openreach
a BT Group business

BT

How to build a FIBRE network

DEVELOPERS' HANDBOOK

CONTENTS

INTRODUCTION

By working closely with you in the earliest stage of your new development, our newsites team can create a modern communications infrastructure that will enable your customers to communicate in the best way possible.

This Fibre to the Premise (FTTP) network How to Guide will ensure you have the relevant information to build the Openreach network that will provide communication services for your future occupants in residential properties/houses and apartments. Openreach must complete all network and infrastructure build before your customers move in as orders for service cannot be placed until this has been delivered. Your nominated new site representative (NSR) will guide you through the installation requirements and the periodic quality inspections during the initial site meeting.

For commercial properties or copper developments please refer to the appropriate How to Guide.

Avoiding damage to the Openreach U/G network

Openreach has an extensive underground network that can be located inside and/or on the perimeter of a site. This network is vulnerable to excavation related damage unless appropriate precautions are taken. The precautions for avoiding damage to an underground utility plant are contained within the Health & Safety Guide No. 47: "Avoiding Danger from Underground Services". This document stresses the need for the availability of utility plans on site and the use of safe digging practices.

Damage to an Openreach network by a third party can be expensive for that party to repair. By working with you, Openreach wants to ensure you avoid the repair and associated cost which can consist of one or more of the following:

- Direct Cost – the cost of repair
- Operational Cost – delays associated with repair
- Social Cost – the off-site effects i.e. loss of service to emergency services/centres or the vulnerable in society.

Enabling your customers to place orders for service

Openreach must complete **all** network build activities **before** you allow a customer to move into the premises and place an order for service.

On time delivery will require working closely with your NSR to ensure on-site and in-plot infrastructure are built to specification and time.

If this is not achieved, your customers will not be able to place orders for service, and remedial work will involve significant delays and costs that we may seek to recover from you.

To obtain a more precise location of Openreach apparatus (either within your site or on the adjoining ground) and avoid costly damage, contact:

Click Before You Dig
Email: cbyd@openreach.co.uk

Utilisation of the Openreach "Click Before You Dig" service has a proven record of minimising the potential for damage and cost.

Please note:
This is a FREE service.

1 FTTP NEW SITES QUALITY CONTROL CHECKLIST

A quality checklist must be completed for every phase.

Any subsequent changes to the site plan must be communicated and agreed with your new sites rep as soon as possible.

Any re-work may result in an associated delay and time related charges may apply.

The Site Manager/Developer Agent agrees to the quality standards and conditions.

Signature: .....

Date: .....

The Site	
Developer	
Site Name	
Site Address	
Post Code	
Site Manager/ Developer Agent Name	
Telephone	
Email	
Openreach NSI Ref	

Openreach Contact	
New Sites Office	
NSR Name	
Telephone	
Developers Handbook Version 1	
Off Site Connection Location	
First Occupation Date	

FTTP NEW SITES QUALITY CONTROL CHECKLIST

Item Audited	Developer Shown Quality Standards		Checked			Comments
	YES	NO	YES	NO	N/A	
The property will be designed to accommodate voice and data wiring in a convenient place for homeowners to use (Section 2&3)						
Developer understands that NO orders can be made or taken via a service provider until all installation works of Openreach equipment to each plot has been completed, tested, commissioned and left connected to a permanent 240 volt power supply						
Voice and data cabling will be provided and terminated correctly (Section 2)						
Duct Installation (Section 4 & 5 – As shown on the diagram)						
Correct type of duct will be provided						
Ducts will be laid at a minimum depth, or exceptions agreed and documented						
Duct separation distance will be maintained, or exception agreement obtained and documented						
Ducts will be properly trimmed and keyed when set in walls and enter joint boxes at the appropriate point						
Ducts will be positioned correctly on external walls and in line with the cable entry point						
Correct rope/cables/tubing will be installed as per instructions						
Temporary duct seals will be fitted correctly to standard						
Cable/BFT left in planned location						
External cable/BFT protected + sealed in plot						
Duct seal plug 1A fitted						
Box Building / Frames & Covers (Section 6, 7 & 8 – As shown on the diagram)						
Joint boxes will be constructed as planned, positioned correctly and conform to drawings or alternatives agreed and documented						
Box will be installed at the correct depth. Any deviations to plan recorded and signed off by NSR						
Base will be cast correctly						

FTTP NEW SITES QUALITY CONTROL CHECKLIST

Item Audited	Developer Shown Quality Standards		Checked			Comments
	YES	NO	YES	NO	N/A	
Bolts will be fitted and positioned correctly during construction of boxes						
Ducts will be properly trimmed and keyed when set in walls						
Frames and covers will be bedded and correctly installed						
Cement and brick types will be used as specified or exceptions agreed and documented						
Modular boxes will be installed and prepared as per instructions						
Unmade surfaces joint box frame will be surrounded with 100mm wide strip of grade C30 concrete						
Boxes will be free of debris or other inappropriate material						
Reinforced base cast correctly for JBC (N)						
External cable/BFT protected + sealed in joint box						
MDUs (apartment blocks) (Section 9 – As shown on the diagram)						
EZ Bend Fibre cable installed with 2/3 metres slack at each end						
Developer to install EZ Bend Fibre cable and will be installed as per schematic and in accordance with manufacturers specifications. It will be coiled safely to maintain integrity						
All tubes will be presented as per schematic and capped						
Adequate space and access will be available and maintained for FTTP (lift, alarm, telemetry lines etc)						
All designated track ways/trays/ supports will be in good working order with separations maintained						
Back box fitted in each unit at a usable depth, within close proximity to a double 240v outlet for FTTP						
In Home Connections (Section 2- As shown on the diagram)						
Back box fitted at a usable depth, within close proximity to a double 240v outlet for FTTP						

FTTP NEW SITES QUALITY CONTROL CHECKLIST

Plot Numbers Inspected												

Comments

Developers Representative

Print Name:

Signature:

Date:

New Site Representative

Print Name:

Signature:

Date:

2 HOME WIRING

Nowadays, home purchasers expect good access to Broadband and the wiring you install will determine their experience. Smart TV's, remote alarms, heating and lighting controls along with digital recording devices, games and computers all require connectivity. Although wireless access has its place, some technologies work better through a wired connection to the home's broadband router. Your home wiring strategy for the 'connected home' should determine your wiring requirements. The following information is a guide for connecting the Openreach Network to your home wiring and not a comprehensive list of configurations. Refer to Governmental guidance PAS:2016 for further information.

Installing additional telephone sockets as part of the overall building programme avoids the problem of exposed wiring and will enhance the appearance of your development.

Basic Materials

Openreach will supply the ONT at the time of installation and generally 1 – 2 weeks ahead of occupation. The ONT will remain the property of Openreach. The developer will install a flush mounted back box at the entry position of the Service Access Hole adjacent to the external duct location. The ONT will be installed at this location unless an alternative position has been agreed with the NSR and the appropriate Easy Bend (EZ) fibre cable run in a continuous fault-free length.

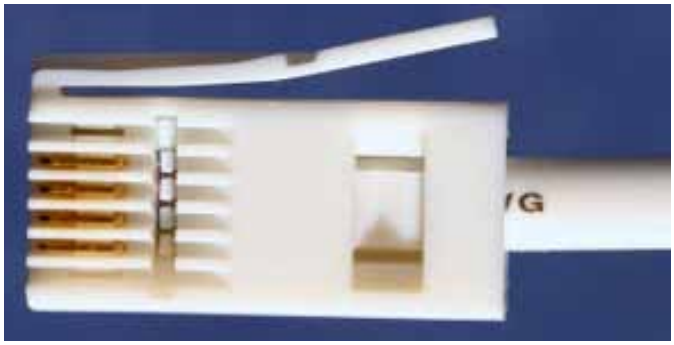
To install telephone extension points you will need: back box for extension sockets, flush-mounted extension socket points, internal cable, an Insulation Displacement Connector Tool, (IDC)BS6312 431A Plug with crimping tool or the interconnection voice lead.

It's recommended that either Cat 5E or Cat 6 cable is used for the provision of data sockets fitted to the relevant Cat type outlet mounted to flush fitting back boxes.

Wherever possible, the duct should be positioned on the external wall to allow for the installation of the ONT on the opposite side of the wall internally, removing the need to run internal fibre cables.

Installation

- Voice extension cabling must run direct from the ONT voice port. Connection to the ONT is made via a BS6312 431A Plug inserted into voice port 1

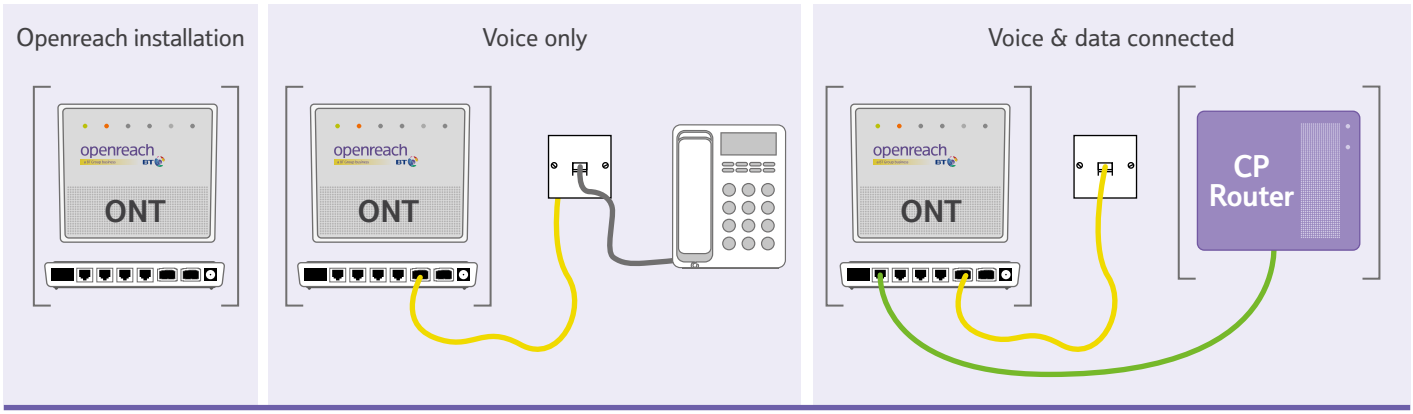


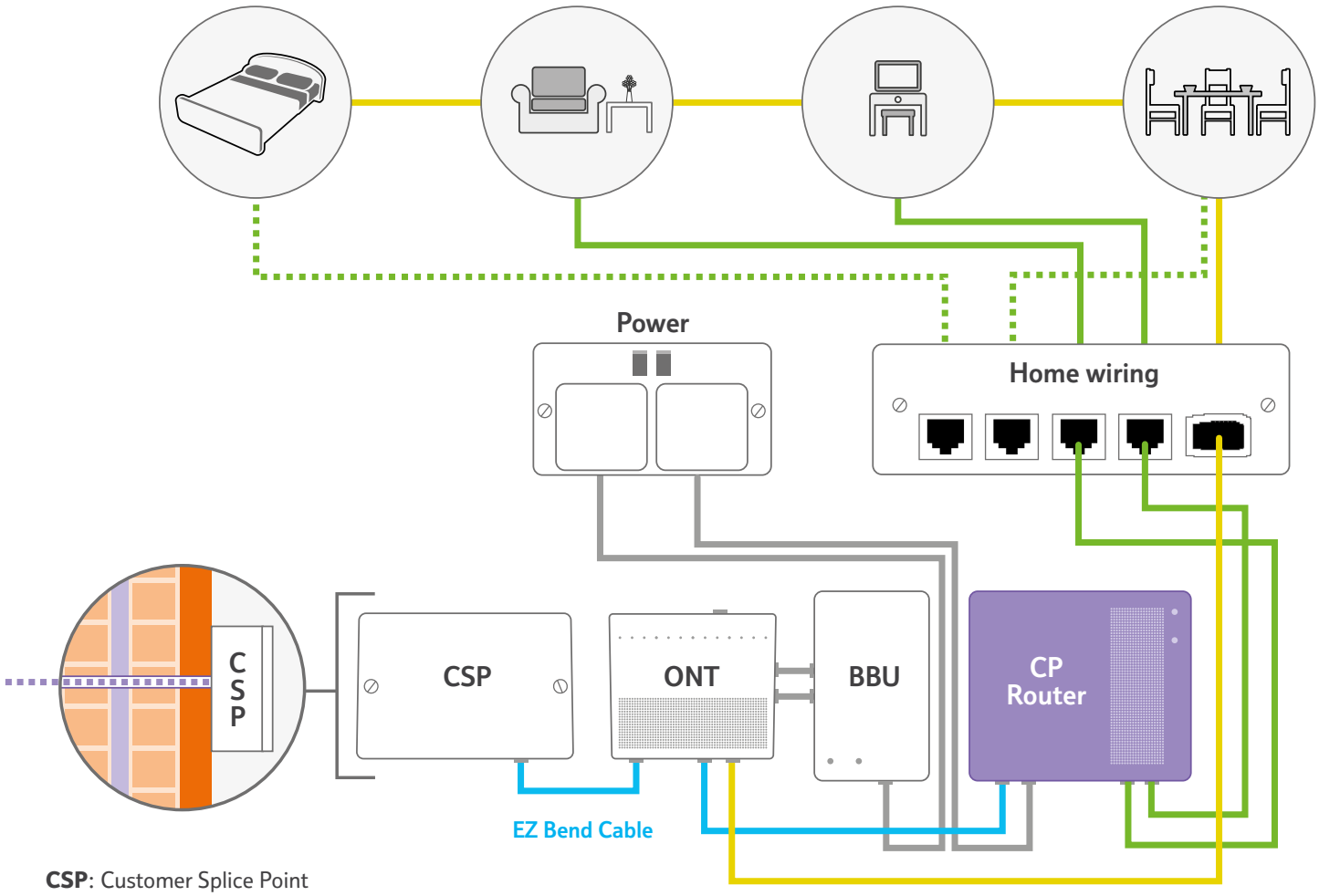
- Extension sockets should be located close to power sockets for easy equipment connection. A minimum of 50mm between telephone cables and power cables should be left throughout. Where this is not practical, telephone and power cables must be separated by an acceptable divider (i.e. of rigid, non-conducting material).
- Extension wiring must be telephone/data grade and shall have plain annealed solid copper conductors of a diameter between 0.5mm and 0.63mm. The conductors shall be in twisted pair format. The conductor resistance shall be of a maximum of 96 ohms/km. The cable sheath shall be PVC.
- As a rule of thumb internal communication cables should not exceed the bend radius of a 2p coin

Detailed information on cable installation and separation is given in the British Standard Code of Practice 6701, Part 1 (particularly clause 6) and the relevant sections of the latest IEE Regulations for Electrical Installation (Regulation 525 is of particular importance).

Please note: while the provision of internal wiring beyond the Openreach Optical Network Termination Point (ONT) will normally be the developers/customers responsibility, you can contract an Openreach engineer to do this work for you. If interested, please contact your local Customer Network Solution Team. www.openreach.co.uk/orpg/home/solutions/engineeringsolutions/customernetworksolutions/cns.do. Terms and conditions for the provision of internal wiring and charges will apply.

HOME WIRING

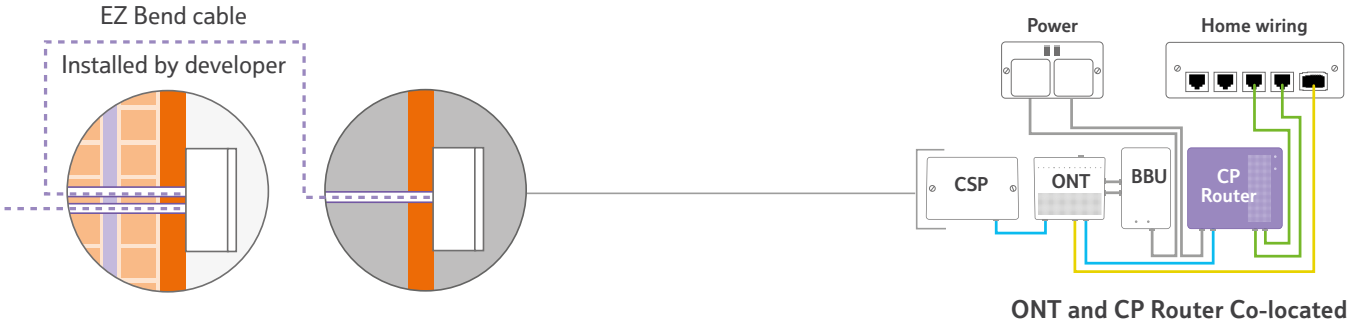




CSP: Customer Splice Point
ONT: Optical Network Termination
BBU: Battery Back UP
All installed, owned and maintained by Openreach. Developer installs home wiring and home owner provides CP equipment/router following a communication provider order for broadband services.

Interconnecting voice lead (Item Code 77004) will be provided free of charge by Openreach. It enables connectivity from the ONT to a co-located voice socket/module. Upon installation it becomes the property of the home owner.

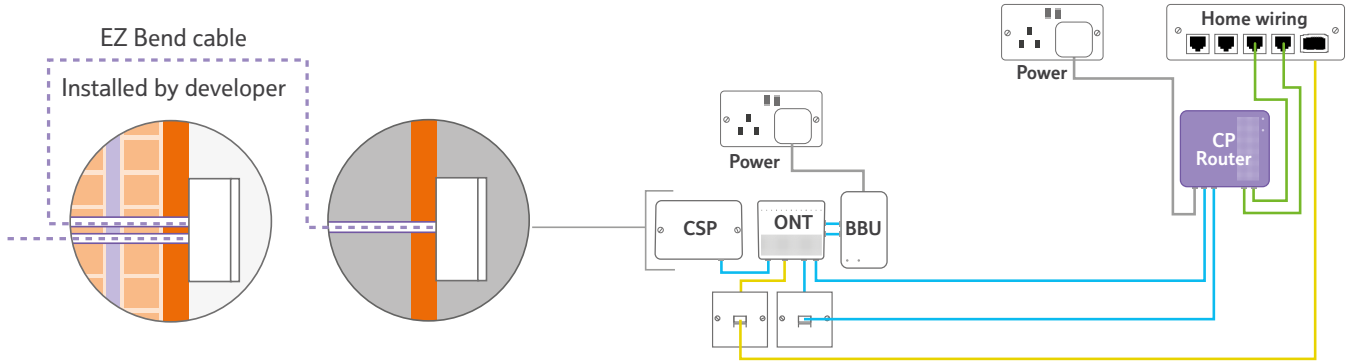
HOME WIRING

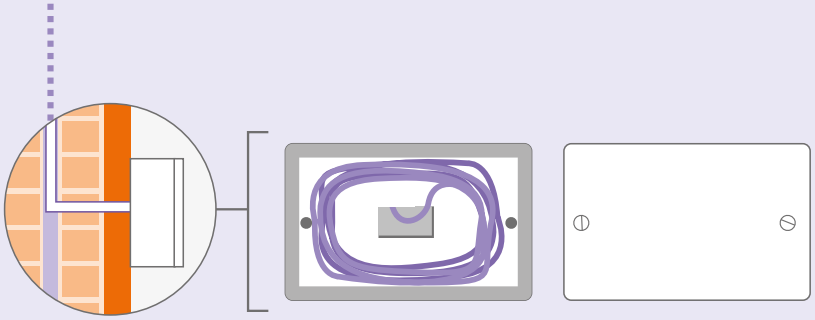


ONT and CP Router Co-located

Use an EZ Bend cable to site the ONT adjacent to the CSP, otherwise in a more convenient location within the property.

CP Router located away from ONT





The developer must run the EZ Bend cable in a continuous length and it must remain free from any damage that could reduce the lifespan of the cable.

Two metres of cable is required at each end of the installation. It should be left coiled and housed/protected within a flush mounted double back box and faceplate ready for Openreach provision of CSP and ONT nearby.

Issues with Home wiring

- EZ Bend cable too short 3rd and 4th Fix trades cutting cable
- EZ Bend cable damaged
- Defective or damaged home wiring creating a fault on the line
- Extension sockets not connected to Openreach ONT
- Bending radii exceeded causing reduced levels of service.

Impact on delivery

- Inability for Openreach to provision service and developer requirement to re-provide EZ Bend cable
- Poor user experience for home purchaser with possibility of Openreach charges if called upon to rectify.

3 ONT AND BBU POSITIONING

Optical Network Termination Unit (ONT)

The ONT is the Openreach demarcation point. It replaces the traditional Copper master socket.

All network components up to the ONT including the BBU, remain the responsibility of Openreach.

All internal networks connected to the ONT are the responsibility of the home owner.

- Optical port connects to the customer splice point
- Ethernet ports connect to the CP router
- Telephony ports connect to voice network.

Battery backup (BBU)

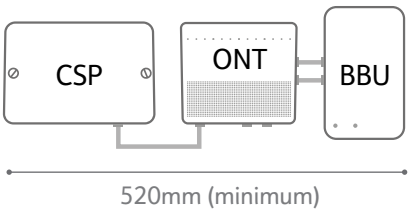
The battery backup supports voice calls for a limited time should there be any interruption to the mains power supply.

Customer Splice Point (CSP)

The CSP provides the joint housing for the external EZ Bend cable and the connected end that fits into the ONT. The CSP may be internal or external depending on your house design. Your NSR will guide you through this.

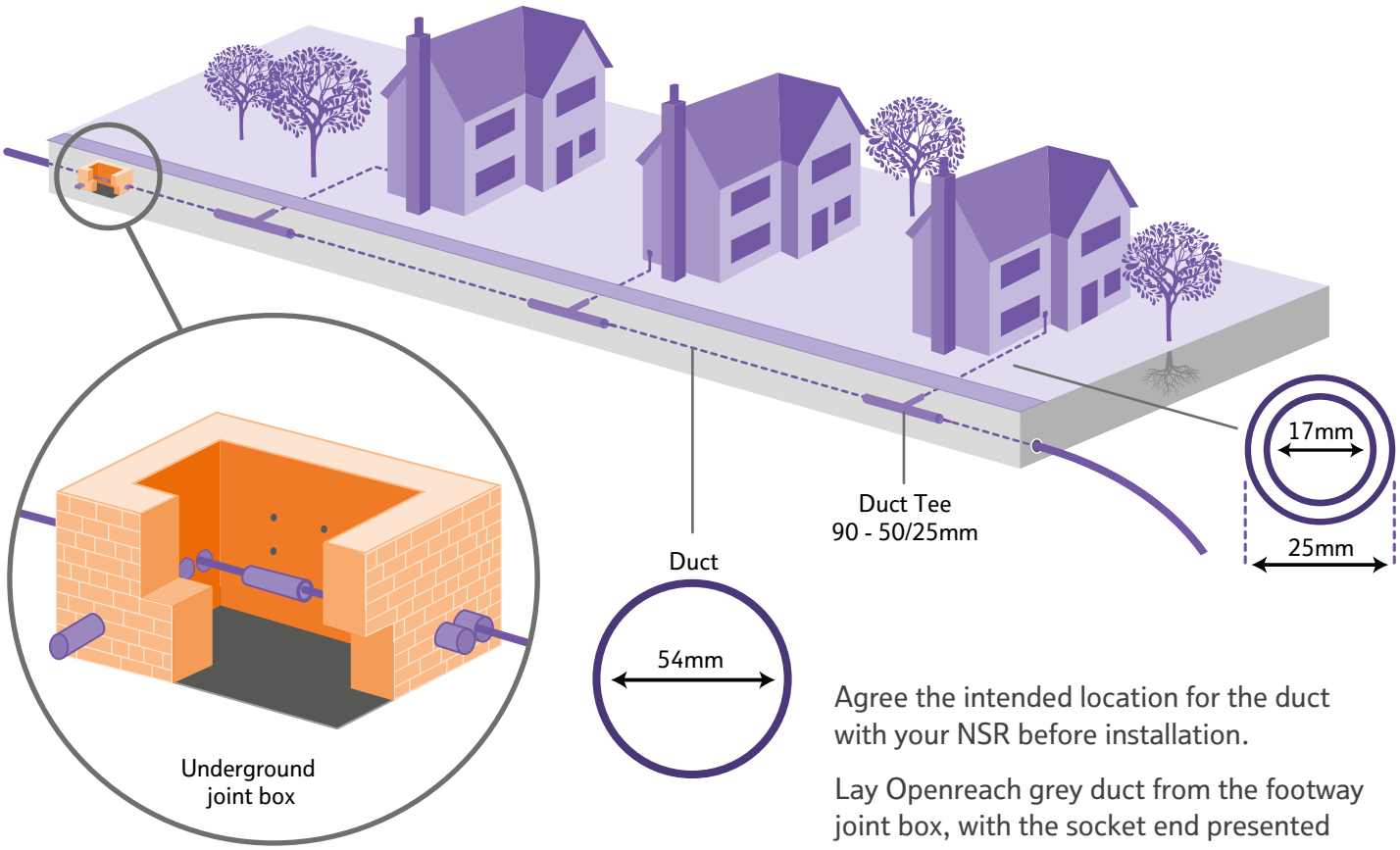
Placement Guidelines for ONT & BBU

- Install at a minimum of 300mm and a maximum of 1600mm above finished floor level.
- Ideally aligned with height of power outlet (double socket).
- Aligned with Customer Splice Point (CSP).
- ONT must be accessible for home owner and Openreach Engineers.
- Must be in an environment above +5C but not exceeding 25C.
- Must be in an environment that allows for unrestricted ventilation (not covered).
- Requires unrestricted access to connectors.
- Please avoid fitting Openreach equipment in areas of high humidity e.g. kitchens and bathrooms.



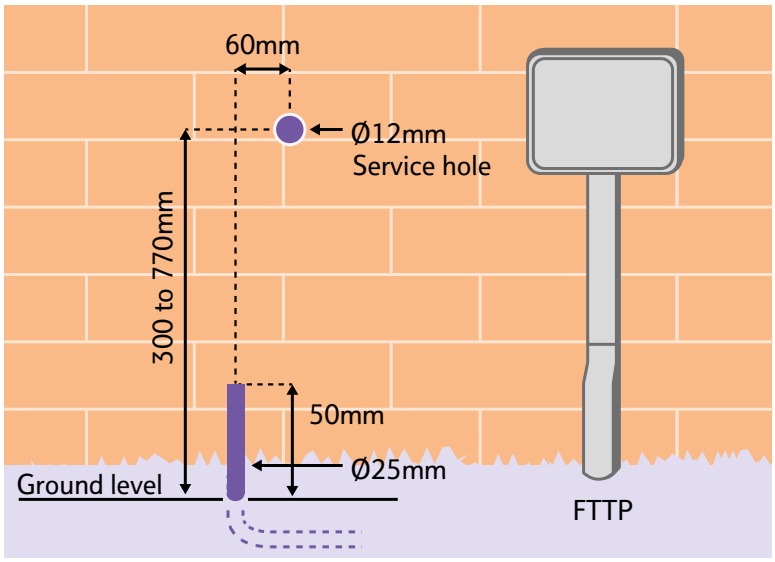
4 DUCT PRESENTATION – HOUSES

Installation for houses



Agree the intended location for the duct with your NSR before installation.

Lay Openreach grey duct from the footway joint box, with the socket end presented to the joint box and terminated with a 90° pre-formed bend on the outside of the properties wall.

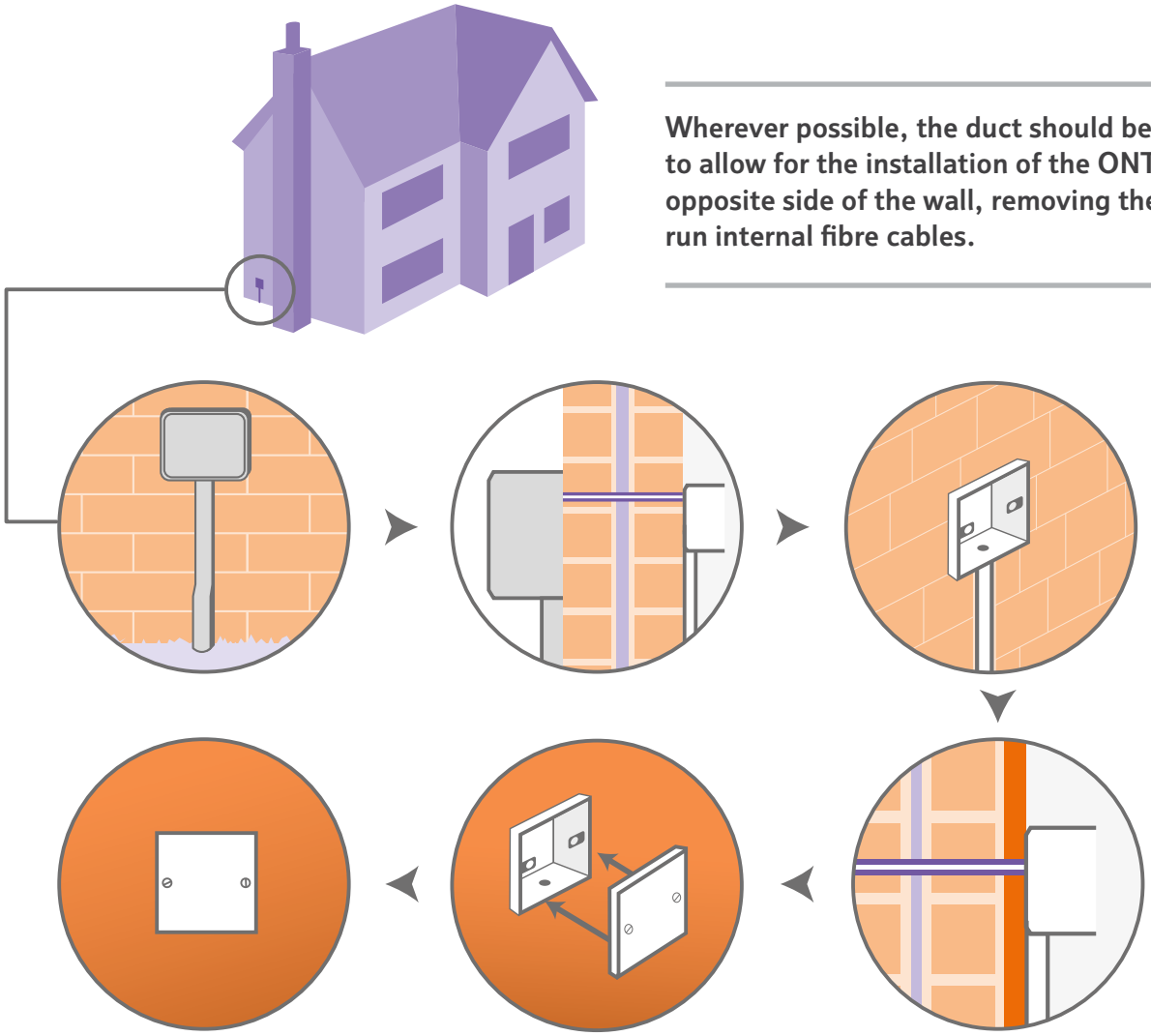


External capping 25 and connector bend 4 should be fitted, as required.

Aesthetics will be impaired if the service access hole is not drilled in line with the duct and in keeping with the above dimensions.

Please note that:

All internal wires and sockets beyond the Openreach Fibre Optical Network Terminating Equipment (ONT) are the responsibility of the developer/future home owner. Any faults or defects resulting in an Openreach visit may incur a charge.



Wherever possible, the duct should be positioned to allow for the installation of the ONT on the opposite side of the wall, removing the need to run internal fibre cables.

- Limit duct runs to a depth of 350mm/450mm beneath the proposed external ground level.
- The Openreach duct should be no greater than **15mm** from the finished wall surface.
- The duct should protrude no more **75mm** from the finished ground level.
- A rope, cable or tube MUST be installed as directed by your NSR.
- The duct must be left in a protected state preventing the ingress of debris.

Wiring through cavity walls must be installed within 20mm conduit (to protect the cable and ensure easy maintenance). The CSP and ONT should be installed in close proximity and wiring through cavity walls should be for the CLI (Customer lead in) only. Where wiring is not run back box to back box then a CLI must be used. Additional wiring through cavity walls is permissable, and where the CSP and ONT cannot be sited in close proximity the wiring must be installed within 20mm conduit (to protect the cable and ensure easy maintenance).

Typical Issues with duct presentation

1. Service hole not off set from duct centre.
2. Duct not cut to the appropriate height from the finished ground level.
3. Duct installed too shallow.
4. Duct protruding too far from the finished wall surface.
5. Customers may not be able to place orders and remedial work may incur additional costs

Impact on delivery of issues

- Delay in completion – Openreach may refuse to cable if we can't ensure adequate protection
- The capping and covers would look unsightly
- Failure to provide conduit can prevent a cable from being installed.

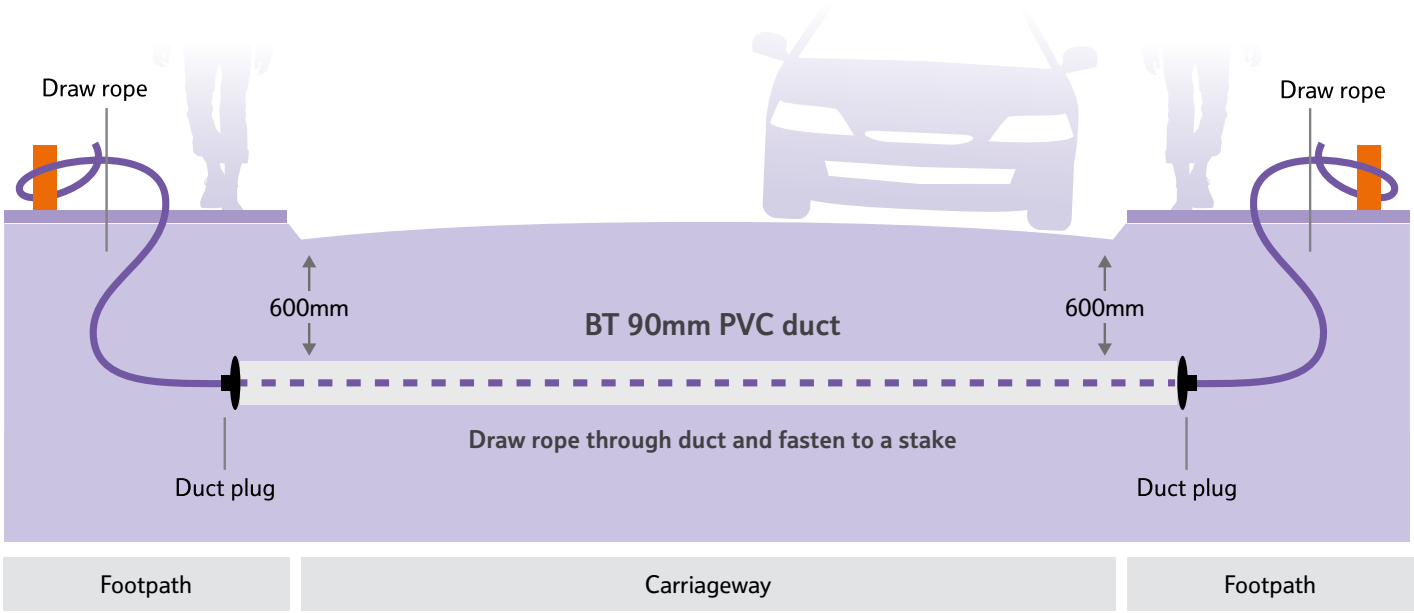
5 DUCT LAYING

Carriageway Road Crossings

Where our duct crosses a carriageway, adjoining kerbs must be temporarily marked to note positions.

Openreach **duct should be laid on an outer edge of the service trench** to enable box building. A draw rope should be inserted through the duct and secured to the marker posts at both ends of the crossing. The appropriate plug – **4B socket end and 4C Spigot**.

Duct laid beneath a carriageway crossing must be **600mm depth** from the cover of the final surface levels and, for engineering reasons (NJUG7), separated from other services **laid in parallel by 600mm** (to permit us to install underground joint boxes without the need for bends).



Cable marker No. 2 is required at the site entrance/ boundary, to ensure link up identification for our contractors.

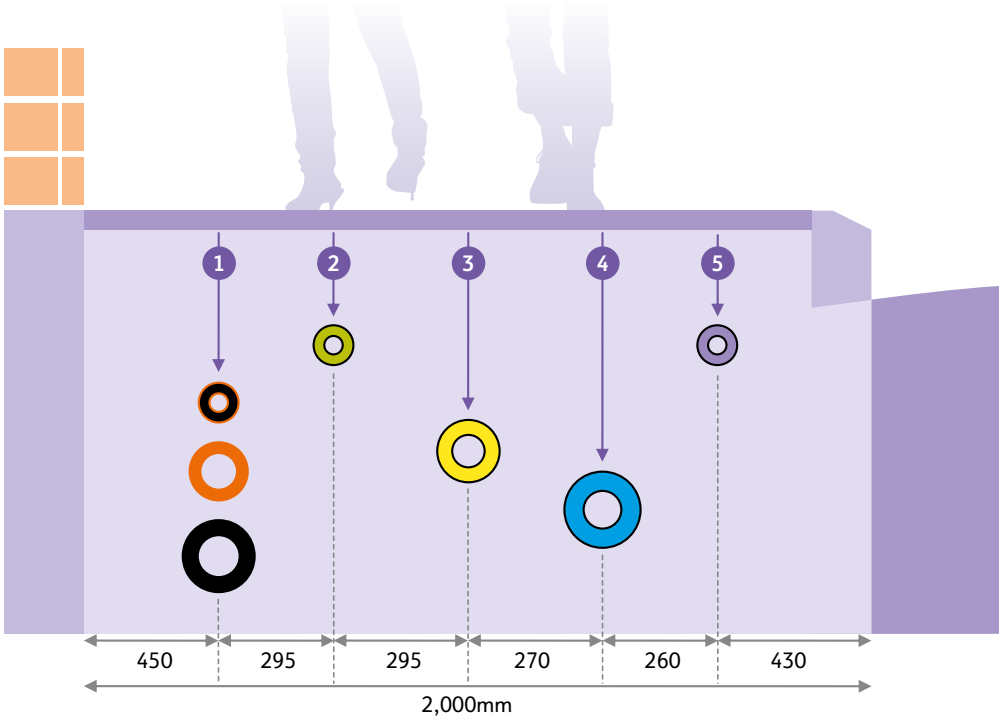
The latest information on the positioning of utilities, mains and plant can be obtained from the National Joint Utilities Group www.njug.org.uk

Ducting to the building

Duct to the premises/building must be laid at a minimum depth of 350mm; 450mm under a soft surface as straight as possible.

Ducting general principles

- All runs should be laid as straight as possible. If needed, you can carefully bend the ducts or use pre-formed bends supplied by Openreach
- There should be no more than one pre-formed 90° bend in any single run of duct
- Pre-formed 90° bends should not be installed in any duct linking two joint boxes
- Footpath or service strip ducting must be laid at 350mm depth of cover and 450mm depth of cover within premises
- All space alongside the duct must be backfilled with granular fill to a minimum thickness of 75mm
- For ALL single dwelling units (SDUs) duct must be terminated on the external surface of the property
- The duct termination point should be in a location that will allow unrestricted access for any future maintenance activity
- All ducts must be provided with a draw rope after installation, unless it's agreed locally to substitute the draw rope or a tube rather than copper
- Please notify your new sites representative (NSR) when the duct has been laid and is ready for inspection.



Recommend depth of utility apparatus

1. Electricity
   HV 450 to 1200mm
   LV 450mm
2. Cable TV & Communications
   250 to 350mm
3. Gas 600mm
4. Water 750mm
5. Telecommunications 350mm

Typical issues with carriageway road crossings

1. Insufficient depth
2. Proximity to other services

Impact of issues

Developer will have to renew duct and this may delay any first occupation date (FOD)

6 JOINT BOXES FOOTWAYS & CARRIAGEWAY

Footway (JBF104/106)

Joint box designs and specifications may vary, depending on the duct layout and whether multi-way ducts or major road crossings need to be incorporated into the network design.

Full technical drawings and specifications are available from your new sites rep/designer.

Materials

- **Bricks:** British standard EN771-1 Engineering
- **Cement:** British Standard EN197-1:2000 ordinary mix. 3 parts sand to 1 part cement

Specifications

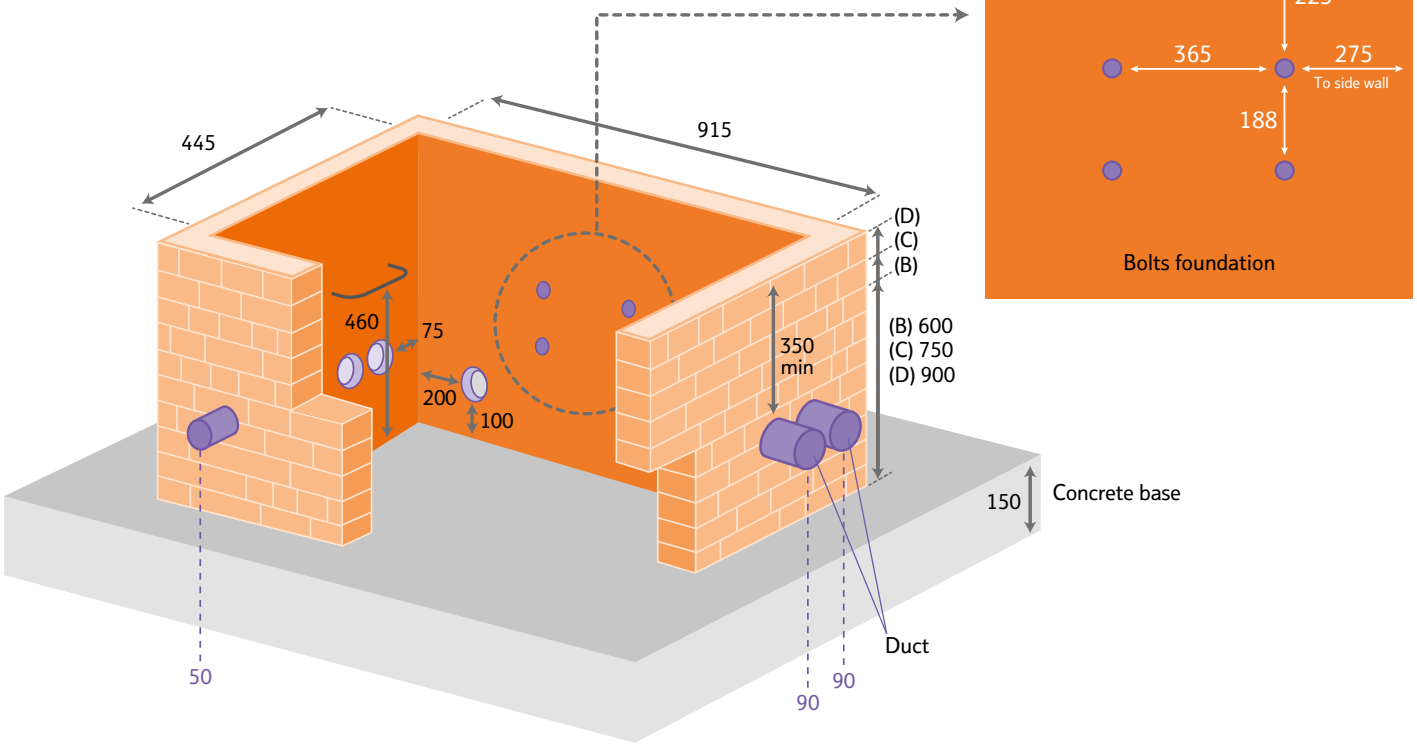
- **Base:** 150mm concrete, clean and level
- **Brickwork:** Keyed in at the corners and pointed
- **Frame and Cover:** Set on a mortar bed and fitted squarely to the box structure. You can purchase lifting keys (key No. 5, item code TW1731) for the covers from TW Tools,
- **Duct Entries:** Must not enter through corners and be no less than 75mm from the sidewall. Should enter wall at a minimum depth of 350mm from the top of the frame, cut flush and clear the base by a minimum of 100mm
- **Bolts:** Must be fitted in each box to allow ironwork to be installed
- **Step(s):** One step is required in all boxes deeper than 700mm. Two steps are required if the depth of the box is more than 1050mm
- **JBF104(C):** 915mm(L) x 445mm(W) x 750mm(D)
- **JBF 104(D):** 915mm(L) x 445mm(W) x 900mm(D), the minimum depth for boxes either side of road crossings.

At no time must minimum box depth be compromised. Consult with your Openreach New sites representative if the 750mm minimum depth cannot be achieved.

- All backfill material to be class 6N type
- Workmanship, materials and method of construction are to comply with all current relevant contract documents, British standards and codes of practice for the construction industry
- Concrete to be grade C32/40 with a water cement ration 0.4 minimum. Cement content 380kg/m^2. Aggregate maximum size 20m All in accordance with BS8500
- All ducts shown are based on maximum recommended values for duct type 54D
- End ducts to be inline
- Ducts to be positioned not less than 75mm from a side wall
- Mesh to be grade B500B or B500C conforming to BS4483
- Short lengths of duct 54D to be used on non-ducted routes. Appropriate duct to be used on ducted routes
- Where instructed to do so Drill 1 set of 3 holes using a 12mm masonry drill bit to a depth of 80mm for future fitting of MOBRA bracket.

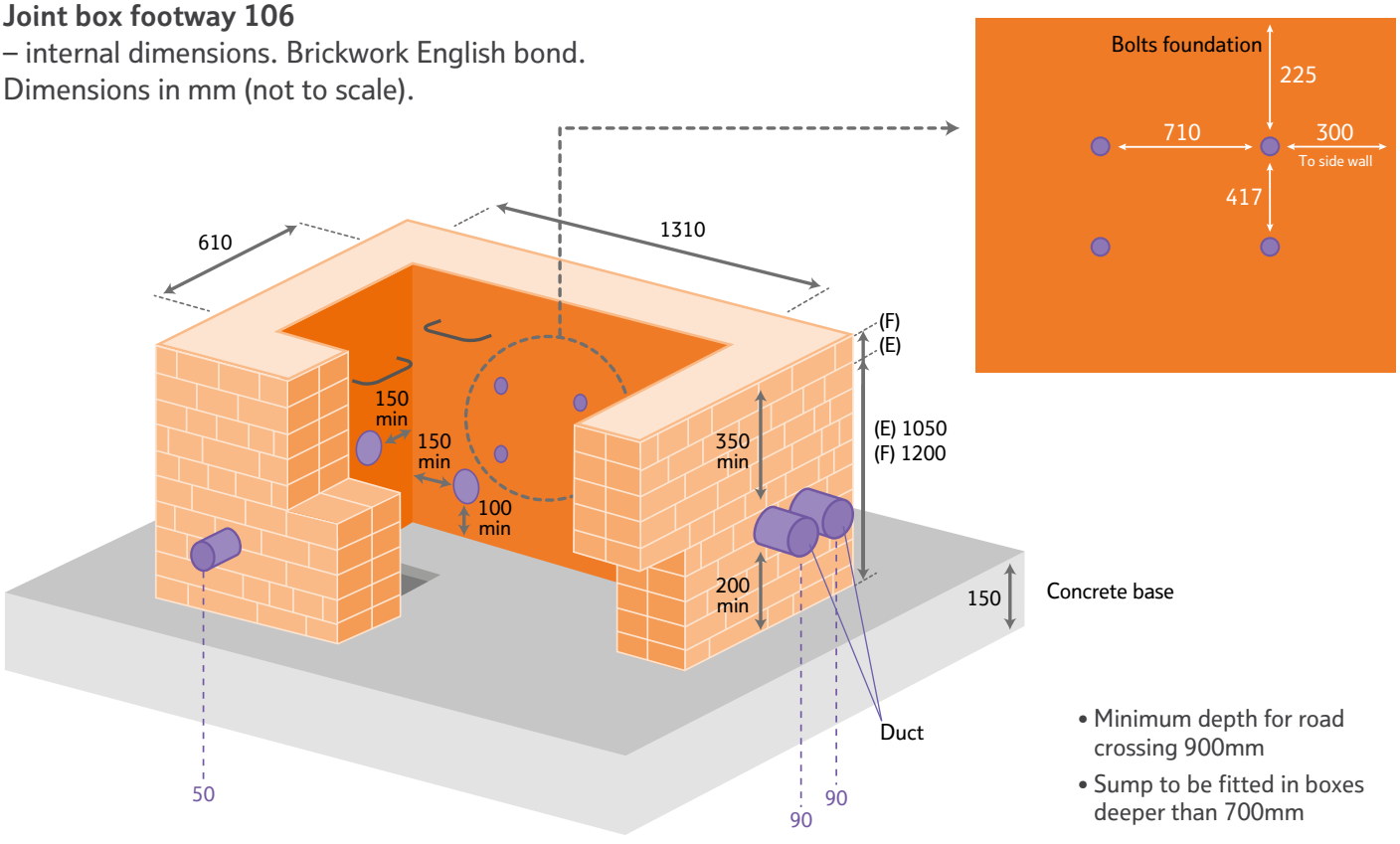
Joint box footway 104

– internal dimensions. Brickwork English bond.
Dimensions in mm (not to scale).



Joint box footway 106

– internal dimensions. Brickwork English bond.
Dimensions in mm (not to scale).



- Minimum depth for road crossing 900mm
- Sump to be fitted in boxes deeper than 700mm

Carriageway JBC4

Box design and specifications may vary. This will be determined by the duct lay-out and whether multi-way ducts or major road crossings need to be incorporated into the design.

Materials

- **Bricks:** Grade B to BSEN771 & BSEN772
- **Cement:** BS12 Portland Cement
- **Concrete:** Grade 32/40 reinforced concrete with A393 grade mesh at 70mm cover – BS EN206
- **Mortar:** designated within BS5628; Part1 requirement for mortar table 1; Type (i) BS5628.

Base

- **Bricks:** Grade B to BSEN771 & BSEN772
- **Cement:** BS12 Portland Cement
- **Concrete:** Grade 32/40 reinforced concrete with A393 grade mesh at 70mm cover – BS EN206
- **Mortar:** designated within BS5628; Part1 requirement for mortar table 1; Type (i) BS5628.

Brickwork

- All brickwork to be keyed in at corners and pointed
- Brickwork to be English bond constructed with a 10mm joint thickness of cement mortar.

Frame and cover

- Carriageway No.4 Frame and cover to be set on a mortar bed and fitted squarely to box structure to Highway Agency document standards HA104.

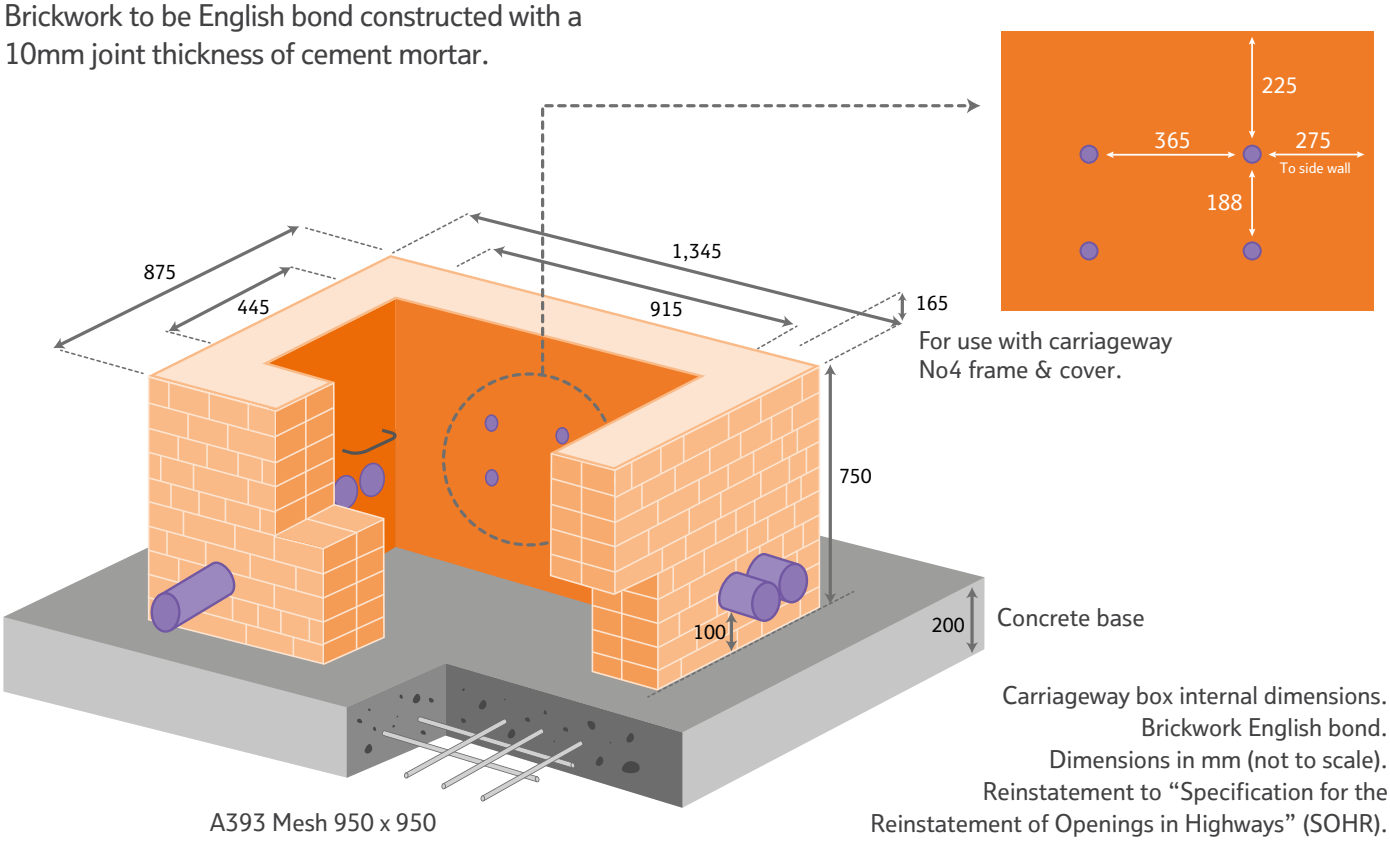
Lifting keys

- Lifter manhole cover 4B should be used to lift the cover and can be purchased from: TW Engineering Tel: 0115 932 3223 or other approved suppliers.

Duct entries

- Duct to be cut flush to the internal box wall
- Duct must not enter through corners and be no less than 75mm from the side wall
- Duct to enter wall no less than 600mm from the top of the frame
- Duct to be no less than 100mm from the box base.

Step to be installed



For use with carriageway No4 frame & cover.

Carriageway box internal dimensions.
Brickwork English bond.
Dimensions in mm (not to scale).
Reinstatement to "Specification for the Reinstatement of Openings in Highways" (SOHR).

7 PRE-FORMED CHAMBER – QUADBOX

We've approved a pre-formed chamber system – Quadbox™ to speed up the installation process. This means that there's no need for specialist box building teams and concrete backfill.

Joint box modular footways 102, 104 and 106 are the Openreach approved versions (BT specification LN178).

Box furniture items slot into moulded pockets within the chamber, eliminating the need to cast-in fixings or drill on site. Duct entries are also easy to achieve, using a standard hole saw mounted on a cordless drill.

The Quadbox™ is not a free stores item from Openreach, but can be purchased directly from our approved supplier, Cubis Industries: www.cubisindustries.com

Your NSR will approve your request to use this product.

The lightweight high-strength system is supplied as 150mm deep twin wall HDPE rings to provide maximum flexibility and strength which are simply stacked on a prepared base and backfilled with suitable as-dug or type 1 material. You must provide a clean and level 150mm concrete base for them.

If purchasing a pre-formed chamber you must also purchase the associated furniture.

Furniture

Cable brackets, bearers, pins and steps (where required) are supplied in a bagged kit and easily slot into purpose designed pockets in the chamber.

The brackets and steps drop into preformed slots.

Available Size Range	
Product Code	Clear Opening
MJF102	725 X 255mm
MJF104	915 X 445mm
MJF106	1310 X 610mm

Duct entries

Duct entries can be cut as and where required using a hole saw mounted on a cordless drill.

The chambers incorporate guides which identify drilling points to ensure correct duct spacing.

Typical issues with Quadbox are:

1. Box too shallow
2. Base/Plinth not installed correctly or missing
3. Frame not level with surface
4. Over compaction/side wall damage allowing the box to misshapen
5. Unapproved boxes being used
6. Core drill not used for cutting Duct entries
7. Duct not cut flush to box wall.

Potential impact on delivery is:

- Delay completing work by Openreach
- Additional cost
- Re-work by developer
- Unable to install fibre.

8 FRAMES & COVERS

Cubis Industries are the only supplier of these BT approved products

Only approved frames and covers must be fitted on your site. They are identifiable via the following markings; "EN124 B125" the British Standards kitemark, the Manufacturer's Mark (SID), the year of manufacture and the BT identifier.

The 'standard frames and covers' supplied by BT are 'lockable'. They consist of a galvanised steel fabricated frame, fitted with unfilled galvanised steel fabricated cover trays and cross-beams. There is also an optional 'recessed frame & cover'.

Security

Lockable footway frames and covers are available. The covers are secured by one or two integrated locks and fit into a reinforced frame that is bolted to the joint box during installation.

The installation of the box is the same specification, except that we supply you with the lockable frame and cover.

- They can be fitted to brick or concrete
- Securing tabs on the frame need to be bent down and bolted to the structure of the joint box during construction
- The cover has a Turnbuckle lock activated by the Key Security 1A. All other activities associated with opening the joint box remain unchanged
- Ensure the lock is secure.

Lockable frames and covers are also available for the "Quadbox" pre-formed chamber system.

Where ordered by the installer, security covers will be supplied pre-fitted in the Quadbox which must be fitted as the top ring.

Note – Where there is evidence or significant risk of vehicles using the soft verge e.g. as an undertaking area opposite a T-Junction, a passing point on a narrow road or a parking area, it will be necessary to install a 'carriageway chamber, frame & cover'.

Recessed frames & covers

These may be purchased by the installer as an option to the "standard frame & cover".

Each cover tray is equipped with two key-hole fittings (in the centre of the short side) one of which carries a BT identity mark and the manufacturers' three letter identification 'SID'. The other key-hole fitting displays EN124 and B125 together with the BSI Kite mark certifying the covers to BS EN124: 1994.

Recessed frames and covers will accommodate infill blocks to a maximum depth of **65mm**.

If you are planning to install frames and covers that are not supplied by Openreach e.g. for block paving, or you have any doubts about what frames and covers to use, advice should be sought from your nominated new sites representative.

Installation

All frames and covers should be levelled to the final running surface.

Where a box is located on a **grass, soft or unmade surfaces**, the frame shall be surrounded with a 100 mm wide strip of minimum grade C25/30 concrete, to the full depth of the frame, finished level with the top edge of the frame and the outside edge and be straight and parallel to the frame.

www.openreach.co.uk/orpg/home/contactus/connectingyourdevelopment/installationdiagrams/installationdiagram.do

Unapproved frames & covers

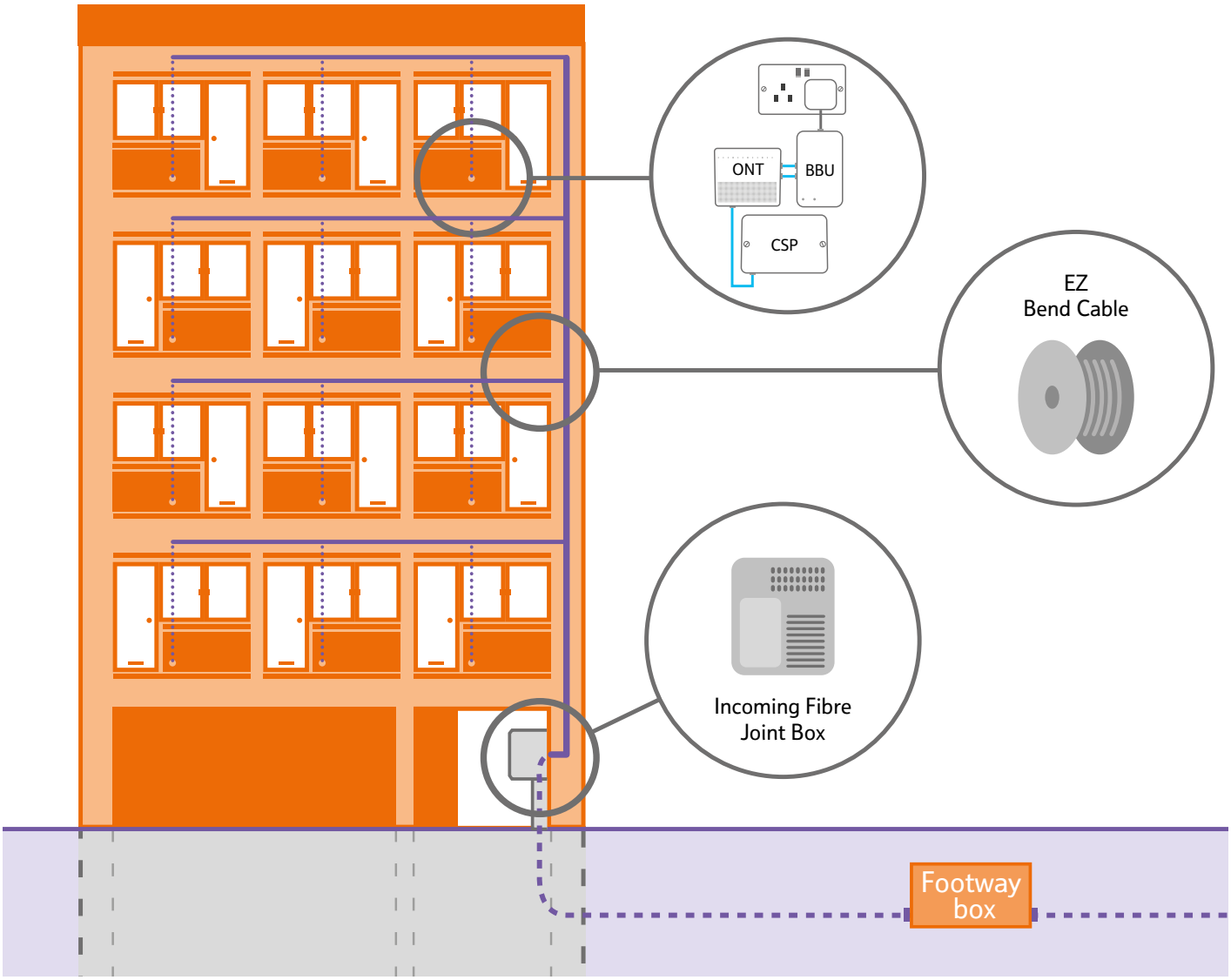
Unapproved frames and covers must not be fitted.

BT will take any necessary action against any developer who fits unapproved frames and covers within the BT network, including any potential claim for damages and costs, with possible delayed SOD payments.

If you are unsure how to specify approved covers, please contact your new sites representative.

9 MULTI DWELLING UNITS FROM INTAKE ROOM TO CUSTOMER

Small MDU

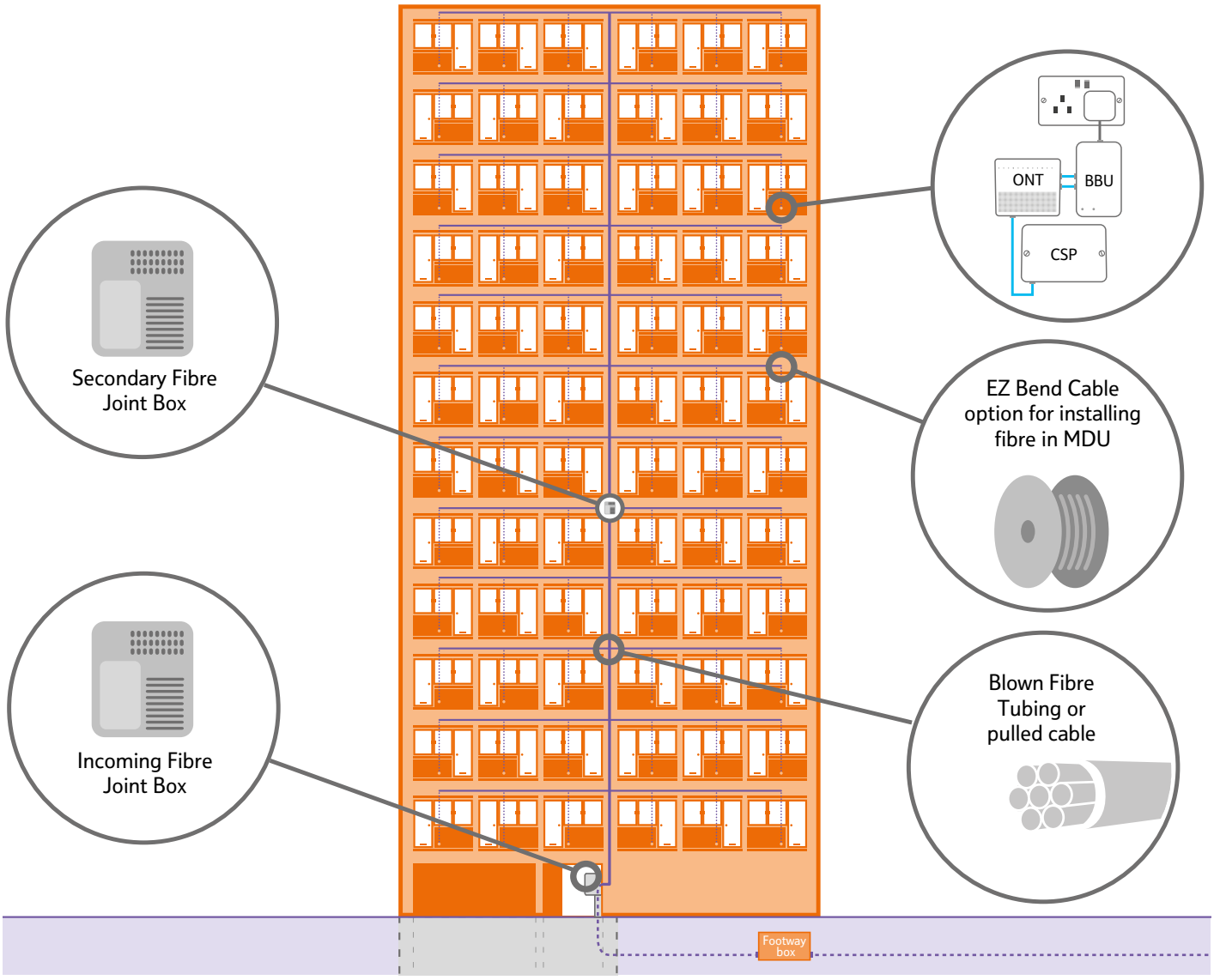


Our newsite designers will create a fibre layout based on your M&E drawings of the MDU. The design will calculate the stores required to build the network. Your NSR is on hand to guide you through the ordering process to ensure the equipment is available when you need it.

The incoming fibre will terminate in the communications intake room or riser cupboard. This needs to be a secure and safe location with access for installation and any future maintenance visits.

Our fibre box/splitter needs to be installed at a minimum height of 200mm and a maximum of 1500mm. Your NSR will agree the location with you.

Large MDU

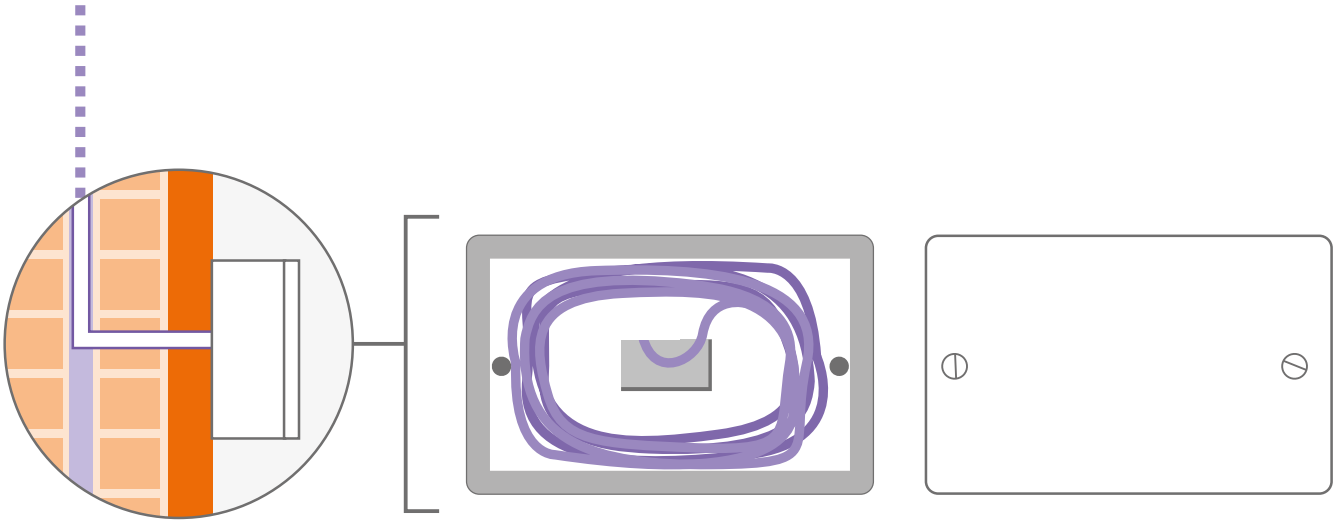


For larger MDUs there may be a requirement to install multiple fibre boxes/splitters.

These boxes/splitters will be connected with fibre tubing commonly housed within the riser space.

Each apartment will require a designated EZ Bend fibre cable run in a continuous fault-free condition from the designated ONT location within the apartment to the designated fibre/splitter box within the riser. The cable should be clearly marked with the apartment number and left safely coiled within the riser. 2000mm of spare cable is required at the apartment CSP location end and at least 2500mm of spare cable is required at the location the fibre box/splitter is to be located within the riser.

MULTI DWELLING UNITS FROM INTAKE ROOM TO CUSTOMER



- Install a flush mounted double back box at the desired ONT location
- Install the EZ Bend cable from this point to the designated riser termination point.
- Ensure there is 2000mm of spare EZ Bend cable protruding from the back box
- Push some of the spare cable back into the wall void and coil the remainder inside the back box
- Install blanking plate to protect cable ready for Openreach provision of CSP and ONT nearby.

Your NSR will advise of all cable marking/labelling and will check for this when calling off the work.

IEE wiring regulations should be adhered to.

External type cables can run to a maximum of 2000mm from the internal building entry point. From this point onwards all cables must either be of retarded, reduced or limited fire hazard properties. Alternative is to house in metallic trunking.

Fibre tubing must not be bent beyond its minimum radius. If a tube has been bent and there is evidence of kinking it should be discarded. Your NSR will advise on the possibility to join or to replace.

Care should be taken to avoid stretching the tubes through installation. If the tubes are found to be deficient through restricting installation of fibre they will require replacement by the developer.

Bends in fibre tube should be kept to a minimum and the installation of trunking, cable trays/grids should not compromise the bending radii

Fibre Tubing containing NO metal parts can be run on shared trays. IEE Regulations apply.

Correct sized Shouldered cleats are to be used for fixing Fibre cable to walls.

Plate Cable Fixings with cable ties must be used to fix Fibre Tubing direct to walls to avoid tube damage.

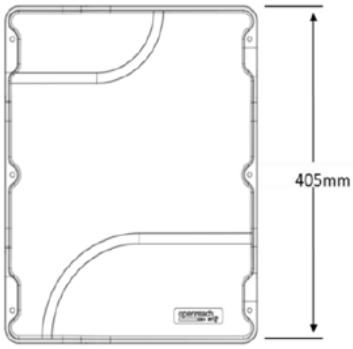
Under no circumstances should cable or tubing be secured or supported to the suspended ceiling hangers or under floor support legs.

It is the developer's responsibility to provide fire stopping on completion of the cable/tubing installation.

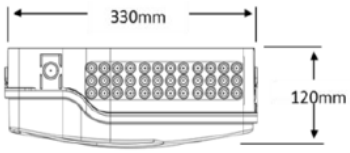
Openreach networks must not interfere with or be interfered by other services within the riser or any other shared space. E.g.

- Un-insulated hot water pipes
- Unscreened mains cables
- Fluorescent lighting
- Heavy duty switch gear.

Bending radius For fibre tubing	
7 tube cable PE and RFH type	225mm
4 tube cable PE and RFH type	200mm
2 tube cable PE and RFH type	115mm
1 tube cable PE and RFH type	115mm
1 tube unsheathed	80mm



Fibre DP dimensions



Array of ports for EZ Bend
Cable located at bottom of DP

All externally run cables must be of a type designed for external use, comply with the bending radius and appropriate cable separations to current IEE regulation and the appropriate British Standards. Consult your NSR if you or your contracted partner is unsure of the installation requirements.

If your site is identified as being in an area of higher than normal risk from lightning we may ask you to provide additional protection. For example we may ask you to provide an earth wire to the Openreach main distribution point, or run copper tape in the ground for the jointing chambers.

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