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Specification for U/G Copper Cabling

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1 **Scope**

This document forms part of the Access Network Specifications range of ISIS documents and is applicable to both Openreach direct labour and external contractors. (See EPT/ANS/A001 for an index of all other documents in this range). This section details the performance requirements that shall be met when copper cables are installed, secured or recovered.

2 **Cabling in Duct**

2.1 **General**

This sub-section details the performance requirements that shall be met when metallic cables are installed into underground duct.

2.2 **Glossary/Application**

Anchor Cable 4

A steel collar with a shoulder and notched tail designed for use in 92mm diameter duct to prevent cable creepage, where necessary. It has a notched tail which is designed for securing the cable using Strips and Clips Binding.

Cap Sealing 16 A-F, a range of heat shrinkable caps suitable for sealing non-pressurised cable ends.

Cap SealingEnd Capping of Non-Pressurised Cable Diameters (mm) Cap Sealing 16A5-8 Cap Sealing 16B8-11 Cap Sealing 16C11-17 Cap Sealing 16D17-30 Cap Sealing 16E30-50 Cap Sealing 16F50-90

Cap Sealing 19 A & B , a range of heat shrinkable caps suitable for sealing pressurized cables ends
--

Cap SealingEnd Capping of Pressurised Cable Diameters (mm) Cap Sealing 19A16-26 Cap Sealing 19B26-44
--

Cap Sealing 20 A-D , a range of heat shrinkable caps incorporating an air valve suitable for sealing pressurized cable ends
--

Cap SealingEnd Capping of Pressurised Cable Diameters (mm) Cap Sealing 20A16-26 Cap Sealing 20B26-44 Cap Sealing 20C44-71 Cap Sealing 20D71-90
--

Lubricant Cable 2A

Lubrication of cables to assist their installation into underground ducts, when installed by pulling techniques only.

Mesh Cable Anchor

Used for wrapping cable where cables anchor is to be fitted.

Strips and Clips Binding

Steel binding strip approx. 10mm wide and associated clip with eye for tightening used to secure cable to Anchors Cable.

2.2.1 Performance Requirements

The works executioner shall comply with the following performance requirements:

2.2.2 Cable Installation

- a) Only the approved cable anchors detailed in paragraph 2.2 shall be used to anchor cables.
- b) Only the cable lubricants detailed in paragraph 2.2 shall be used to lubricate cables installed by pulling techniques.
- c) The disposal of any scrap material e.g. lubricant shall be disposed of in accordance with the current Openreach environmental policy.
- d) There shall be no damage to any of the copper pairs or any other component part of the cable. Approved cabling products (rollers, bell mouths and cable guides) must always be used in cabling operations.
- e) There shall be no damage to existing Openreach cables or plant.
- f) Each route shall be cabled such that the number of joints does not cause the loss requirement of the route to be exceeded.
- g) Coaxial and Quad type cables are coded to indicate clockwise or anti-clockwise orientation of the cable. These cables shall be installed so that clockwise ends are jointed to anti-clockwise ends.
- h) Sufficient cable shall be left in the jointing chamber to enable the jointer to position the joint in any convenient position he chooses. In addition, an extra 2.5 m of cable per cable end shall be left for copper cables. This jointing allowance shall not include the part of the cable which was used for attachment of the pulling device as this is unsuitable for jointing.
- j) Where cable ends are left in the joint box or manhole for jointing they shall be capped using the appropriately sized Cap Sealing 16 (Non-pressurized applications). For pressurized applications Cap Sealing 19 or Cap Sealing 20 (with air valve) shall be used.

2.2.2.1 Additional requirements for Copper Cable Installation

- a) The External (PE sheathed) Copper Cable minimum bending radius is 7 x outside diameter and the Minimum Bending Radius for pulling during installation is 8 times the outside diameter.

- b) The maximum pulling tension that may be applied to a copper cable during installation, is given by the following formula -
Maximum Pulling Tension (Newtons) = 100nD²
D is the Cable Diameter in millimetres and n is the Number of Pairs
- c) Use only the newly provided draw rope for installing cable/rope in duct.
- d) Cables shall be marked, collected/labelled as necessary
- e) Anti creepage devices shall be re-fitted on completion of work.

2.3 Duct Sealing

All ducts connected to the Openreach duct network which terminate inside any structure, irrespective of ownership, must be sealed against the egress (exit) of gas or water from the duct into the structure.

Always check for gas before entering any structure to carry out duct sealing. If breaking down an existing seal, check for gas when the seal is finally broken. If gas is detected reseal immediately and arrange for the gas to be vented. The dangers from gas entering structures through the cable ducts are serious and very real and it is essential that the duct seals are maintained in good condition.

2.3.1 Use of Duct Seals

Table 1

Application	Seal	Degree of sealing
Duct 54D whilst laying	Plug Duct 4B, socket end or 4C, spigot end	ingress of foreign matter
Duct 54D open ended without cable	Duct Seal 1A. If the duct is to be cabled within 30 days then use a Plug Pressure 1	ingress/egress of gas or water
Duct 54D open ended with cable	Duct Seal 1A or 1B, depending on cable diameter and quantity of cables	ingress/egress of gas or water
Duct 54D with existing Gland Caulking	Preferred method Duct Seal 1A or 1B, depending on cable diameter and quantity. If the gland is empty and is to be cabled within 30 days then use a Plug Pressure 1 Alternative method Compound 16A with Discs Caulking 1	egress of gas or water
Duct 56 as external lead-in	Plug Duct 1A	ingress of foreign matter
Duct 56 open ended without cable	Duct Seal 1C. If the duct is to be cabled within 30 days then use a Plug Pressure 3	ingress/egress of gas or water
Duct 56 open ended with cable	Duct Seal 1C	ingress/egress of gas or water
Duct 56 with existing Gland Caulking	Preferred method Duct Seal 1C. If the gland is empty and is to be cabled within 30 days then use a Plug Pressure 3 Alternative method Compound 16A with Discs	egress of gas or water

	Caulking 4	
Earthenware duct	Duct Seal 1A, 1B or 1C, depending on duct and cable diameter and cable quantity. If the duct is to be cabled within 30 days then use a Plug Pressure 1 or 3 if size is suitable	ingress/egress of gas or water
Existing lead sleeve lead-ins, in cable chambers	Preferred method RISE Duct Seal 100WG or 150WG depending on duct diameter Alternative method Duct Seal 2A or 2B, depending on sleeve diameter	egress of gas or water
New lead sleeve lead-ins, in cable chambers	Preferred method Duct Seal 1A, 1B or 1C, depending on duct and cable diameter and cable quantity. If the duct is to be cabled within 30 days then use a Plug Pressure 1 or 3 if suitable	egress of gas or water
Cabinet lead-ins	Un-cabled bore Plug Pressure 1 Cabled bore Resin Pack 14	egress of water vapour
Kiosk	Resin Pack 14	egress of gas or water
Hollow Pole	Duct Seal 1A, 1B or 1C, depending on duct and cable diameter and cable quantity	ingress of gas or water
Telephone Entry Box CN 13794	Compound 16A	ingress/egress of gas, water and foreign matter
For all duct entries where none of the above may be utilised	RISE Duct Seal 100WG or 150WG depending on duct diameter	ingress/egress of gas or water

The above seals will provide the degree of sealing necessary, although no B Openreach practice for testing the degree of sealing, after installation, exists.

2.3.2 Cable Recovery

2.3.2.1 General

This sub-section details the performance requirements that shall be met when cables are recovered from underground duct

2.3.2.2 Performance requirements - recovery for scrap

- a) There shall be no damage to Openreach plant.
- b) Any anti-creepage devices shall be recovered prior to cable recovery.
- c) The disposal of any scrap material e.g. lubricant shall be disposed of in accordance with the current Openreach environmental policy.

2.3.2.3 Performance requirements - recovery for re-use

- a) There shall be no damage to Openreach plant.
- b) Any anti-creepage devices shall be recovered prior to cable recovery.

- c) There shall be no damage to the recovered cable.
- d) Cable recovered for re-use shall be fit for re-use in accordance with the criteria laid down in EPT/ANS/017.

2.4 Cable Support & Protection

Support and protection are necessary to minimise the risk of damage and prevent excessive bending of all Copper Cables. Failure to provide adequate support and protection could result in a change in the overall cable section loss or reduce the possibility of upgrading the terminal equipment as technology develops.

2.4.1 Supporting Cables & Joints

Supporting Cables & Joints in Jointing Chambers

General

This section describes methods of supporting cables and joints in jointing chambers. These methods can be applied to all types of cables. All the methods described have been devised to reduce to a minimum the incidence of cable sheath fractures resulting from the following causes:

- a) Sagging of the cable (and joint) due to its own weight
- b) Mechanical damage
- c) Vibration and creepage

The supporting methods recommended in this section should be applied to new cables where applicable and to existing cables where their fault histories indicate that they are inadequately supported. However, proposals for retrospective action on a considerable scale should be agreed by the planner. Where it is impracticable to follow fully the recommendations outlined in this instruction, methods of support should *be devised which differ as little as possible from those described*.

Description of Supporting Devices

Brackets, Cable Bearer and Pins, Locking, Cable Bearer

Brackets, Cable Bearer are the most commonly used type of supporting bracket (see

Figure 2 and

Figure 3). They are located by means of Pins, Locking, Cable Bearer in pressed-steel channels fixed to the jointing-chamber wall, or exceptionally in rolled-steel joists fixed to the floor. Brackets are manufactured in grey cast iron, and although having an adequate factor of safety for carrying cables, they should not be stood upon or thrown down upon concrete floors. Brackets are made in various sizes as shown in **Table 1**. The pins are made of high tensile steel wire, bent to form self-locking pivots.

Table 1 - Brackets, Cable Bearer

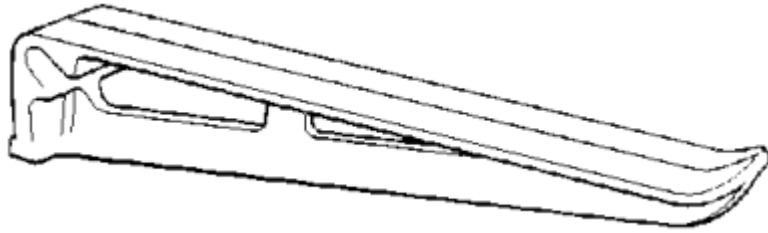
<i>Bracket No.1</i>	<i>Effective Length (mm)</i>	<i>Overall Length (mm)</i>
3	80	150
5	130	170
8	200	250
12	300	350
18	450	500
24	600	650

The three designs of Bracket Cable Bearer and all are compatible with and attach to Bearers Wall Type using Pins Locking Cable Bearer in the conventional manner. The working physical dimensions of all bracket types remain unaltered.

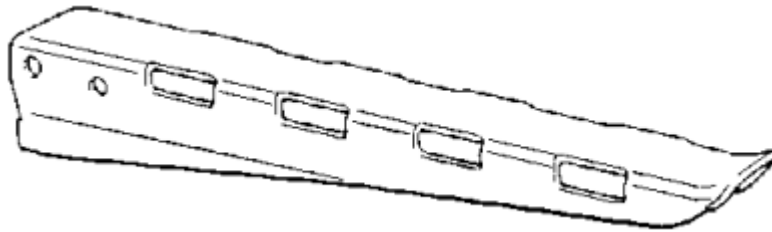
Figure 1 a, b & c - Types of Bracket Cable Bearer



Conventional Cast Iron Bracket



New Cast Iron Bracket



Pressed Steel Bracket

2.4.2 Cable bearers, wall type

These bearers are of light pressed-steel channel section, fixed to the jointing-chamber wall by means of Bolts, Foundation, Indented, No. 2 which are set in the walls at the construction stage or Bolts, Expansion, 13 mm x 64 mm for additional channels placed upon existing walls (see

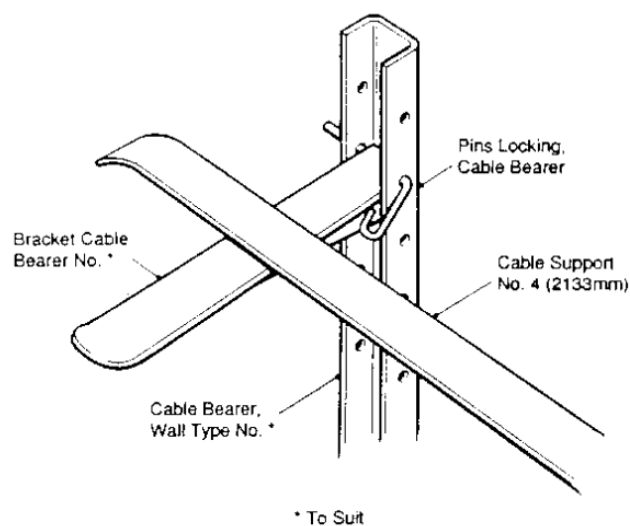
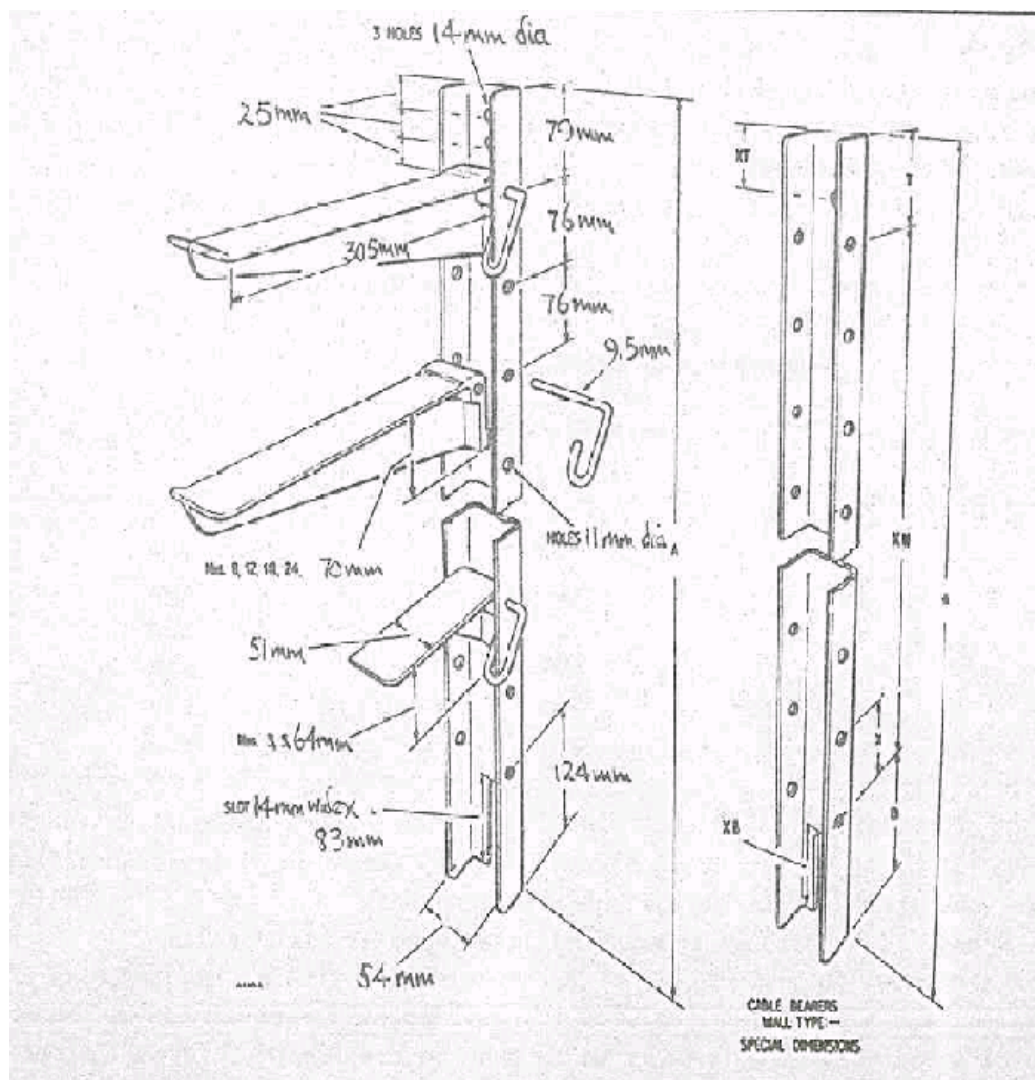
Figure 2). Three holes are drilled, at 25 mm, centres at the top of the channel and a corresponding slot is provided at the bottom of the channel. These

holes and the slot allow some adjustment to be made to compensate for small discrepancies in the fixing centres and/or the duct levels. Holes spaced at 76 mm centres are drilled in each of the sides of the bearers to take the locking pins (an exception is the smallest type of bearer which has only one hole in each of its sides). The description of the item is Cable Bearers, Wall Type, No.xx. The number 'xx' indicates the number of brackets which the bearer will carry (at 76 mm bracket spacing for type No. 2, and 152 mm bracket spacing for types Nos. 3-12). The various sizes of cable bearers and the number of pairs of holes in each size are shown in [Table 2](#).

Table 2 - Cable Bearers, Wall Type

Cable Bearer Numbers	Overall Length A (See Fig. 1) (mm)	Pairs of Brackets Fixing Holes
1	178	1
2	279	2
3	508	5
5	813	9
8	1270	15
10	1574	19
12	1879	23
Special Size	Dimensions A, B, T, X, XB, XN and XT (see Fig. 1) to be stated at time of ordering.	

Figure 2 a and b - Cable Bearer, Wall Type Assembly



2.4.3 Cable bearers, standard type

These consist of lengths of rolled-steel joists, 76 mm x 76 mm x 3.9 kg, fixed by cleats to the floor, and, where necessary, to the roof (see

Figure 3. Fixing centres are shown in Drawing CN 1059. These bearers are not made in stock sizes, but in accordance with dimensions A (see note below), B, T, X and XN, which should be furnished at the time of ordering; the number of foot and head-cleats required should also be stated. The holes drilled in the flanges of the rolled-steel joist are provided for the Pins, Locking, Cable Bearer and are normally spaced at 152 mm centres unless otherwise stated.

Note: If a head-cleat is required, dimension A should be the measured height of the jointing chamber less 13 mm. The slots provided at the top of the bearer will enable the cleat to be bolted to the bearer with the flange of the cleat in contact with the roof.

2.4.4 Brackets, joint box

These supporting brackets are made of wrought iron or mild steel (see inset of

Figure 4), and are built into the side walls of Footway Joint Boxes No. 2, which is the only type of jointing chamber in which they are used. The brackets project 76 mm to 89 mm from the face of the wall.

2.4.5 Restrainers

These are made of lengths of 25 mm mild steel angle, slotted along their length and provided with a "stop" and a fixing hole (see

Figure 5). They are intended for use in conjunction with Straps Cable Fixing (or Strip, Binding and Clips, Binding) for restraining plastic-sheathed cable in position on Brackets, Cable Bearer. The range of sizes is shown in Table 3, the numbers corresponding with those for Brackets, Cable Bearer. The suffixes L and R indicate the direction in which the slotted angle is bent.

Table 3 - Restrainers

Restrainer Number (See Note)	Effective Length (mm)	Overall Length (mm)
3L and 3R	25	121
5L and 5R	127	171
8L and 8R	203	248
12L and 12R	305	349

18L and 18R	457	502
24L and 24R	610	654

Note: The Restrainer Number selected should be the same as the Bracket, Cable Bearer, Number with which the restrainer is associated.

2.4.6 Supply of Cable Supports and Cable Bearers

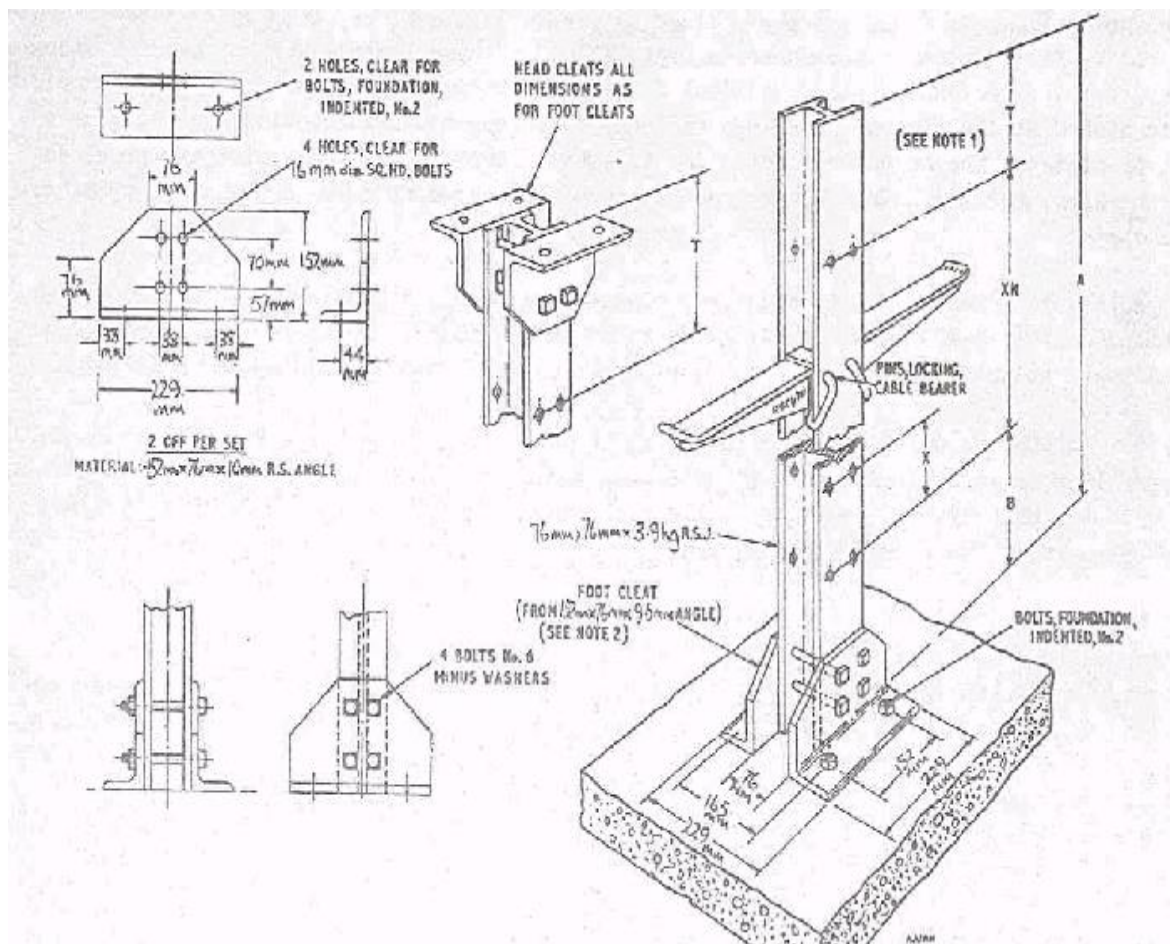
Due to the small demand for them, the following items should be obtained locally, either by manufacturing in Region or Area workshops or by local contractor:

Cable Supports Nos. 2 and 3 (to be manufactured to Drawing CN 1830)

Cable Bearers Wall Type Special (to be manufactured to Drawing CN 1061)

Cable Bearers Standard Type (to be manufactured to Drawing CN 1060)

Figure 3 - Cable Bearer, Standard Type



Note: 1: Dimensions A, B, T, X and XN to be furnished.

Note: 2: Cleat requirements to be stated.

Figure 4 - Brackets, Joint Box

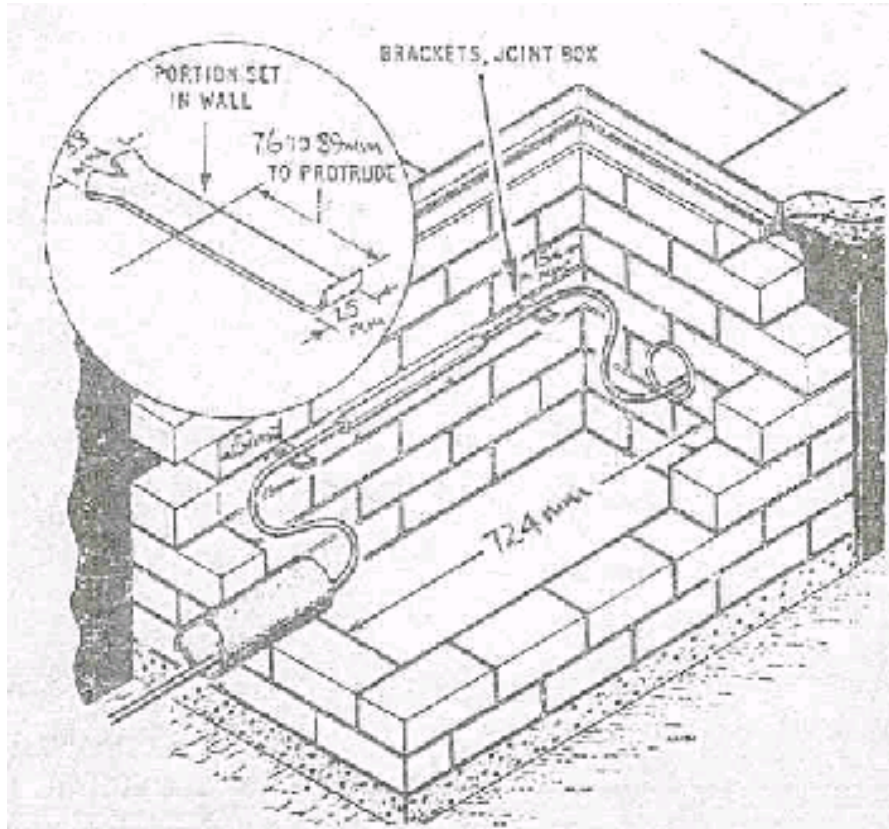


Figure 5 - Restrainers

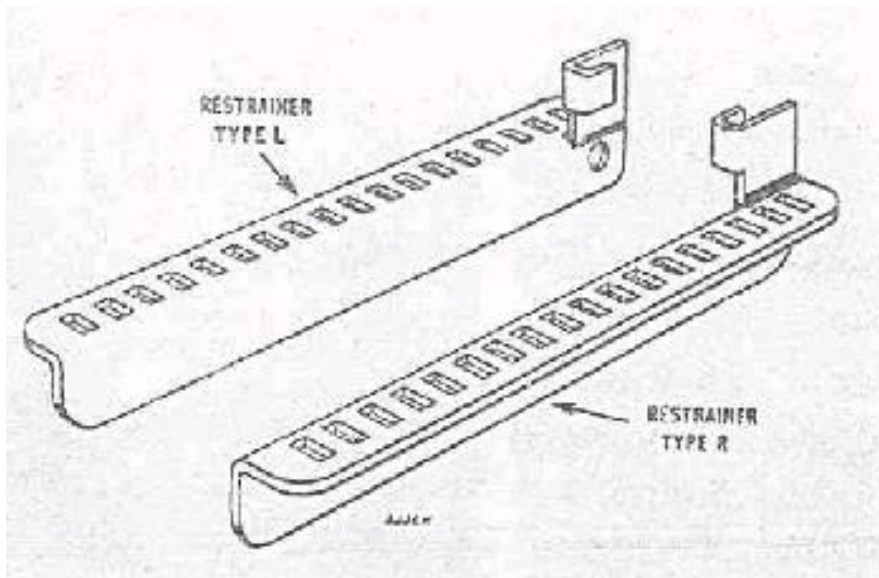
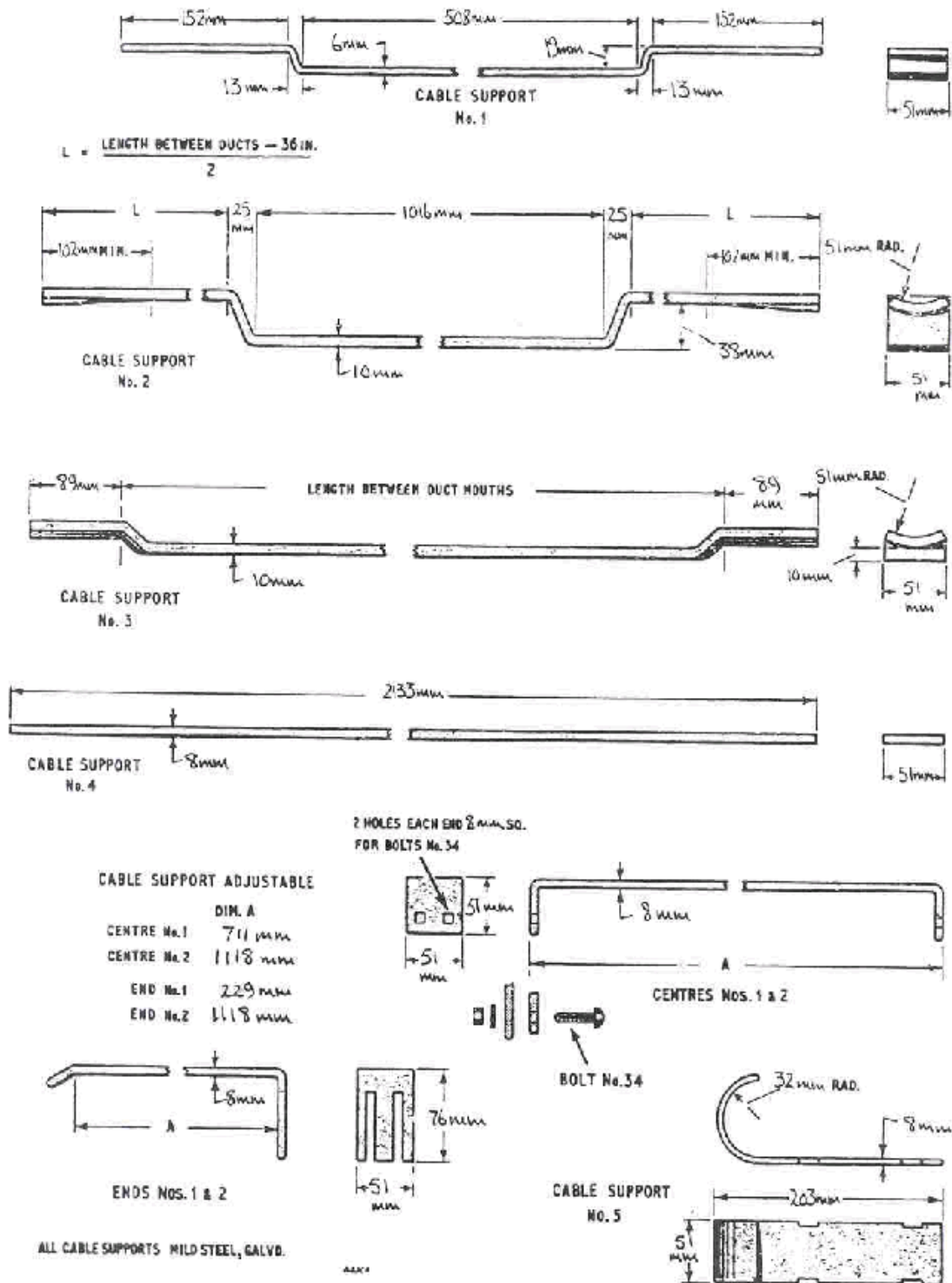


Figure 6 - Cable Supports



2.4.7 Cable Supports (also see Section 4)

These are galvanized mild steel bars designed to give support to cables and joints in most jointing chambers (see

Figure 6). Six types of bar, Cable Supports Nos. 1-5 and Cable Support, Adjustable, are shown in

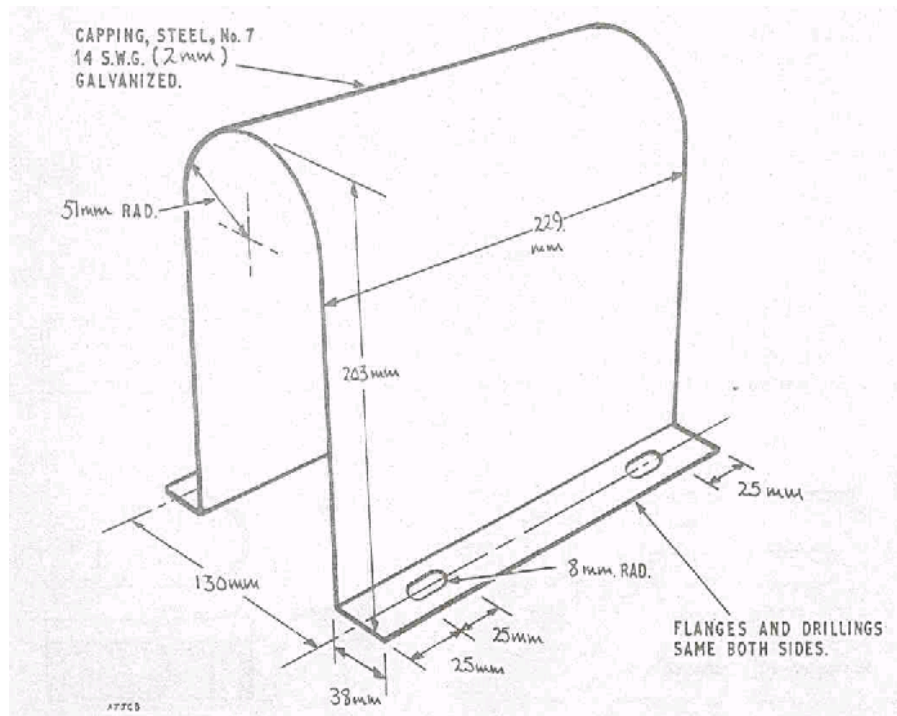
Figure 6.

Cable Supports Nos. 1 and 2 and Cable Support, Adjustable are typically used for the support of joints, and Cable Supports Nos. 3-5 are typically used for the support of cable, however, they may be used for either purpose. All the cable supports except Nos. 2 and 3 are designed to rest on Brackets, Cable Bearer. Nos. 2 and 3, which are curved at their ends, are designed to rest in the duct-mouth into which they project by 76 mm. Cable Supports No. 1 are for use in Footway Joint-boxes No. 4 only, Cable Supports Nos. 2 and 3 are primarily for use in Buried Boxes Nos. 7 and 8, and the remaining Cable Supports are for use in nearly all types of jointing chamber. Cable Support No. 4 is 2133 mm long, but it may be cut if a shorter length is needed; the cut end should be painted with Paint, Black, for Ironwork. Cable Support No. 4 may be used to extend Cable Supports, Adjustable. Cable Support No.5 is typically used as a supporting device for a cable which does not rest squarely on a cable bracket.

2.4.8 Capping, steel, no. 7

This capping is provided in 299 mm lengths to protect the tail cables of Cases, Repeater Equipment, No. 1 where these are provided in joint boxes (see fig 7)

Fig. 7



2.5 Method of Use of Supporting Devices

2.5.1 Brackets and Bearers

The size of Brackets, Cable Bearer to be used will normally depend on the number and diameter of the cables to be supported, the aim being to plan the layout so that short brackets will meet requirements. Sometimes, however, it is necessary to use long brackets, e.g. Brackets, Cable Bearer, No. 24, to give a greater outreach when cables cannot be set close to the jointing-chamber wall; long brackets should not be used as a means of reducing the number of tiers of brackets. The Cable Bearers, Wall Type or Cable Bearers, Standard Type associated with the Brackets, Cable Bearer are spaced 914 mm apart, except where they are installed in the smaller surface-entry joint-boxes or where special requirements necessitate some other spacing. Normally the cable, and not, the joint sleeve, rests on Brackets, Cable Bearer, the sleeve being situated between the brackets. Cable Bearers, Wall Type are always used in joint boxes (except Footway Joint Boxes No. 2 and Buried Boxes Nos. 7 and 8), and generally in manholes; Cable Bearers, Standard Type are used in manholes in which the positioning of cables is restricted because of their large minimum bending radius or where manholes are built on an existing cable track and it would be expensive and inconvenient to piece-out the cables to enable them to be set against the manhole walls. The supporting device used in Footway Joint Boxes No. 2 is a Bracket, Joint Box, and

Figure 4 illustrates the way in which a cable is supported on these items set into the wall of a brick-built box.

2.5.2 Tape binding

A cable having a plastic sheath without a substantial metal sheath in addition tends, after setting, to return to its original position. Therefore, when such a cable is set and laid on brackets, without the use of cable supports, it is frequently necessary to attach or anchor the cable to the bracket. For cables of diameter up to and including 19 mm, a simple means of attachment to the brackets may be provided by bindings of Tape, Plastic Adhesive, ½ inch, each binding having about six turns. If the cable is attached to a cable support the tendency of the cable to depart from the position into which it has been set is nullified in the vicinity of the support; away from the support, however, the measures referred to above to prevent movement of the cable may still be required.

Note: **Where additional support is required, Straps Cable Fixing, tensioned and cut using the appropriate tool, may be used to secure the cable in position.**

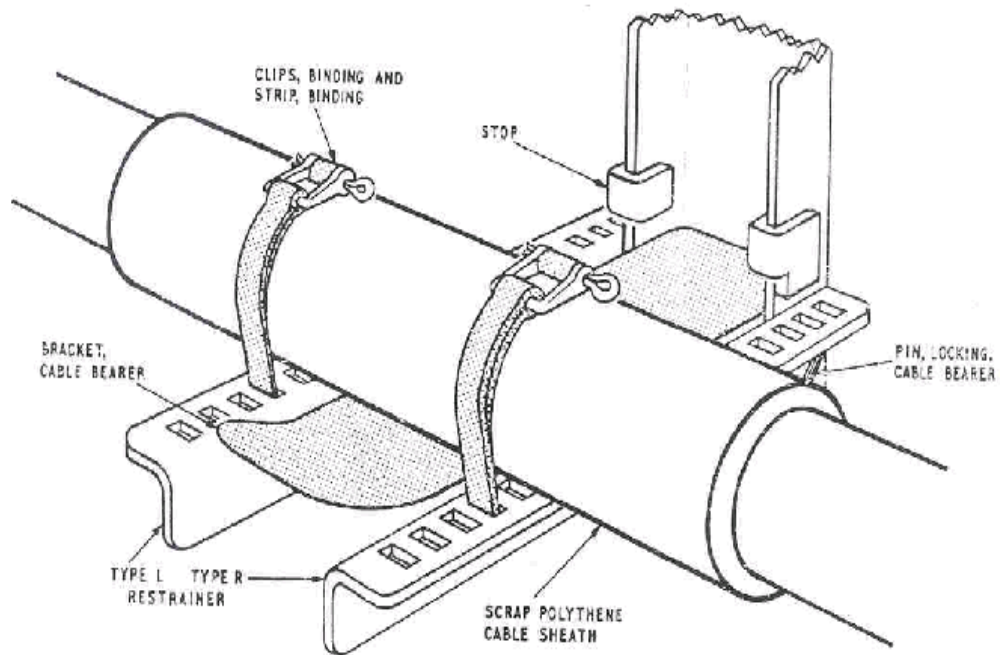
2.5.3 Restrainers

Restrainers may be used (see [Figure 7](#)) if it is necessary, to anchor in position on the brackets a cable, over 19 mm diameter, having a plastic sheath without a substantial metal sheath in addition.

Two restrainers are located, one along each side of the Bracket, Cable Bearer, by means of the Pin Locking, Cable Bearer, which also retains the bracket in position. The provision of left- and right-hand types of restrainer enables the cable to be bound on each side of the bracket, the two fixings enabling a cable to be set so that it will enter a joint in the same plane as the joint sleeve (this is especially desirable where expanding plugs are used for joint closure).

Straps Cable Fixing (or Clips, Binding and Strip, Binding) should be used in accordance with the manufacturer's instructions, the restrainers lifted until horizontal and flush with the bracket (the stop at the pivot end of the restrainer should prevent it from rising above this level but if, due to tolerances of the piece parts, the restrainer does rise above the plane of the bracket, the stop should be 'set' to obtain satisfactory positioning. The fixing should be threaded through appropriate slots in the restrainer, a piece of scrap polythene sheath placed over the cable sheath at the position where the fixing will be applied.

Figure 7 - Use of Restrainers

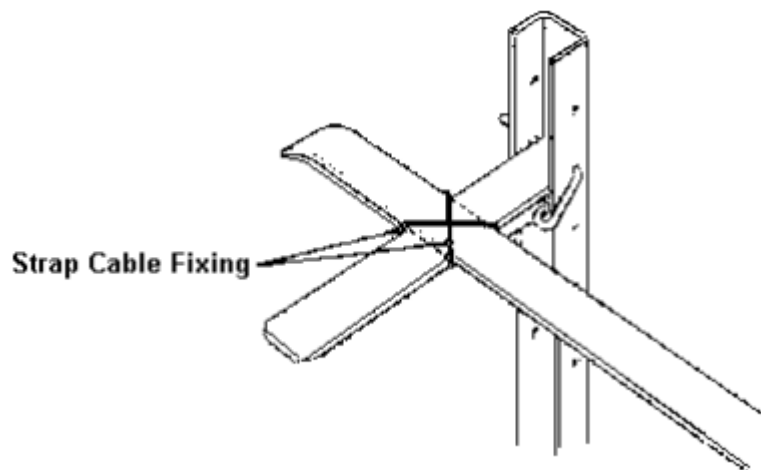


2.5.4 Cable Supports

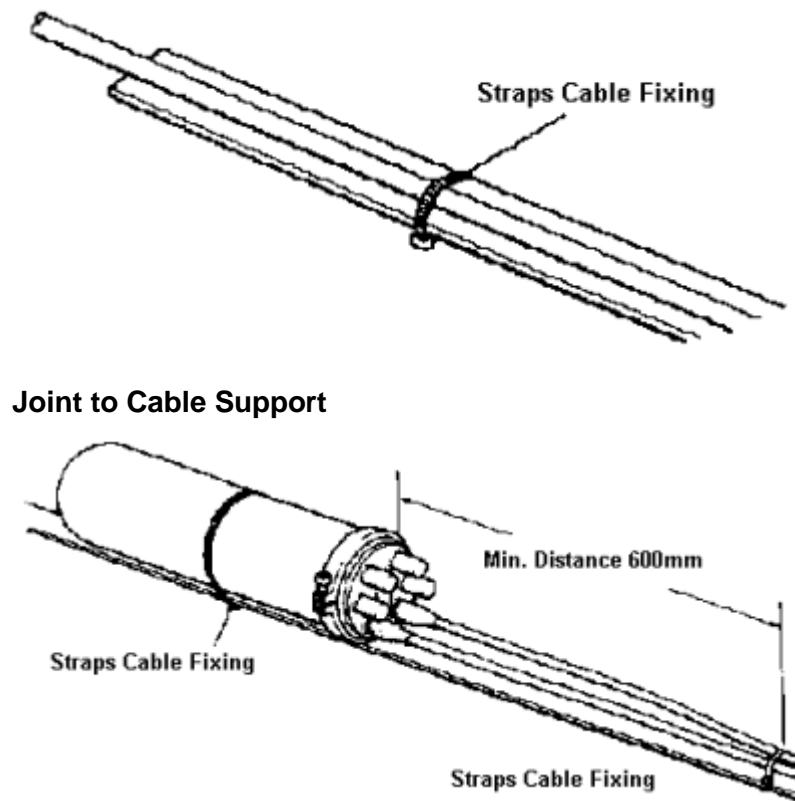
Straps Cable Fixing, tensioned and cut using the appropriate tool, may be used to secure ironwork, cabling and joints as shown in [Figure 8](#).

Figure 8 - Securing with Straps Cable Fixing

Cable Support to Bracket



Cable to Cable Support



2.5.5 Capping, steel, no. 7

Capping, Steel, No. 7 is used to provide protection to the tail cables of Cases, Repeater Equipment, No. 1 installed in a joint-box (see

Figure 9). The Capping, Steel, No. 7 is fixed to the floor of the joint box by means of Bolts, Expansion, 13 mm x 64 mm or if the position for the Capping, Steel, No. 7 can be determined at the time the joint-box is constructed, Bolts, Foundation, Indented, No. 2 can be provided for this purposes.

2.6 Choice of Supporting Device

Figures 11-14, show devices which should be chosen for supporting the various types of cables and joints in jointing chambers.

Special attention should be paid to the choice of supporting device for cables of fragile construction, i.e. coaxial pair (excluding the solid dielectric type) and balanced pair cables if they have less than two layers of paper-core quads, and low capacitance carrier cables. An example of the way in which a fragile cable should be supported in a turning manhole of the RT8 type is illustrated in **Figure 11**.

2.7 Layout of Cables in Jointing Chambers

In order that the provision of good support should not be hindered by lack of space, and so that there is easy access to cable joints for maintenance purposes, every effort must be made to ensure that all cables occupying a particular duct-way are supported on brackets at one level, and that bracket levels are allocated to duct-ways in a systematic manner.

Note: See Section 2.2.2.1 for guidance on Minimum Bend Radius for various cable types.

In order to limit the bending radius, a cable in a particular duct-way often has to be accommodated on brackets aligned with other duct-ways. [Figure 11](#) and [Figure 12](#) illustrate the principles which should be followed when arranging cables in a jointing chamber. In these situations, it is important to ensure that Minimum Bend Radius rules are followed.

Note: The cables should be secured along their lengths where practical to minimise the risk of accidental damage.

The routing of cables from the duct mouth to a suitable bearer, should:-

1. provide a clear and safe working area in front of the joints,
2. provide secure support and protection for the plant, and
3. Accommodate cable bend limits.

Figure 9 - Use of Capping, Steel, No.7

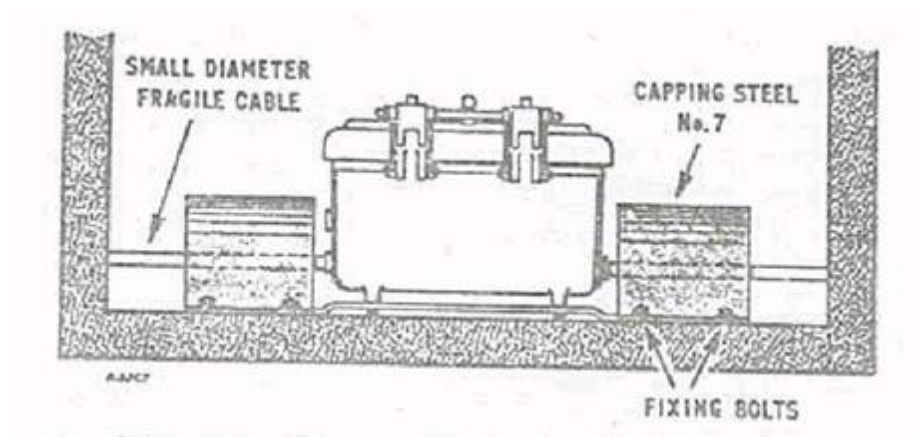
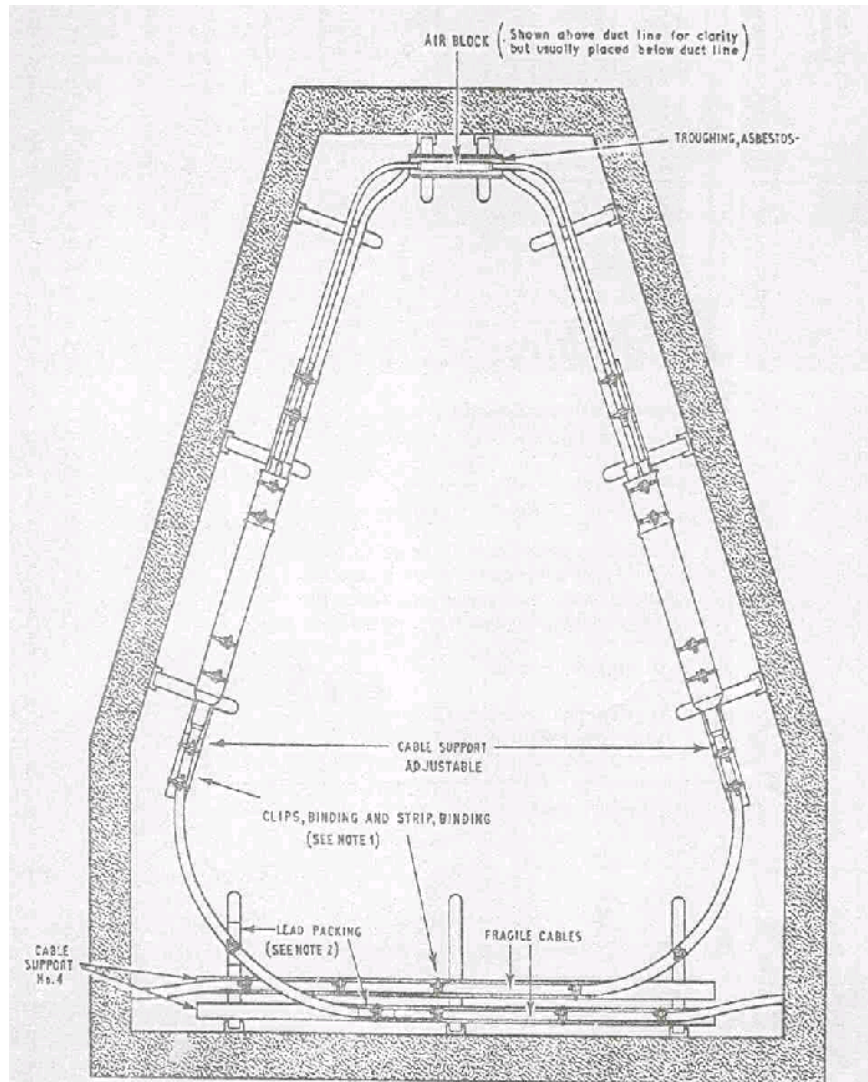


Figure 10 - Support Fragile Cables



Note: 1: Protective tape over bindings not shown.

Note: 2: To avoid the necessity for many layers of packing under the cables supported on the base wall of the jointing chamber, it is sometimes practicable to support the cables at different levels without bending them to a radius less than that permitted

Note: 3: Lead packing is now obsolete. Use a suitable alternative material.

Figure 11 - Cables may be elevated to suitable positions (Cable Supports not shown)

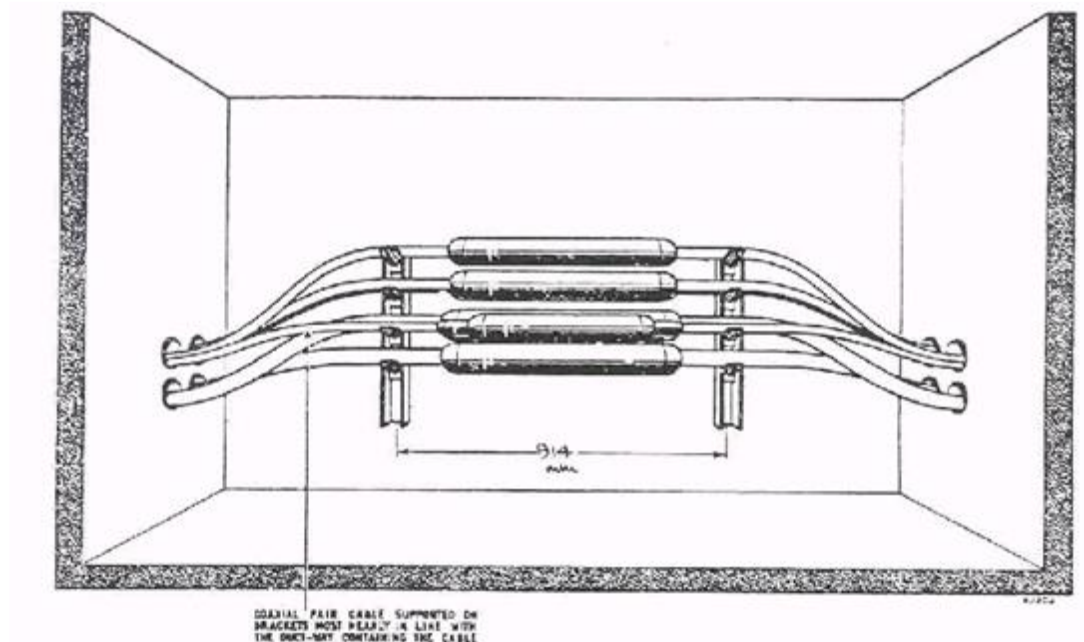
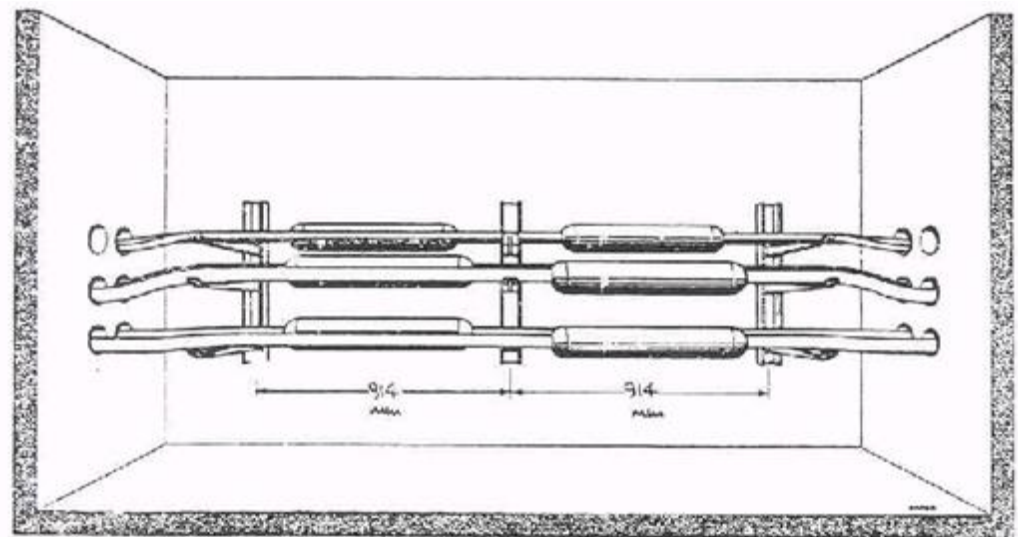


Figure 12 - Cables may be recessed to suitable positions (Cable Supports not shown)



3 ***Use of Cable Supports (Flat Bar)***

The following table is for guidance purposes only.

Chamber	Chamber Length (mm)	No. of Brackets	Bracket Bearer Spacing (mm)	Recommended Supports
JRF102	725	2	375	Use existing brackets, no additional support required. Cable Support Adjustable Centre No.1 is optional

JRF104	915	2	365	Use existing brackets, no additional support required. Cable Support No.1 or Cable Support Adjustable Centre No.1 are optional
JRF106	1310	2	710	Cable Support No.9
JRF111	1690	2	920	Cable Support Adjustable Centre No.2
JRF110	2315	3	915 & 915	Cable Support No.4
JRCX11	1820	3	800 & 400	Cable Support Adjustable Centre No.2 + Cable Support Adjustable End No.1 at one end
JRCX14	2285	4	800 & 400 & 400	Cable Support No.4
JRCX12	1220	2	700	Cable Support No.9

Note: 1. Cable Supports may be cut to size if required.

Note: 2. Alternative combinations of any support (see list below) may be used to suit the size of the chamber and available space.

Note: 3. Includes Modular Boxes

Support	Length (mm)	Item Code	Comments
Cable Support No.1	838	070288	Typically used for in-line joints
Cable Support No.4	2133	070291	Flat Bar
Cable Support No.9	1100	075851	Flat Bar
Cable Support Adj Centre No.1	711	070297	
Cable Support Adj Centre No.2	1118	070298	
Cable Support Adj End No.1	229	070301	
Cable Support Adj End No.2	1118	070302	
Bolt No.34		070296	Required to fix Cable Supports Centres & Ends together

4 ***Supporting Cables & Joints in Small Chambers***

In joint boxes; JB23, JB26, JRC2, JBC2, JUF2 & JBF2, without pre-installed mounting bolts, it is no longer necessary to support joints or cables. Where there is sufficient cable, coil it against the wall and stand the joint in the corner of the box.

4.1 **Joint Support Kit 1a**

ISIS EPT/ANS/A004 also refers

The Joint Support Kit 1A (item code 017807) is intended for use in joint boxes; JRC4, JBC4, JUF4, JBF4, JUF6, JBF6, JRC12 and JBC12, which do not

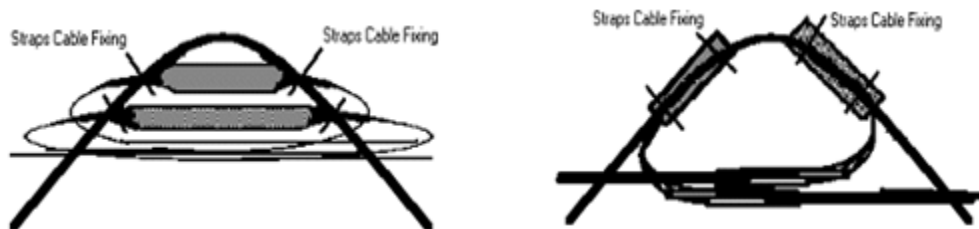
have the necessary mounting bolts for the installation of standard brackets and bearers, or other means of joint support. Do not remove any existing brackets.

The kit comprises two 2.5m lengths of Duct 102. The only other requirements are Straps Cable Fixing 1A (item code 072492 - not supplied).

Step 1 - The Duct 102 sections have been pre-cut (2.5m) to fit a JUF6. If the duct support is to be installed into a smaller JUF4, it will need to be cut down to approximately 1.9m (as joint-box dimensions may vary slightly, it may be necessary to cut the duct to fit).

Step 2 - Take the duct and fit it into the joint-box placing the ends on one side at each corner of the box and resting the arch on the opposite wall (see diagram) - care should be taken when handling the bent duct to ensure that it does not spring loose.

Step 3 - Place the joints across the arch and secure them using Straps Cable Fixing 1A at each end. Multiple joints can be mounted on a single support by placing them around the arch and at different heights.



Where a large number, or heavy joints are to be mounted, two sections of Duct 102 may be strapped together to provide a single, stronger support.

Warning: In ANY joint box, where fixing bolts have been installed, the products & practices described in Section 1 to 3 MUST be followed.
--



Joint Support Kit 1A can be cut to length and positioned to take into account the location of the joints in the box.



If the existing metal bearers are already underwater, consider providing Joint Support Kit 1A to position the joints out of the water



If cables are too short to strap the joint onto the bearer, strap a length of Joint Support Kit 1A between bearers to support the joint.



Off cuts of Joint Support Kit 1A can also help in a JB26 / JB102 to support joints out of any water.

Support joints and cables using Joint Support Kit 1A this will;

- Reduce the risk of kinks and strain on cables entering the joints.
- Reduce the chance of water entering a poorly fitted joint

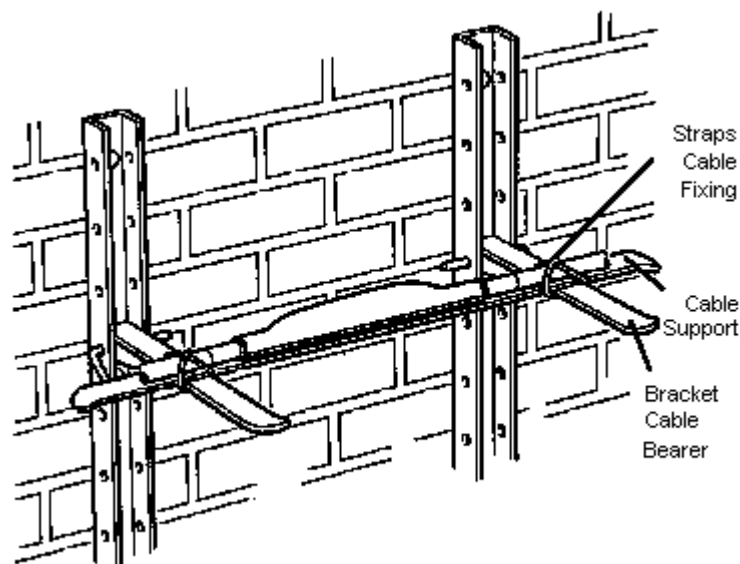
Warning: Under no circumstances may the Joint Support Kit 1A be used for any other purpose than that described in this document.

5 Closure Mounting

5.1 Sleeve Support and Mounting Brackets

All joints should be supported in joint boxes and manholes. Lay in-line joints across Brackets, Cable Bearers using Cable Supports where necessary and secure the cables using Straps Cable Fixing (see [Figure 13](#)).

Figure 13



It is preferable to mount Sleeves 30 series closures in a vertical position with the cable entries at the bottom. The sleeves are supplied with a mounting bracket but these are also available separately (see [Table 4](#)).

Table 4

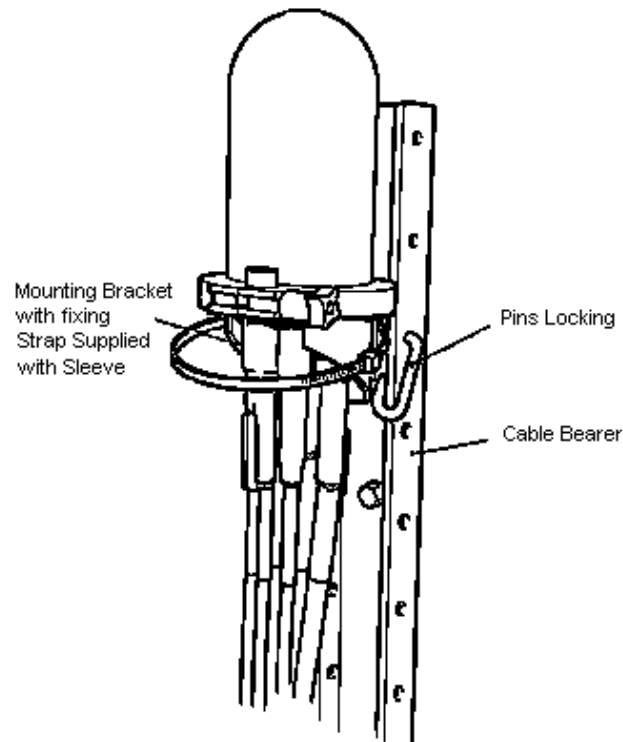
Sleeve Size	Mounting Bracket
Sleeve 30	Bracket CN 14089
Sleeve 31	Bracket CN 14071
Sleeve 32	Bracket CN 14051

Note: Bracket CN 14071 is now obsolete, sleeves 31 should be supported on conventional bearers or with a support kit 1A.

The following mounting arrangements can be used:

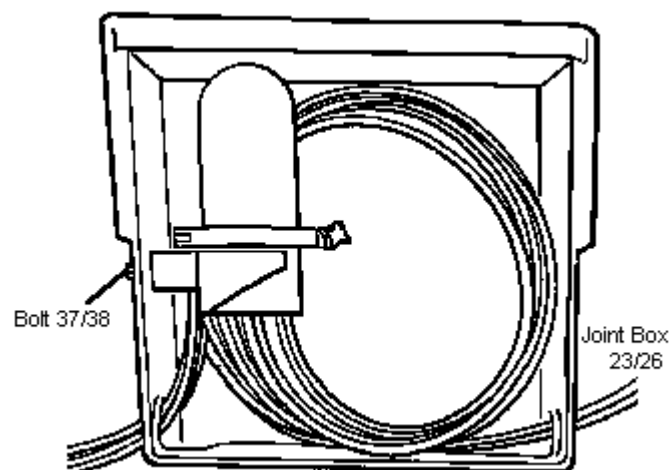
Fit directly to a cable bearer using the mounting bracket and a Pins Locking (see [Figure 14](#)).

Figure 14



- Attach the sleeve to a Bracket Cable Bearer using the mounting bracket and a Clamp CN 10817.
- In a Joint Box 23 or 26 attach the sleeve's mounting bracket using a Bolt 37 or Bolt 38 respectively (see [Figure 15](#)).

Figure 15

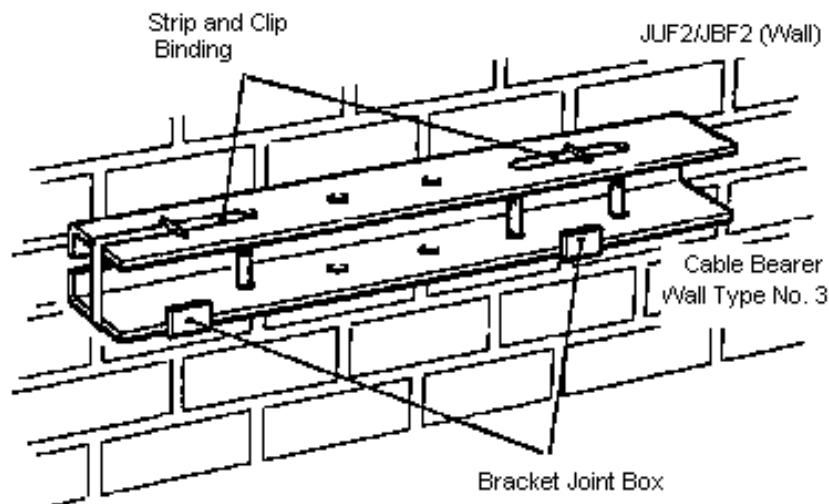


- In JUF2/JBF2s and JUF4/JBF4s where Brackets Joint Box have been fitted, attach a Cable Bearer Wall Type No 3 to the brackets and secure using Strips

Binding and Clips Binding (see [Figure 16](#)). The sleeve may then be fixed to the cable bearer using the mounting bracket and a Pins Locking.

- **Do not stand on cables or joints.**
- Use Plate Protection 42A to protect directly-buried frontage tee joints.
- Only a single joint can be fitted on a cable bearer WT3 and if more joints are introduced into a JBF4/JUF4 then additional supports will need to be provided.

Figure 16 (Applicable to both JUF2/JBF2 and JUF4/JBF4)



5.2 NewSite Brick Boxes – Reducing Metalwork

5.2.1 Copper Pull through:

All JBF2s and 4s should only be fitted with two Bolts Foundation Indent (Item Code 070131) with the nuts and washers provided over the end of the bolt as a safety precaution (see Figure 1). This will enable the provision of a Cable Bearer Wall Type 3 (Item Code 070283) if one is required at a later date.

5.2.2 Copper Joints:

Where joints are introduced into JBF4s and 2s, two Bolts Foundation Indent should be provided with one Cable Bearer Wall Type 3 fitted horizontally (see Figure 2). The joint should be restrained as demonstrated in Figure 3, using Straps Cable Fixing No 14A (Item Code 073063). The NewSites Representative (NSR) will highlight the location of joints on the optimised plan, to enable the developer to fit the Wall Type Bearer. Alternatively, operatives can also fit this Bearer during the jointing and cabling operations.

Only a single joint can be fitted on a cable bearer WT3 and if more joints are introduced into a JBF4/JUF4 then additional supports will need to be provided.

In joint boxes; JB23, JB26, JRC2, JBC2, JUF2 and JBF2, without pre-installed mounting bolts, it is no longer necessary to support joints or cables. Where there is sufficient cable, coil it against the wall and stand the joint in the corner of the box.



Figure 1: (Above) Bolts Foundation Indent with nuts and washers fitted.



Figure 2: (Above) Cable Bearer Wall Type 3 fitted.



Figure 3: (Above) Joint supported on the Cable Bearer with Straps Cable Fixing 14A.

Fibre Cabling

Note: This initiative will not affect future requirements, as the method of supporting fibre cable (including BFT / SDMB and Joint Support) in pull-through boxes in ISIS EPT/ANS/A004 can be adopted.

In addition to bracket and bearers, methods of support include galvanized steel flat bars (Cable Support Bar) and a Joint Support Kit 1A. The MOBRA bracket will be fitted into boxes where joint support is required.

6 ***Fibre Joints and Cabling***

For methods of supporting fibre cable (including BFT / SDMB and Joint Support), see ISIS EPT/ANS/A004.

7 ***Cable Theft Deterrent***

Where a copper cable has been targeted by thieves there is a strong possibility that the replacement cable will also be targeted. To deter a repeat theft a cable anchor (Fig1) may be utilised using the following method:



Fig1. Cable Anchor 070001

Wind Tape Cabling Adhesive (072129) overlapping as a protective and friction bearing layer around the cable for a distance, from the duct mouth, of approximately 350mm (Fig2)



Fig 2.

Cover the Tape Cabling Adhesive, again overlapping, with Tape Temporary Closure (075853) build shoulders at each end and at the centre of the length with one or two extra turns of tape. These will take the bindings (Fig3)



Fig 3.

Position the cable anchor in the duct mouth and bind to the cable using strips and clips binding (071237 & 073258) (Fig4)



Fig 4.

Repeat this procedure at the other end of the carriageway/footway box as the direction of pull cannot be anticipated.

Note: It is usually the case that large single cables are targeted by thieves and this deterrent is designed for that occurrence. However, where there is more than one cable in the targeted duct, and it is expedient to do so, the sharing cables can be individually wrapped in Tape Cabling Adhesive, then bound with Tape Temporary Closure as a single cable and affixed to the cable anchor as above. This method has proved equally effective.

A risk assessment on this method can be found in ISIS SFY/GRA/A024

8 *Newsites Carriageway Chamber JBC3N*

A new box has been introduced for use in the underground network, Newsites Carriageway Chamber JBC3N, (follow this [link](#) or the Newsites [Builders Guide](#) for details). These are intended to contain cable and joints and should not be regarded as a working chamber. Where work has to be undertaken on the joint, it should be removed from the box and work undertaken from ground level outside the box. The area around the open box must be adequately guarded to ensure that the area is safe for pedestrians and you must not work in proximity, or in such a way, that you are at risk of falling into the box. You may enter the box feet first where necessary, but you must not lean into the structure or place yourself in a position where you could overbalance head

first into the box. If water is present in the box this must be removed prior to "feet first" entry.

The length of cable should allow sufficient slack for you to take the joint to a safe and convenient place to undertake work, please ensure that if you are employed on cabling work that you always leave sufficient cable tail length to allow this, typically 2 to 3 metres from the box. If you find that you cannot remove the joint due to insufficient cable length this should be reported via the A1024 process or requesting your line manager to undertake a Local Risk Assessment (to be stored on the engineer's laptop for no less than 30 days) to consider any possible work alternatives."

END OF DOCUMENT
