange for installation of the fibre equipment.

10.1.1 Prerequisites for installation of fibre equipment

- builder has completed all preparatory installation work
- electrical power is available
- building is at lock-up stage

10.1.2 Booking pre-installation appointment form online

To request a booking for pre-installation of nbn® equipment, apply online at the following link:

<https://www.nbnco.com.au/develop-or-plan-with-the-nbn/new-developments/prepare-for-connection/ntd-pre-installation-request>



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

10.1.3 Pre-installation activities

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

- installation of the PCD, NTD and PSU.
- 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 PSU.



nbn does not verify that the internal customer wiring is correctly installed.

10.2 Troubleshooting connection problems

Circumstances may arise during construction that could result in nbn being unable to readily connect the building to the nbn® fibre network. If this situation should occur, then the building owner will have to contact their RSP or ISP to facilitate service activation after handover. The RSP/ISP will then contact nbn to determine the appropriate remediation and arrange installation and connection to the nbn® fibre network.

Alternatively, the nbn® website has tips on how to optimise your experience at home: [Make more of your internet experience | nbn \(nbnco.com.au\)](https://nbnco.com.au).



The building owner may incur additional charges where remediation work is necessary.

11 Glossary

Term	Description
AC	Alternating Current
ACMA	Australian Communications and Media Authority
BEP	Building Entry Port
Copper to the MDF	Copper from the node cabinet extends to a MDF located in the communications room or cupboard of an MDU. Services are delivered via backbone copper provided by the developer to each premises or tenancy.
Customer	The final 'downstream' customer; being the individual or organisation who acquires services from one (1) of nbn 's RSPs. Also called the end user.
DP	Delivery Partner
DSLAM	Digital Subscriber Line Access Multiplexer
EUP	End User Premises
FGL	Finished Ground Level
FHL	Flood Hazard Level
FTTB	Fibre to the Building Optical fibre extends to the basement communications room or cupboard of an MDU, connecting to a DSLAM unit. A copper tail from the DSLAM terminates onto the developer provided MDF. Services would be delivered via backbone copper provided by the developer to each premises or tenancy.
FTTC	Fibre to the Curb Optical fibre extends to the pit and Services are delivered over the existing copper network to each premise.
FTTN	Fibre to the Node Optical fibre extends to a node cabinet located close to existing copper pillars and/or cabinets. Services are delivered over the existing copper network to each premise.
FTTP	Fibre to the Premises Optical fibre cable extended to the premises, with GPON fibre-sharing.
FTTP solution provider	Any company or supplier providing FTTP.
FTTx	Fibre to the 'x' (building, distribution point, node, premises)
FTV	Fibre TV

Term	Description
GPO	General Purpose Outlet
GPON	Gigabit Passive Optical Network
HFC	Hybrid Fibre Coaxial HFC cable is extended from the HFC network to each premises.
HS&E	Health, Safety & Environment
ISP	Internet Service Provider
LIC	Lead-In Conduit
nbn	<ul style="list-style-type: none"> National Broadband Network Company established by the Australian Government to design, build and operate the wholesale-only National Broadband Network.
MDF	Main Distribution Frame Contains the 'A' side termination blocks for the nbn [®] copper cable and the 'B' side termination blocks for the customer's side.
MDU	Multi Dwelling Unit A structure that contains more than one (1) premise.
MTM	Multi Technology Mix
NBP	Network Boundary Point
New developments	A new or undeveloped piece of land that represents the growth of the premises market, formerly called Greenfields.
NTD	Network Termination Device (also referred to as an nbn [®] connection box)
NTD enclosure (legacy)	Optional wall-mounted, purpose-built housing for an NTD, PS/S and cabling. Consists of a base and a removable cover. (Also referred to as an nbn [®] connection box cover.)
OH&S	Occupational Health & Safety
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.

Term	Description
PS/OBB (optional)	Power Supply with Optional Battery Backup Provides power to a legacy NTD. Note: nbn no longer provides a Battery Backup unit. Customers can source their own UPS from Electronics retailers if required.
PS/S	Power Supply Standard Provides power to a legacy NTD.
PSU	Power Supply Unit Provides power to 1 and 4-port NTDs.
PVC	Polyvinyl Chloride
RG	Radio Grade
RSP	Retail Service Provider
SDU	Single Dwelling Unit A structure that contains only one (1) premise.
TO	Telecommunications Outlet
UNI-D	User Network Interface - Data
UNI-V	User Network Interface – Voice Note: Voice services delivered via the UNI-V ports will no longer be available for ordering with a Retail Service Provider (RSP) beyond 26 May 2024.
WHS	Workplace Health & Safety

Appendix A Standard circumstances defined



A.1 Standard circumstances: checklist




Important: The 1-port NTD and 4-port NTD its PSU or HFC modem are only suitable for installation in standard circumstances.

All the checks in Table 13 must be true for an installation to be categorised as standard circumstances.

Table 13. Standard circumstances checklist

No.	Requirement	Complete
1.	Both the NTD and PSU or HFC modem 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"/>
2.	<p>Both the NTD and PSU or HFC modem meet the following requirements:</p> <ul style="list-style-type: none">are installed inside the same building as each otherare not installed on the external surface of an external wall <p> This refers to the outside of a building and would include, for example, an undercover area within an enclosed patio or similar circumstances.</p> <p>The installation of an NTD and PSU 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.</p> <ul style="list-style-type: none">are not installed in an enclosure situated on, or embedded into, the external surface of an external wall of the building <p> This means that the NTD and PSU 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 and PSU.</p>	<input type="checkbox"/>
3.	<p>The customer cabling remains wholly within the same building containing both the NTD and the PSU or HFC modem.</p> <p>This includes any cables that contain electrical conductors or conductive components, for the purpose of reticulating any UNI-D service, or reticulating PSU power. This term is intended to mean the same as the term customer cabling in <i>AS/CA S009:2020 Installation requirements for customer cabling (Wiring rules)</i>.</p> <p>This requirement also means there must not be any electrically conductive telephone or data or power cables between the main building and a separate free-standing building.</p>	<input type="checkbox"/>
4.	Neither the NTD nor the PSU are installed in a situation where they might be reasonably expected to experience damp, moist or excessively humid conditions.	<input type="checkbox"/>

No.	Requirement	Complete
5.	Neither the NTD nor the PSU or HFC modem are installed within a roof cavity.	<input type="checkbox"/>
6.	<p>Neither the NTD nor the PSU or HFC modem are installed below a floor outside the normal living, working or occupancy areas of the building.</p> <p>This means that neither the NTD nor the PSU may be installed under a home between the floor and bare earth, or in a location that cannot be locked up.</p>	<input type="checkbox"/>
7.	<p>Neither the NTD nor the PSU or HFC modem are installed in a cupboard/enclosure/home distributor or in a confined space where any of the following are true:</p> <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 PSU or HFC modem it might be reasonably presumed that items could be stored that restrict free airflow around the NTD or HFC modem 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 	<input type="checkbox"/>
8.	<p>Neither the NTD nor the PSU are installed in either of the following situations:</p> <ul style="list-style-type: none"> in a location where the ambient temperature in the immediate vicinity of the NTD or the PS/S might routinely exceed +40° Celsius or fall below 0° Celsius on a surface where the surface temperature might routinely exceed +40° Celsius or fall below 0° Celsius <p>This means that neither the NTD nor the PSU 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 PSU is mounted near a space heater, water heater or heater vent <p>i 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. 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"/>
9.	<p>Neither the NTD or HFC modem are installed in a location where either the power cabling or the customer cabling might be a tripping or strangulation hazard.</p> <p>i 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"/>
10.	Neither the NTD or HFC modem 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.	<input type="checkbox"/>

No.	Requirement	Complete
11.	<p>Neither the NTD nor HFC modem are installed in either of the following locations:</p> <ul style="list-style-type: none">• onto an accessible conductive/metallic surface encompassing a GPO• inside a conductive/metallic enclosure with accessible metallic parts encompassing a GPO <p> Exception: All accessible conductive surfaces and parts are protectively earthed, in accordance with <i>AS/NZS 3000:2018 Wiring Rules</i> and <i>AS/CA S009:2020 Installation requirements for customer cabling (Wiring rules)</i>.</p>	<input type="checkbox"/>
12.	Neither the NTD nor the PS/S are at risk of being damaged.	<input type="checkbox"/>

A.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 NTD technical requirements, as specified in A.1 Standard circumstances: checklist.
- 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 S009:2020 Installation requirements for customer cabling (Wiring rules)* or *AS/NZS 3000:2018 Wiring Rules* nor meets the technical requirements outlined in A.1 Standard circumstances: checklist

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 S009:2020 Installation requirements for customer cabling (Wiring rules)* for more information.

- Services delivered into a lift car.
- MDU or body corporate managed alarm services, and/or fire indicator panel alarm services.

Appendix B Builder checklist: SDU/MDU preparation

Table 14. Builder checklist

No.	Task	Complete
1.	Locate developer's starter pipe at the property boundary.	<input type="checkbox"/>
2.	Plan the preferred location for the future fitting of the PCD or NTD by nbn. Check for clearance requirements or exclusion zones from other utilities.	<input type="checkbox"/>
3.	Install the LIC with drawstring from the developer's starter pipe to the nominated location for the PCD on the exterior of the premises.	<input type="checkbox"/>
4.	Plan the preferred location for the future fitting of nbn® network equipment by nbn. For FTTP 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 PCD or NTD location to the nominated nbn® equipment or customer equipment location.	<input type="checkbox"/>
6.	Provide a dedicated GPO at the nbn® equipment location to power the installation.	<input type="checkbox"/>
7.	Plan for any customer cabling (if required). If data cabling is installed, co-locate the cabling connections at the proposed nbn® equipment location. Ensure that additional space is provided to accommodate the wiring.	<input type="checkbox"/>
8.	Consider 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 that ensures an aesthetic installation.	<input type="checkbox"/>
9.	After preparation work is complete and the premises is at a secure lock-up stage with power available, book a pre-installation of the nbn® equipment by nbn (FTTP only) by submitting an online booking request at https://www.nbnco.com.au/develop-or-plan-with-the-nbn/new-developments/pre-installation-request .	<input type="checkbox"/>
10.	When the above steps are complete, 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 RSP to order a broadband service or package that uses the fibre network.	<input type="checkbox"/>